

**ARKANSAS STATE HIGHWAY
EMPLOYEES RETIREMENT
SYSTEM (ASHERS)**

EXPERIENCE STUDY THROUGH JUNE 30, 2020
With Preliminary June 30, 2021 Valuation Results

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August 24, 2021

Board of Trustees
Arkansas State Highway Employees
Retirement System (ASHERS)
P. O. Box 2261
Little Rock, AR 72203

RE: Experience Study through 6/30/2020 with Preliminary Valuation Results 6/30/2021

Ladies and Gentlemen:

This report presents the results of our experience study comparing actuarial assumptions with actual experience of the Arkansas State Highway Employees Retirement System (ASHERS) from 2016 through 2020. We are providing the expected value of changes using the preliminary valuation results for June 30, 2021. The primary purposes of this report is to evaluate current assumptions and suggest updates to various actuarial assumptions of ASHERS.

Organization of Report

Following this cover letter and a table of contents, there is an Executive Summary of the results of the report and a discussion of the highlights. The Exhibits then provide details about each of the discussed assumptions. The Appendices then disclose a complete listing of the current assumptions, a glossary of actuarial terms, and the actuarial results detailed..

Statement of Qualifications

This report has been prepared by actuaries who have experience valuing public employee retirement systems, with the undersigned taking the primary responsibility. To the best of our knowledge, this report is complete and accurate and was completed in accordance with standards of practice promulgated by the Actuarial Standards Board and in conformance with applicable Arkansas law. The actuaries are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report.

Sincerely,



Jody Carreiro, FCA, ASA, EA, MAAA
Actuary

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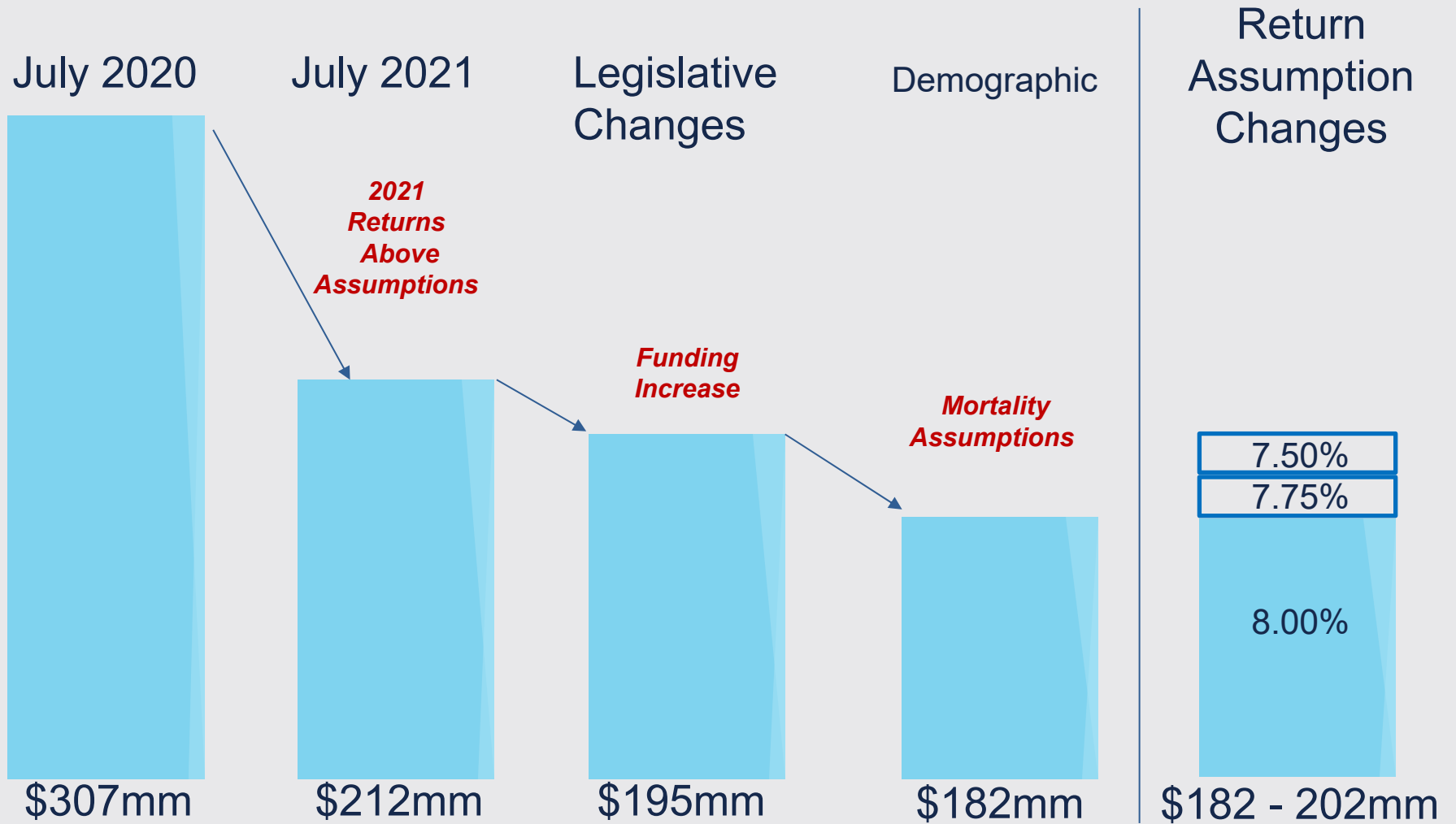
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Arkansas State Highway Employees' Retirement System
Review of Preliminary Results and Recommended Assumption Changes
Estimates based on Preliminary 6/30/2021 Valuation

<u>Item</u>	<u>Brief Description</u>	Unfunded (\$Millions) <u>UAAL</u>	Funded <u>Percentage</u>	Expected (\$Million) <u>Contribution</u>	Contribution Needed for <u>30-year Payoff</u>	Years to Payoff <u>UAAL</u>
	Previous year Actual Amounts as of 7/1/2020	307.5	82.35%	35.6	38.3	39.5
	Preliminary 7/1/2021 Valuation Results - No Changes	211.9	87.79%	36.9	33.3	18.6
<i>Effect of Recommended Legislative Changes</i>						
	Combined Effect of 2021 Legislative Changes	-17.2	0.88%	2.8	-1.7	-6.0
	Preliminary 7/1/2021 Valuation Results - Including Plan Changes	194.7	88.67%	39.7	31.6	12.6
<i>Effect of Recommended Demographic Assumption Changes</i>						
1	Change to Salary Increase Table	-5.1		-0.2	-1.4	-1.1
2	Change to Employee Turnover Rates Table	0.3		0.0	-0.2	-0.1
3	Change to updated Mortality Tables	-8.4		0.0	-1.0	-0.9
	<i>Total Combined Effect of Demographic Changes</i>	-13.2	0.69%	-0.2	-1.9	-2.0
	Preliminary 7/1/2021 Valuation Results (Including Legislative Changes and Demographic Assumption Changes)	181.5	89.36%	39.5	29.7	10.6
<i>Effect of Recommended Economic Assumption Changes</i>						
A	Change to 7.5% Discount Rate (continue 2.25% inflation rate)	20.4	-0.66%	0.0	2.5	2.8
	Preliminary 7/1/2021 Valuation Results - All changes with 7.5%	201.9	88.70%	39.5	32.2	13.4
B	Change to 7.75% Discount Rate (continue 2.25% inflation rate)	10.0	-0.33%	0.0	1.2	1.3
	Preliminary 7/1/2021 Valuation Results - All changes with 7.75%	191.5	89.03%	39.5	30.9	11.9

Changes in Unfunded Liability by Source



EXECUTIVE SUMMARY

The previous two pages show a summary of the changes that we are recommending along with the effect that each of those would have on the June 30, 2021 preliminary actuarial valuation results. The second page is a graphic showing the same results and how it effects the relative size of the Unfunded Actuarial Accrued Liability. A summary of the recommended changes is as follows:

1. An update to the **Salary Increase Table** to adjust for experience and make more consistent with the other economic assumptions, in particular, 2.25% inflation and a productivity adjustment of 0.75%, so that the total salary increase base of 3.0%, down from 3.5%. There are other adjustments in the early years to smooth in experience.
2. An update to the Employee **Turnover Rates Table**. This change takes the previous table which was based on experience and averaged in the last several years of experience. In general, there was a bit higher turnover rate, especially in the first three years of employment.
3. An update to the **Mortality Tables** used both for active and retired members. The table recommended is one that is based on experience in public plan employees across the country. This has separate tables for teachers, public safety and general employees; we will apply the table for general employees. This includes the improved way in which actuaries adjust for future mortality improvement.
4. Other assumptions were reviewed and NO changes are currently recommended for several important assumptions including retirement rates, disability rates, the rate of inflation and the overall salary increase rate.
5. Finally, we are recommending a reduction in the **Investment Discount Rate** from 8.0% to 7.5%. The Investment Discount Rate is roughly equivalent to the expected long term investment income reduced for investment expenses.

Introduction

The purpose of an actuarial valuation is to provide an annual best estimate of the ultimate costs of a retirement system and to calculate a contribution rate that will be suitable to a rational fulfillment of the ultimate obligations of the system. We perform annual valuations to see if the current assets along with the expected future contributions will meet the future obligations. The valuation requires the use of various assumptions with respect to the occurrence of future events, such as rates of death, termination of employment, retirement age, and salary changes to make these estimates of future obligations.

The basic purpose of an experience study is to determine whether the actuarial assumptions currently in use are adequately projecting the actual emerging experience. The experience information along with the professional judgment of the System personnel and advisors is used to evaluate the current assumptions and suggest updates to actuarial assumptions. **The setting of actuarial assumptions does not change the ultimate obligations of the plan. An updated assumption will not increase or decrease the amount of the liability.**

The importance of appropriate assumptions is that we have the best tools to measure and evaluate those obligations so that we can ensure a reasonable and rational contribution plan to fulfill the obligations of the System.

EXHIBIT 1

Salary Increase Assumption

Summary

We compared the salaries of individuals who worked a full year in two consecutive years. From that information we then calculated the salary increase rate for that individual. We did this for all of the experience years. We then compiled averages of the individual rates as well as averages weighted on the beginning salary. All of these averages were compiled by the number of completed years of service (based on date of hire) of the members. We then had significant experience to compare with the current assumption.

The results are shown on the following page. In general, the rates of increase in the first couple of years of employment were greater than currently used. The rates of increase at all other service levels was less than currently used. Since previous tables are also based on experience, it was determined that it was best to roughly average the current assumption rate and the weighted average assumption rates to derive a new table. This table is also now more consistent with other economic assumptions, especially the inflation assumption.

Recommendation

We recommend changing the current salary increase table to the newly derived salary increase table. The rates are shown on the following page and a graph showing the previous table, experience and the new table follow that. The effect of this change will be a decrease in the calculation actuarial accrued liability.

Arkansas Highway Employees Retirement System
Comparison of Experience and Proposed Assumption Table
Salary Increase Assumption

	Per Person Average	Salary Wtd Average	Current Assumption	Proposed Assumption	Promotional Component
0	15.94%	13.48%	10.50%	12.00%	9.00%
1	13.33%	11.69%	10.50%	10.00%	7.00%
2	5.86%	5.63%	10.50%	7.50%	4.50%
3	4.88%	4.58%	5.50%	5.00%	2.00%
4	4.84%	4.20%	4.75%	4.50%	1.50%
5	5.40%	4.56%	4.25%	4.50%	1.50%
6	6.64%	5.32%	4.25%	4.50%	1.50%
7	5.06%	4.73%	4.25%	4.00%	1.00%
8	3.00%	3.03%	4.25%	4.00%	1.00%
9	4.63%	3.78%	4.25%	4.00%	1.00%
10	3.61%	3.41%	4.25%	4.00%	1.00%
11	3.32%	3.37%	4.25%	3.75%	0.75%
12	3.90%	3.74%	4.25%	3.75%	0.75%
13	2.84%	2.53%	4.25%	3.75%	0.75%
14	2.91%	2.95%	4.00%	3.50%	0.50%
15	4.10%	2.47%	4.00%	3.50%	0.50%
16	2.94%	2.83%	4.00%	3.50%	0.50%
17	2.13%	1.85%	4.00%	3.25%	0.25%
18	3.42%	3.22%	3.75%	3.25%	0.25%
19	3.27%	3.22%	3.75%	3.25%	0.25%
20	2.88%	2.69%	3.50%	3.00%	0.00%

Comparison of Salary Increase Rates and Experience

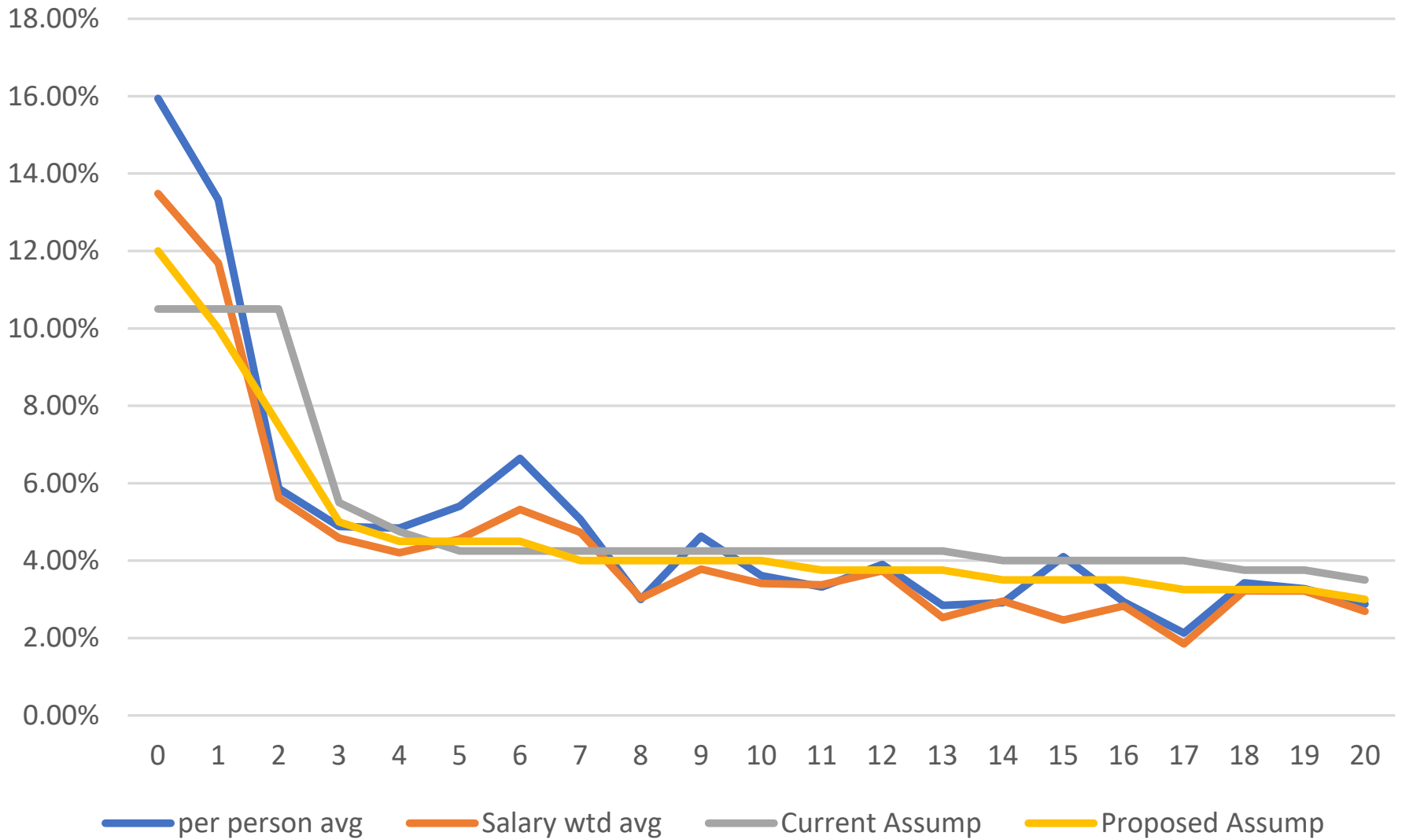


EXHIBIT 2

Employee Turnover Assumption

Summary

This assumption is the probability of an employee leaving the service of the employer for reasons other than death, disability, or retirement. We calculated rates for the first five years and then thereafter of employment. We compared these rates with the current assumptions. We found a higher turnover rate on years 0, 1 and 2 of employment. There was an increase, but much smaller in later years. We averaged these measurements with the previous assumption, giving the previous assumption about a 60% weight and the current experience a 40% weight.

Recommendation

We recommend changing the current turnover table to the newly derived turnover table. The amount by which the new table effects the calculation of the actuarial accrued liability is contained in the summary of this report.

Arkansas State Highway Employees Retirement System Turnover Assumption Experience and Proposed Table - Male

Participants with Possibility of Turnover

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
<25	372	239	138	86	56	52
25-35	310	286	248	224	174	896
35-45	202	210	180	176	141	1730
45-55	179	183	163	146	131	2326
>55	76	87	57	52	56	

Actual Turnovers

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
<25	181	72	38	15	13	10
25-35	94	65	38	38	21	63
35-45	52	45	17	19	18	88
45-55	31	17	18	21	9	198
>55	11	16	5	4	3	

Turnover Rates

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
<25	48.66%	30.13%	27.54%	17.44%	23.21%	19.23%
25-35	30.32%	22.73%	15.32%	16.96%	12.07%	7.03%
35-45	25.74%	21.43%	9.44%	10.80%	12.77%	5.09%
45-55	17.32%	9.29%	11.04%	14.38%	6.87%	8.51%
>55	14.47%	18.39%	8.77%	7.69%	5.36%	

Current Assumption Table

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
20	37.12%	25.36%	16.97%	11.80%	11.50%	10.43%
30	29.25%	2.00%	13.13%	8.62%	7.56%	5.78%
40	21.93%	15.38%	10.24%	6.46%	4.77%	26.10%
50	16.28%	12.42%	8.94%	5.82%	3.68%	1.59%
60	13.42%	12.38%	10.33%	7.48%	4.62%	3.02%

Recommended Assumption Table

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
20	43.06%	27.64%	18.50%	13.57%	13.23%	10.95%
30	29.84%	22.68%	14.31%	9.91%	8.69%	6.07%
40	23.68%	18.15%	9.83%	7.43%	5.49%	2.74%
50	16.77%	12.79%	9.83%	5.99%	3.79%	1.64%
60	1.38%	12.75%	9.71%	7.70%	4.76%	3.11%

Arkansas State Highway Employees Retirement System Turnover Assumption Experience and Proposed Table - Female

Participants with Possibility of Turnover

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
<25	54	29	13	9	7	14
25-35	53	61	54	45	40	218
35-45	45	43	37	38	31	487
45-55	37	44	32	32	33	652
>55	9	11	13	10	9	

Actual Turnovers

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
<25	32	16	3	2	0	1
25-35	9	11	10	6	3	15
35-45	13	6	5	7	5	24
45-55	9	6	4	4	2	56
>55	2	1	1	0	2	

Turnover Rates

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
<25	59.26%	55.17%	23.08%	22.22%	0.00%	7.14%
25-35	16.98%	18.03%	18.52%	13.33%	7.50%	6.88%
35-45	28.89%	13.95%	13.51%	18.42%	16.13%	4.93%
45-55	24.32%	13.64%	12.50%	12.50%	6.06%	8.59%
>55	22.22%	9.09%	7.69%	0.00%	22.22%	

Current Assumption Table

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
20	40.28%	30.08%	21.68%	15.09%	10.47%	7.61%
30	28.19%	21.18%	15.42%	10.93%	7.65%	5.71%
40	19.80%	14.83%	10.73%	7.52%	5.14%	3.66%
50	17.15%	12.50%	8.63%	5.50%	3.36%	1.71%
60	19.85%	13.91%	8.96%	4.81%	2.30%	0.07%

Recommended Assumption Table

Age Range	Completed Years of Service					
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>>=5</u>
20	46.72%	32.79%	23.63%	15.39%	10.99%	7.76%
30	28.75%	24.04%	16.81%	11.15%	8.03%	5.82%
40	21.38%	17.50%	10.30%	7.67%	5.40%	3.73%
50	17.66%	12.88%	9.49%	5.61%	3.53%	1.74%
60	20.45%	14.33%	8.42%	4.91%	2.42%	0.07%

EXHIBIT 3

Mortality Assumption

Summary

We compared the recent mortality experience of ASHERS with various national tables. The discussion following shows details of the comparison with the recommended table. The previous table was what was available at that time, that is, a table that was based on retired pensioners from all industries and employers. The newer mortality table are further segmented so that the ones we tested were all based on Public employers. The table we are recommending is based on Public employees, but excludes those who are teachers and public safety workers. Therefore, it is called a general employee table. The table is further segmented to reflect salaries above and below the median. Since Arkansas is typically below the national median for governmental employees, we have used that table. We feel we have a table that is most closely representative of the workforce of Arkansas Department of Transportation.

Finally, we adjust this table by increasing the base rates by 105%. This is to reflect the actual experience of our retirees. It is not in statistical terms “fully credible” because of the number but we have reflected part of the difference between our experience and the national table.

Recommendation

We recommend using the Public employees, General, Below national median pay table increasing the base by 105%. This is often denoted as 105% Pub-G(B). We also recommend using the most recent mortality projection scale, Mortality Projection – 2020, or MP-2020. These projection scales are updated each year, but our recommendation is to pick the one improvement scale and remain with it until the next experience study.

Mortality Discussion

After the discount rate, the assumption that has the most significant effect on the value of liabilities is the choice of mortality. Actuaries have taken significant steps in recent years to not only define base mortality tables that describe the general nature of the group, but also have an ongoing project to define a way to reflect mortality improvement. Older improvement scales, like the Scale AA, that we currently use, employ a flat rate. For example, the mortality of a 65 year old improves by .005 every year, in other words the probability of death is .995 times the probability last year. The newer tables usually denoted by MP-2020 where each year it is updated, take into account what is happening in the US (through social security death records) and then smooths them over 15 years into longer term average improvements.

Before we start choosing what might be most appropriate, we need to look at the experience and how it compares with the expectations of our current mortality assumptions. The below table shows the actual deaths for regular retirees by age brackets and the expected deaths from the mortality table.

Age Range	Lives Exposed	Actual Deaths	Expected Deaths	Actual / Expected
Less than 58	1,011	3	3.4	100%
58 – 62	2,112	16	15.4	104%
63 – 67	3,305	43	42.6	101%
68 – 72	2,594	71	54.8	130%
73 – 77	1,816	79	67.4	117%
78 – 82	,1282	104	85.9	121%
83 – 88	638	72	74.1	97%
Over 88	419	82	86.5	95%
Total	13,177	470	430.2	109%

There are a few interesting points in reviewing this information.

1. The overall actual to expected ratio is 109% so there is a pretty significant understating of the mortality of our group that calls for some adjustment.
2. The area where there are significantly more deaths than predicted by the current table is in the 65-80 age range. That is, under 65 and over 80 are closer to the table.

Note that this group includes just the regular retirees, so there is no need to look at this to adjust for disability or for survivors having slightly different mortality.

We reviewed several of the more current tables to see if they are more appropriate. They are part of the Public plans tables. The study that created these tables is from governmental pension plans all over the country covering different types of employees. There are Teacher, Public Safety, and General employee groups of tables. There are also corresponding disability and survivor tables.

Age Range	Actual Deaths	Expected 105% RP2000 with Scale AA	Expected Pub-G(B) with MP-2020	Expected 105% Pub-G(B) with MP-2020
Less than 58	3	3.4	9.1	9.7
58 – 62	16	15.4	22.4	23.7
63 – 67	43	42.6	44.3	46.7
68 – 72	71	54.8	55.7	58.5
73 – 77	79	67.4	66.9	70.2
78 – 82	104	85.9	81.8	85.9
83 – 88	72	74.1	68.3	71.7
Over 88	82	86.5	77.6	81.4
Total	470	430.2	426.0	447.8

From these number we then derived the actual to expected ratios.

Age Range	Actual Deaths	Expected 105% RP2000 with Scale AA	Expected Pub-G(B) with MP-2020	Expected 105% Pub-G(B) with MP-2020
Less than 58	3	100%	40%	37%
58 – 62	16	104%	71%	68%
63 – 67	43	101%	97%	92%
68 – 72	71	130%	128%	121%
73 – 77	79	117%	118%	112%
78 – 82	104	121%	127%	121%
83 – 88	72	97%	105%	100%
Over 88	82	95%	106%	101%
Total	470	109%	110%	104%

The adjusted 105% Pub-G(B) matches the total mortality quite well, the “shape” isn’t perfect but in mortality terms we don’t have a lot of data.. For example, the under 65 and over 80 is a bit over while the 65 to 80 group is a bit under.

We made sample runs using table Pub-G and the scale MP-2019. The updates for MP-2020 are in but are not yet installed on our equipment, but according to the report it should be about a 0.5% reduction in retiree liabilities when we run the full valuation. The estimates for the 105% Pub-G(B) with MP-2019 are shown in the summary. We can still install the MP-2020 improvement factors for a bit more savings in the final valuation. We don’t want to change mortality very often, so having the most up to date improvement scale is probably a good thing.

EXHIBIT 4

Retirement Assumption

Summary

The current retirement assumptions which are shown in the Appendices are the rates at which people leave employment. As we know, and show in the attached tables, about 2/3 of those who retire go through the Deferred Retirement Option Plan (DROP). This makes it difficult to completely untangle the pieces of this experience. From what we did accomplish, there does not appear to be a significant change in the rates of retirement. But, there is not a great way to measure those who go through the DROP. Therefore, we want to continue to study and we have begun to collect the information needed to make sure that this is still the most appropriate way to make this measurement and if these rates are still appropriate.

The assumptions also include the assumption that members who become eligible for DROP before age 60, using the 30 years of service, all enter the DROP by the 31st year. Evidence shows this to remain a good assumption.

Recommendation

We do NOT recommend any change to the retirement rate assumptions at this time.

EXHIBIT 5

Investment Discount Assumption

Summary

This assumption produces the most significant changes in the actuarial accrued liability calculation. It is also the one that is most difficult to predict and has the highest amount of variability. The following pages discuss the items that we have taken into account in presenting our recommendation.

In general, we need to make a good recommendation in an area that we have the least training, so we must depend on other sources. I give the most weight in my decision to the results and the recommendations from ASHERS investment advisory team. The System and CastleArk has a long working relationship and a method that I am comfortable in reviewing. My next significantly weighted outside source is what other public plans are doing. The most recent NASRA review follows this discussion for your review. The building block method of determining an investment return includes an inflation component and that long term projection is about 0.75% less than it was several years ago. I reviewed other items but did not give them as much weight in the decision.

We have from CastleArk a projection of 7.5% to 8.5% long-term rate of return on a gross basis. This is roughly a 7% to 8% range on a net basis. The NASRA information suggests 7% (or less) to 7.5% as a good range. The change in inflation projections suggest a 0.5% to 1.0% reduction in our long-term rate, that is, 7.0 to 7.5%.

Recommendation

Therefore, based on this information, it is my recommendation that we reduce the discount rate from 8.0% to 7.5%. I do not do this lightly and I do not do it with the intent that this is some “first step”. I feel very good about the long-term plan of the System and their investment team. I believe that investment assumptions should be reviewed every year, but should only be changed when long-term systems suggest the change and then not quickly or often.

I also want to note that we have a once in a not very often opportunity to make this adjustment without making a significant change to the long-term reporting that we have made to our various audiences. I am also recommending using a one-time adjustment to our definition of actuarial value of assets (or smoothed value) to ameliorate the presentation effect of this change.

In one sense, this change will make the future bad years less painful and when we have years like the one we just completed, they will be even more enjoyable to the System.

Resources Reviewed by Actuary in determining suggested Discount Rate

Actuaries are not typically investment managers or trained in general long term economic forecasting directly. But we are required (in particular by ASOP 27) to make appropriate, professional selections of certain economic assumptions, in particular, discount rate. As we all know, the discount rate is the single biggest mover of liability calculations of all other assumptions. It does deserve careful consideration.

The general selection process (see ASOP 27, 3.3) includes:

- a. Identify the components of the assumption.
- b. Evaluate relevant data (see below)
- c. Take into account factors specific to the measurement
- d. Take into account other considerations (like materiality, cost of refinement, etc)
- e. Then, select a reasonable assumption (or range of assumptions)

The resources reviewed by our team and listed in other public studies of assumptions include:

1. Historical observations of price and wage inflation statistics (usually from one of the Fed banks.
2. Social Security Trustees Report (one of the best outlooks for GDP component)
3. Future return expectations of the plan's investment consultant
4. Horizon Actuarial Services Survey of Capital Market Assumptions (sample in packet)
5. US Department of Treasury bond rates.
6. Assumptions used by other large public retirement systems, usually based on the Public Fund Survey published by NASRA.

Some general observations from this information:

First, we are assuming a net of investment expenses return. Since our investment expenses in total average about 0.60% to 0.65%. This implies we are assuming 8.65% gross and 8.00% net of investment expenses. Most papers and discussions about expected returns are for the market and are gross of investment expenses.

Looking at ASHERS 10, 20 and 30 year returns, it suggests that the 8% assumption is pretty close. So what is changing going forward. A look at the Fed projections and the projections of inflation from the first two sources shows a slight reduction of long-term GDP projected, but not significant. The more significant piece is the inflation. If we look at our total return as a combination of risk premiums and inflation, then the change in inflation makes a difference. Before the past few years, the long-term inflation assumption used by almost everyone was 3%. The long-term inflation projections are now 2% to 2.25%. Our plan is currently using 2.25%. But if our return is on a building block approach it suggests that unless we have more risk premium, our returns going forward may be between 0.50% and 1.00% lower than in the past.

We have spent a lot of time talking with the CastleArk group. They make a very good case that their expected long-term return is in the 7.5% to 8.5% range. This would imply a net investment return assumption in the roughly 7% to 8% range.

I have not included but can make available the Horizon Survey of Capital Market Assumptions (2020 edition). This report addresses exactly what we are discussing. But, there are some clear biases in the report. Primarily, they have projections of the US equity market that is lower than any 30 year period and they have projections of the private equity markets that are higher than these investments as a group have produced. There seems to be an underlying unspoken assumption (in my opinion) that the innovation in the market will happen in the private equity sector instead of in the general market. But, as we have seen even in the past year, there are new innovations and new innovative ways (SPACs) for companies to participate in the general equity market. With that in mind, there is a consensus among contributors that there is some reduction in the market going forward. It also demonstrates that with the low returns in the bond market, that the outlook for the next 10 years is not as strong as the next 20 years.

I did include the NASRA Issue Brief on investment return assumptions. This is a look at our peers and what they are doing. We don't want to over weight what our peers are doing, but we don't need to ignore it either. We are one of only 3 in the survey still at 8%. About 80% of the group have reduced return assumptions in the past five years. Almost all have made an adjustment down in the past 10 years.

NASRA Issue Brief: Public Pension Plan Investment Return Assumptions



Updated February 2021

As of December 31, 2020, state and local government retirement systems held assets of approximately \$5.1 trillion.¹ These assets are held in trust and invested to pre-fund the cost of pension benefits. The investment return on these assets matters, as investment earnings account for a majority of public pension financing. A shortfall in long-term expected investment earnings must be made up by higher contributions or reduced benefits.

Funding a pension benefit requires the use of projections, known as actuarial assumptions, about future events. Actuarial assumptions fall into one of two broad categories: demographic and economic. Demographic assumptions are those pertaining to a pension plan's membership, such as changes in the number of working and retired plan participants; when participants will retire, and how long they'll live after they retire. Economic assumptions pertain to such factors as the rate of wage growth and the future expected investment return on the fund's assets.

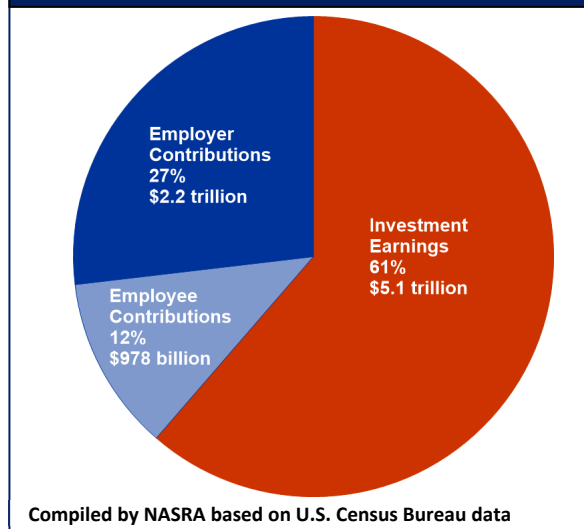
As with other actuarial assumptions, projecting public pension fund investment returns requires a focus on the long-term. This brief discusses how investment return assumptions are established and evaluated, compares these assumptions with public funds' actual investment experience, and the challenging investment environment public retirement systems currently face.

Because investment earnings account for a majority of revenue for a typical public pension fund, the accuracy of the return assumption has a major effect on a plan's finances and actuarial funding level. An investment return assumption that is set too low will overstate liabilities and costs, causing current taxpayers to be overcharged and future taxpayers to be undercharged. A rate set too high will understate liabilities, undercharging current taxpayers, at the expense of future taxpayers. An assumption that is significantly wrong in either direction will cause a misallocation of resources and unfairly distribute costs among generations of taxpayers.

As shown in Figure 1, for the 30-year period ended in 2019, public pension funds accrued approximately \$8.3 trillion in revenue, of which \$5.1 trillion, or 61 percent, is from investment earnings. Employer contributions account for \$2.2 trillion, or 27 percent of the total, and employee contributions total \$978 billion, or 12 percent.² The large portion of revenues from investment earnings reflect the important role they play in funding public pension benefits.

Public retirement systems typically review their actuarial assumptions regularly, pursuant to state or local statute or system policy. The entity (or entities) responsible for setting the return assumption, as identified in Appendix B, typically works with one or more professional actuaries, who follow guidelines set forth by the Actuarial Standards Board in Actuarial Standards of Practice No. 27: Selection of Economic Assumptions for Measuring Pension Obligations (ASOP 27). ASOP 27 prescribes the factors actuaries should consider in setting economic actuarial assumptions, and recommends that actuaries consider the context of the measurement they are making, as defined by such factors as the purpose of

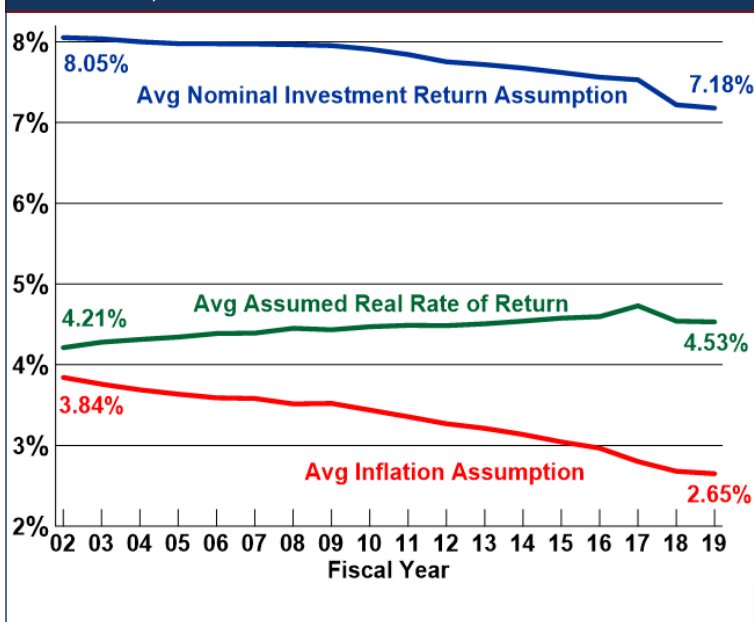
Figure 1: Public Pension Sources of Revenue, 1990-2019



¹ Federal Reserve, *Flow of Funds Accounts of the United States: Flows and Outstandings, Fourth Quarter 2020*, Table L.120

² US Census Bureau, Annual Survey of Public Pensions, State & Local Data

Figure 2: Average nominal and real rate of return, and average assumed inflation rate, FY 02 – FY 19



the measurement, the length of time the measurement period is intended to cover, and the projected pattern of the plan’s cash flows.

ASOP 27 also advises that actuarial assumptions be reasonable, defined in subsection 3.6 as being consistent with five specified characteristics; and requires that actuaries consider relevant data, such as current and projected interest rates and rates of inflation; historic and projected returns for individual asset classes; and historic returns of the fund itself. For long investment horizon, i.e., 20 to 30 years, which is the length of a typical public pension plan’s funding period. One key purpose for relying on a long timeframe is to promote the key policy objectives of cost stability and predictability, and intergenerational equity among taxpayers.

The investment return assumption used by public pension plans typically contains two components: inflation and the real rate of return. The sum of these components is the nominal rate of return, which is the rate that is most often used and cited. The system’s inflation assumption typically is also applied to other actuarial assumptions, such as the level of wage growth and, where relevant, assumed rates of cost-of-living adjustments (COLAs). Achieving an investment return approximately commensurate with the inflation rate normally is attainable by investing in securities, such as US Treasuries.

The second component of the investment return assumption is the real rate of return, which is the return on investment after adjusting for inflation. The real rate of return is intended to reflect the return produced as a result of the risk taken by investing the assets. Achieving a return higher than the risk-free rate requires taking some investment risk; for public pension funds, this risk takes the form of investments in assets such as public and private equities and real estate, which contain more risk than Treasury bonds.

Figure 2 illustrates the changes in the average nominal (non-inflation-adjusted) return, the inflation assumption, and the resulting real rate of return assumption. As the chart shows, although the average nominal public pension fund investment return has been declining, because the average rate of assumed inflation has been dropping more quickly, the average real rate of return has risen, from 4.21 percent in FY 02 to 4.53 percent in FY 19. One factor that may be contributing to the higher real rate of return is public pension funds’ higher allocations to alternative assets, particularly private equities, which usually have a higher expected return than other asset classes.

Figure 3 plots median public pension fund annualized investment returns for a range of periods ended December 31, 2020. As the figure shows, strong returns in 2019 helped raise annualized returns for the three- and five-year periods.

Figure 3: Median public pension annualized investment returns for period ended 12/31/2020

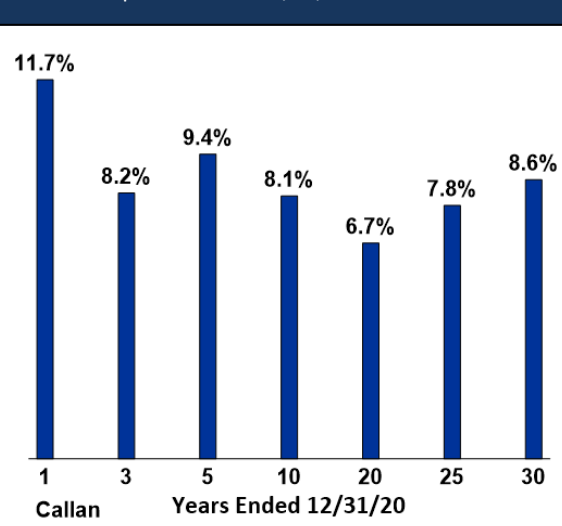
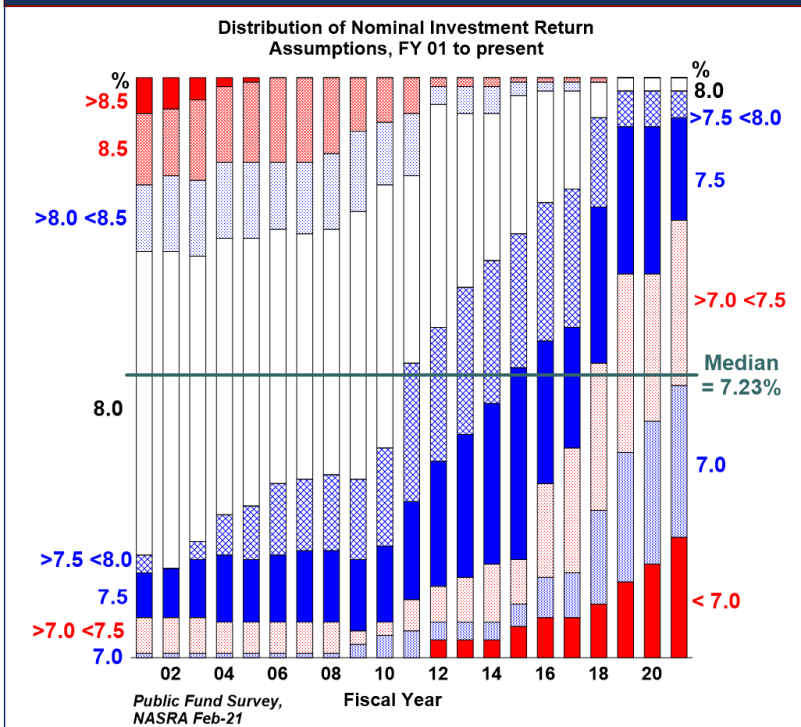


Figure 4: Change in Distribution of Public Pension Investment Return Assumptions. FY 01 to FY 21



In the wake of the 2008-09 capital market decline and Great Recession, global interest rates and inflation declined and have remained low by historic standards. These low interest rates have led to reductions in projected returns for most asset classes, which, in turn, has resulted in an unprecedented number of reductions in the pension plans. This trend is illustrated by Figure 4, which plots the distribution of investment return assumptions among a representative group of plans since 2001. Among the 130 plans measured, 101, or 78 percent, have reduced their assumed rate of return since fiscal year 2017, and all but five plans (96 percent) have done so since fiscal year 2010. These reductions have resulted in a decline in the average return assumption from 7.53 percent in FY 17 to 7.18 percent in FY 21. Appendix A lists the assumptions in use or adopted for future use by the 130 plans in this dataset, as of February 2021.

One challenging facet of setting the investment

return assumption that has emerged more recently is a divergence between expected returns over the near term, i.e., the next five to 10 years, and over the longer term, i.e., 20 to 30 years³. Many investment return projections conclude that near-term returns will be lower than both historic norms as well as projected returns over longer timeframes. Because many near-term projections calculated recently are well below the long-term assumption most plans are using, some plans face the difficult choice of either maintaining a return assumption that is higher than near-term expectations, or lowering their return assumption to reflect near-term expectations.

If actual investment returns in the near-term prove to be lower than historic norms, plans that maintain their long-term return assumption risk experiencing a steady increase in unfunded pension liabilities and corresponding costs. Alternatively, plans that reduce their assumption in the face of diminished near-term projections will experience an immediate increase unfunded liabilities and required costs. As a rule of thumb, a 25 basis point reduction in the return assumption, such as from 7.5 percent to 7.25 percent, will increase the cost of a plan that has an automatic COLA, by three percent of pay (such as from 10 percent to 13 percent), and a plan that does not have a COLA, by two percent of pay.

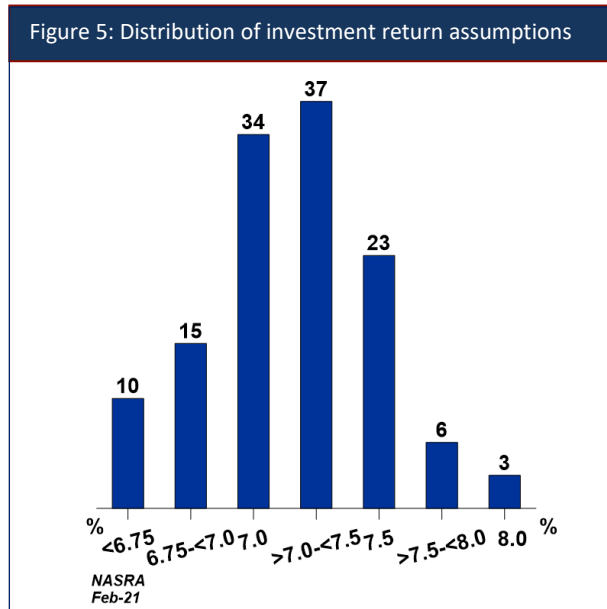
Conclusion

The investment return assumption is the single most consequential of all actuarial assumptions in terms of its effect on a pension plan's finances. The sustained period of low interest rates since 2009, combined with lower projected returns for most asset classes, has caused many public pension plans to reduce their long-term expected investment returns. Absent other changes, a lower investment return assumption increases both the plan's unfunded liabilities and cost. The process for evaluating a pension plan's investment return assumption should include abundant input and feedback from investment experts and actuarial professionals, and should reflect consideration of the factors prescribed in actuarial standards of practice.

³ Horizon Actuarial Services, "Survey of Capital Market Assumptions, 2020 Edition (August 2020) p4

See Also:

- [Financial Reporting for Pension Plans, Statement No. 67](#), Governmental Accounting Standards Board
- [The Liability Side of the Equation Revisited](#), Missouri SERS, September 2006



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[National Association of State Retirement Administrators](#)

Appendix A: Investment Return Assumption by Plan

Figures reflect the nominal assumption in use, or announced for use, as of February 2021.

This list of nominal investment return assumptions is updated at www.nasra.org/latestreturnassumptions

Plan	Rate (%)
Alabama ERS	7.70
Alabama Teachers	7.70
Alaska PERS	7.38
Alaska Teachers	7.38
Arizona Public Safety Personnel	7.30
Arizona SRS	7.50
Arkansas PERS	7.15
Arkansas State Highway ERS	8.0
Arkansas Teachers	7.50
California PERF ¹	7.0
California Teachers	7.0
Chicago Teachers	6.75
City of Austin ERS	7.0
Colorado Affiliated Local	7.0
Colorado Fire & Police Statewide	7.0
Colorado Municipal	7.25
Colorado School	7.25
Colorado State	7.25
Connecticut SERS	6.90
Connecticut Teachers	6.90
Contra Costa County	7.0
DC Police & Fire	6.50
DC Teachers	6.50
Delaware State Employees	7.0
Denver Employees	7.25
Denver Public Schools	7.25
Fairfax County Schools	7.25
Florida RS	7.0
Georgia ERS ²	7.30
Georgia Teachers	7.25
Hawaii ERS	7.0
Houston Firefighters	7.0
Idaho PERS	7.0
Illinois Municipal	7.25
Illinois SERS	7.0
Illinois Teachers	7.0
Illinois Universities	6.75
Indiana PERF	6.75
Indiana Teachers	6.75
Iowa PERS	7.0
Kansas PERS	7.75
Kentucky County	6.25
Kentucky ERS ³	5.25
Kentucky Teachers	7.50

Los Angeles County ERS	7.0
Louisiana Parochial Employees	6.50
Louisiana SERS ⁴	7.55
Louisiana Teachers ⁵	7.45
Maine Local	6.75
Maine State and Teacher	6.75
Maryland PERS	7.40
Maryland Teachers	7.40
Massachusetts SERS	7.25
Massachusetts Teachers	7.25
Michigan Municipal	7.35
Michigan Public Schools ^{6,7}	6.80
Michigan SERS ⁷	6.70
Minnesota PERF	7.50
Minnesota State Employees	7.50
Minnesota Teachers	7.50
Mississippi PERS ⁸	7.75
Missouri DOT and Highway Patrol	7.0
Missouri Local	7.25
Missouri PEERS	7.50
Missouri State Employees	6.95
Missouri Teachers	7.50
Montana PERS	7.65
Montana Teachers	7.50
Nebraska Schools	7.50
Nevada Police Officer and Firefighter	7.50
Nevada Regular Employees	7.50
New Hampshire Retirement System	6.75
New Jersey PERS ⁹	7.30
New Jersey Police & Fire ⁹	7.30
New Jersey Teachers ⁹	7.30
New Mexico PERA	7.25
New Mexico Teachers	7.0
New York City ERS	7.0
New York City Teachers	7.0
New York State Teachers	7.10
North Carolina Local Government	6.50
North Carolina Teachers and State Employees	6.50
North Dakota PERS	7.0
North Dakota Teachers	7.25
NY State & Local ERS	6.80
NY State & Local Police & Fire	6.80
Ohio PERS	7.20
Ohio Police & Fire	8.0
Ohio School Employees	21 7.50

Ohio Teachers	7.45
Oklahoma PERS	6.5
Oklahoma Teachers	7.0
Orange County ERS	7.0
Oregon PERS	7.20
Pennsylvania School Employees	7.25
Pennsylvania State ERS	7.0
Phoenix ERS	7.0
Rhode Island ERS	7.0
Rhode Island Municipal	7.0
Richmond Retirement System	7.0
San Diego County	7.0
San Francisco City & County	7.40
South Carolina Police	7.25
South Carolina RS	7.25
South Dakota RS	6.50
St. Louis School Employees	7.50
St. Paul Teachers	7.50
Texas County & District	8.0
Texas ERS	7.0
Texas LECOS	7.0

Texas Municipal	6.75
Texas Teachers	7.25
Tennessee Political Subdivisions	7.25
Tennessee State and Teachers	7.25
University of California	6.75
Utah Noncontributory	6.95
Vermont State Employees	7.0
Vermont Teachers	7.0
Virginia Retirement System	6.75
Washington LEOFF Plan 1	7.50
Washington LEOFF Plan 2	7.40
Washington PERS 1	7.50
Washington PERS 2/3	7.50
Washington School Employees Plan 2/3	7.50
Washington Teachers Plan 1	7.50
Washington Teachers Plan 2/3	7.50
West Virginia PERS	7.50
West Virginia Teachers	7.50
Wisconsin Retirement System	7.0
Wyoming Public Employees	7.0

1. In February 2017 the CalPERS Board adopted a risk mitigation policy, effective beginning FY 2021, that calls for a reduction in the system's investment return assumption commensurate with the pension fund achieving a specified level of investment return. Details are available online: <https://www.calpers.ca.gov/docs/board-agendas/201702/financeadmin/item-9a-02.pdf>.
2. For each year in which the actual rate of investment return exceeds the target rate of return, the Georgia ERS will reduce its investment return assumption by 0.1% (10 basis points) until a target rate of return assumption of 7.0% is reached.
3. The Kentucky ERS is composed of two plans: Hazardous and Non-Hazardous. The rate shown applies to the plan's Non-Hazardous plan, which accounts for more than 90 percent of the Kentucky ERS plan liabilities. The investment return assumption used for the Hazardous plan is 6.25 percent.
4. LASERS is reducing its discount rate to 7.40% effective FY 22. The discount rate used to determine the FY 2020/2021 funding requirement is 7.55%, which is net of gain-sharing. The investment return assumption differs from the discount rate because of the effective cost of providing potential future ad hoc postretirement benefit increases, or gain-sharing. The investment return assumption, which includes gain-sharing, is reducing incrementally to 7.75% by FY 22.
5. The TRS of Louisiana is reducing its discount rate from 7.45% to 7.40%, effective July 1, 2021. The investment return assumption differs from the discount rate because of the effective cost of providing potential future ad hoc postretirement benefit increases, or gain-sharing. The investment return assumption, which includes gain-sharing, will reduce to 7.75%.
6. The Michigan Public School Employees' Retirement System administers three plans: a defined benefit plan and two hybrid plans (Pension Plus and Pension Plus 2). The rate shown applies to the defined benefit plan and the Pension Plus Plan. The investment return assumption used for the Pension Plus 2 plan is 6.0 percent.
7. In August 2017 the Michigan SERS and PSERS adopted a dedicated investment gains policy that calls for a reduction in the assumed rate of return in years when investment earnings exceed the assumed rate of return. The size of the reduction depends on the level of investment return. More details are available here: <https://www.nasra.org//Files/Topical%20Reports/Actuarial/MI%20Dedicated%20Gains%20policy.pdf>

8. A 2019 amendment to the Mississippi PERS funding policy stipulates that the investment return assumption will be reduced until it reaches the rate recommended by the actuary in the most recent experience study using investment gains based on the following parameters:
 - a. 2% excess return over assumed rate, lower assumption by 5 basis points
 - b. 5% excess return over assumed rate, lower assumption by 10 basis points
 - c. 8% excess return over assumed rate, lower assumption by 15 basis points
 - d. 12% excess return over assumed rate, lower assumption by 20 basis points
9. The assumed rate of return for the New Jersey PERS, Police & Fire, and Teachers plans is scheduled to decrease to 7.3 percent for FY 21 and FY 22, and to 7.0 percent effective FY 23.

Appendix B: Entity Responsible for Setting Investment Return Assumption for Selected State Plans

State	System	Investment Return Assumption Set By
AK	Alaska Public Employees Retirement System	Alaska Retirement Management Board
AK	Alaska Teachers Retirement System	Alaska Retirement Management Board
AL	Retirement Systems of Alabama	Retirement board
AR	Arkansas Public Employees Retirement System	Retirement board
AR	Arkansas State Highway Employees' Retirement System	Retirement board
AR	Arkansas Teachers Retirement System	Retirement board
AZ	Arizona Public Safety Personnel Retirement System	Retirement board
AZ	Arizona State Retirement System	Retirement board
CA	California Public Employees Retirement System	Retirement board
CA	California State Teachers Retirement System	Retirement board
CO	Colorado Public Employees Retirement Association	Retirement board
CO	Fire & Police Pension Association of Colorado	Retirement board
CT	Connecticut State Employees Retirement System	State Employees Retirement Commission
CT	Connecticut Teachers Retirement Board	Retirement board
DC	District of Columbia Retirement Board	Retirement board
DE	Delaware Public Employees Retirement System	Retirement board
FL	Florida Retirement System	FRS Actuarial Assumption Estimating Conference ¹
GA	Georgia Employees Retirement System	Retirement board
GA	Georgia Teachers Retirement System	Retirement board
HI	Hawaii Employees Retirement System	Retirement board
IA	Iowa Public Employees Retirement System	IPERS Investment Board
ID	Idaho Public Employees Retirement System	Retirement board
IL	Illinois State Universities Retirement System	Retirement board
IL	Illinois State Employees Retirement System	Retirement board
IL	Illinois Municipal Retirement Fund	Retirement board
IL	Illinois Teachers Retirement System	Retirement board
IN	Indiana Public Retirement System	Retirement board
KS	Kansas Public Employees Retirement System	Retirement board
KY	Kentucky Retirement Systems	Retirement board
KY	Kentucky Teachers Retirement System	Retirement board
LA	Louisiana State Employees Retirement System	Retirement board
LA	Louisiana Parochial Employees' Retirement System	Retirement board
LA	Louisiana Teachers Retirement System	Retirement board
MA	Massachusetts State Employees Retirement System	Collaborative between the legislature, state treasurer, governor, and the Massachusetts Public Employee Retirement Administration Commission
MA	Massachusetts Teachers Retirement Board	Collaborative between the legislature, state treasurer, governor, and the Massachusetts Public Employee Retirement Administration Commission
MD	Maryland State Retirement and Pension System	Retirement board
ME	Maine Public Employees Retirement System	Retirement board
MI	Michigan Public School Employees Retirement System	Retirement board
MI	Michigan State Employees Retirement System	Retirement board
MI	Municipal Employees' Retirement System of Michigan	Retirement board
MN	Minnesota Public Employees Retirement Association	Legislature
MN	Minnesota State Retirement System	Legislature
MN	Minnesota Teachers Retirement Association	Legislature

MO	Missouri Local Government Employees Retirement System	Retirement board
MO	Missouri Public Schools Retirement System	Retirement board
MO	Missouri State Employees Retirement System	Retirement board
MO	MoDOT & Patrol Employees' Retirement System	Retirement board
MS	Mississippi Public Employees Retirement System	Retirement board
MT	Montana Public Employees Retirement Board	Retirement board
MT	Montana Teachers Retirement System	Retirement board
NC	North Carolina Retirement Systems	Retirement board
ND	North Dakota Public Employees Retirement System	Retirement board
ND	North Dakota Teachers Fund for Retirement	Retirement board
NE	Nebraska Public Employees Retirement System	Retirement board
NH	New Hampshire Retirement System	Retirement board
NJ	New Jersey Division of Pension and Benefits	Retirement board and state treasurer
NM	New Mexico Educational Retirement Board	Retirement board
NM	New Mexico Public Employees Retirement Association	Retirement board
NV	Nevada Public Employees Retirement System	Retirement board
NY	New York State & Local Retirement Systems	State comptroller
NY	New York State Teachers Retirement System	Retirement board
OH	Ohio Police and Fire Pension Fund	Retirement board
OH	Ohio Public Employees Retirement System	Retirement board
OH	Ohio School Employees Retirement System	Retirement board
OH	Ohio State Teachers Retirement System	Retirement board
OK	Oklahoma Public Employees Retirement System	Retirement board
OK	Oklahoma Teachers Retirement System	Retirement board
OR	Oregon Public Employees Retirement System	Retirement board
PA	Pennsylvania Public School Employees Retirement System	Retirement board
PA	Pennsylvania State Employees Retirement System	Retirement board
RI	Rhode Island Employees Retirement System	Retirement board
SC	South Carolina Retirement Systems	Legislature
SD	South Dakota Retirement System	Retirement board
TN	Tennessee Consolidated Retirement System	Retirement board
TX	Teacher Retirement System of Texas	Retirement board
TX	Texas County & District Retirement System	Retirement board
TX	Texas Employees Retirement System	Retirement board
TX	Texas Municipal Retirement System	Retirement board
UT	Utah Retirement Systems	Retirement board
VA	Virginia Retirement System	Retirement board
VT	Vermont State Employees Retirement System	Retirement board
VT	Vermont Teachers Retirement System	Retirement board
WA	Washington Department of Retirement Systems	Legislature
WI	Wisconsin Retirement System	Retirement board
WV	West Virginia Consolidated Public Retirement Board	Retirement board
WY	Wyoming Retirement System	Retirement board

1. The Conference consists of staff from the Florida House, Senate, and Governor's office

EXHIBIT 6

DROP Crediting Rate

Summary

A change in assumed discount rate has implications for the DROP crediting rate. We have discussed this in the past and although this is not an assumption, per se, it is worth consideration.

The System has “made” money from the DROP accounts over the past several years even with the 6% guaranteed rate. But, one of the reasons for this benefit is that there has been a buffer between assumed and credited rate of 2%. This is a fairly typical buffer for plans that have a DROP.

But this is important, not only from a benefit standpoint, but it is important from the standpoint of maintaining the support of the retiree population. So a definite, long-term process needs to be carefully considered and adopted.

Recommendation

We recommend the adoption of a DROP interest crediting policy that would outline the items that the board would consider in making a decision on the credited rate. I further recommend that this is carefully considered and work is begun to complete this process so that it can be implemented by this plan year end, that is, June 30, 2021.

APPENDIX A

ACTUARIAL COST METHODS AND ASSUMPTIONS

INVESTMENT 8.0%* per annum, compounded annually. (Effective June
YIELD RATE: 30,1997) The expected rate of return on pension plan investments
for the purpose of GASB is 7.50%.

* See the end of this Appendix for discussion.

MORTALITY:

- a. Healthy Post-retirement (Effective June 30, 2015)
 - Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 105% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)
 - Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 100% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

- b. Disabled Post-retirement (Effective June 30, 2015)
 - Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 105% with three-year set-forward. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date), minimum 3% rate of mortality at all ages
 - Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 100% with three-year set-forward. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date), minimum 3% rate of mortality at all ages

- c. Healthy Pre-retirement (Effective June 30, 2015)
 - Male: RP-2000 Combined Healthy for males with Blue Collar adjustments, scaled at 70% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)
 - Female: RP-2000 Combined Healthy for females with Blue Collar adjustments, scaled at 70% with no setback. Generational mortality improvements in accordance with Scale AA from the table's base year of 2000 (both before and after the measurement date)

Appendix A (Continued)

RETIREMENT RATES (Effective June 30, 2015):

The following probabilities of retirement were assumed for members eligible to retire:

<u>Age</u>	<u>Early Retirement Rate</u>	<u>Normal Retirement Rate</u>	
	<u>Males and Females</u>	<u>Males</u>	<u>Females</u>
48		5.0%	5.0%
49		5.0%	5.0%
50		6.5%	5.0%
51		8.0%	6.0%
52		9.5%	7.0%
53		11.0%	8.0%
54		12.5%	9.0%
55	1.0%	14.0%	10.0%
56	1.0%	15.5%	15.0%
57	2.0%	20.0%	15.0%
58	2.0%	25.0%	25.0%
59	3.0%	25.0%	25.0%
60	3.0%	15.0%	15.0%
61	8.0%	20.0%	20.0%
62	20.0%	45.0%	45.0%
63	20.0%	25.0%	25.0%
64	15.0%	25.0%	25.0%
65		40.0%	40.0%
66		40.0%	40.0%
67		40.0%	40.0%
68		40.0%	40.0%
69		40.0%	40.0%
70		100.0%	100.0%

Appendix A (Continued)

DISABILITY RATES (Effective June 30, 2009):

Rates based on the experience of other large public sector retirement systems through age 82; thereafter, Non-Disabled Mortality is assumed.

<u>Age</u>	<u>Rates of Decrement Due to Disability</u>
20	.00192
25	.00192
30	.00192
35	.00192
40	.00480
45	.00624
50	.01176
55	.02136
60	.03384
65	.03984

WITHDRAWAL RATES (for causes other than death, disability, or retirement)

(Effective June 30, 2015):

Select and ultimate rates are used based on age and service. Sample rates are shown.

Probability of Decrement Due to Withdrawal

Years of Service

<u>Male Members</u>						
<u>Age</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5+</u>
20	.3712	.2536	.1697	.1180	.1150	.1043
30	.2925	.1998	.1313	.0862	.0756	.0578
40	.2193	.1538	.1024	.0646	.0477	.0261
50	.1628	.1242	.0894	.0582	.0368	.0159
60	.1342	.1238	.1033	.0748	.0462	.0302

<u>Female Members</u>						
<u>Age</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5+</u>
20	.4028	.3008	.2168	.1509	.1047	.0761
30	.2819	.2118	.1542	.1093	.0765	.0571
40	.1980	.1483	.1073	.0752	.0514	.0366
50	.1715	.1250	.0863	.0550	.0336	.0171
60	.1985	.1391	.0896	.0481	.0230	.0007

Appendix A (Continued)

SALARY SCALES (Effective June 30, 2015):

Future compensation is assumed to increase by an inflation (growth) increase rate of 2.5% plus a productivity component of 1.00%, and plus a step-rate/promotional component based on service. Rates are illustrated below:

<u>Years of Service</u>	<u>Step-rate/ Promotional Component</u>	<u>Total Salary Scale</u>
0	7.00%	10.50%
1	7.00%	10.50%
2	7.00%	10.50%
3	2.00%	5.50%
4	1.25%	4.75%
5-13	0.75%	4.25%
14-17	0.50%	4.00%
18-19	0.25%	3.75%
20+	0.00%	3.50%

FUTURE INCREASE IN TOTAL PAYROLL (Effective June 30, 2015):

3.0% per annum. Used for purposes of funding the Unfunded Actuarial Accrued Liability.

COST OF LIVING INCREASE (Effective June 30, 2017):

All benefit in pay status are assumed to be increased by 2.25% annually.

PROVISION FOR EXPENSE (Effective June 30, 1997):

The assumed investment return rate represents the anticipated net rate of return after payment of all administrative and investment expenses.

ELECTION RATES (Effective June 30, 2004):

After their initial vesting, members are assumed to elect the greater value of their deferred annuity or a refund of their account balances. 100% of non-vested members are assumed to take a refund.

ELECTION OF DROP ENTRY (Effective June 30, 2015):

100% of participants who are eligible to enter DROP are assumed to elect to participate in DROP, except as noted below. Members who elect into DROP are assumed to retire at the normal retirement patterns. Members who first become eligible to DROP prior to age 60 (at 30 years of service) are assumed to enter DROP after attaining 31 years of service. Members past their first eligibility are assumed to enter DROP immediately.

Appendix A (Continued)

INTEREST CREDITING RATE ON DROP ACCOUNTS (Effective June 30, 2012):

6.0% interest credit on DROP accounts.

DROP ACCOUNTS PAYOUT PERIOD (Effective June 30, 2015):

It is assumed that members who participate in DROP will receive their DROP accounts in equal installments over a 10-year period.

ASSET VALUATION METHOD (Adopted June 30, 2015):

The actuarial value of assets is equal to the market value of assets less a four-year phase-in of the excess (shortfall) between expected investment return and actual income with the resulting value not being less than 80% or more than 120% of the market value of assets.

The actuarial value of assets was marked to the market for June 30, 2012 valuation. This was done to prevent an expected divergence away from the market value of assets.

ACTUARIAL COST METHOD:

The funding period required to amortize the unfunded actuarial accrued liability (UAAL) is determined using the Entry Age Actuarial Cost Method.

The Individual Entry Age Normal actuarial cost method assigns the Plan's total unfunded liabilities (the actuarial present value of future benefits less the actuarial value of assets) to various periods. The unfunded actuarial accrued liability is assigned to years prior to the valuation, and the normal cost is assigned to the year following the valuation. The remaining costs are the normal costs for future years. Then each year's contribution is composed of (i) that year's normal cost, plus (ii) a payment used to reduce the unfunded actuarial accrued liability.

The normal contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the rate of contribution which, if applied to the compensation of each individual member during the entire period of anticipated covered service (prior to DROP entry), would be required to meet the cost of all benefits payable on his behalf. The salary-weighted average of these rates is the normal cost rate. This calculation reflects the plan provisions that apply to each individual member. The employer normal cost rate is equal to (i) the normal cost rate, minus (ii) the member contribution rate.

The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs. The unfunded actuarial accrued liability (UAAL) is the excess of the actuarial accrued liability over the actuarial value of assets.

Appendix A (Continued)

Since the State statutes governing the System establish the current employee and State contribution rates, the actuarial valuation determines the number of years required to amortize (or fund) the UAAL on a level percentage of payroll basis, taking into account the payroll growth assumption and the normal cost expressed as a percent of pay. Because of this amortization procedure, any change in the unfunded actuarial accrued liability due to (i) actuarial gains and losses, (ii) changes in actuarial assumptions, or (iii) amendments, affects the funding period.

FUNDING OF UNFUNDED ACTUARIAL ACCRUED LIABILITY:

The total normal cost for benefits provided by the System is 11.73% of payroll, which is 9.67% of payroll less than the total contributions scheduled for the year under current law (14.90% from Employer plus 6.5% from employees). This remaining 9.67% of payroll along with any contributions received on behalf of members in Tier II of DROP are assumed to be utilized to fund the unfunded actuarial accrued liability over a period of years in the future, assuming that total payroll is increased by 3.0% per year. The calculation is detailed in Exhibit 2 of this report.

APPENDIX B

DEFINITION OF ACTUARIAL TERMS

ACTUARIAL ACCRUED LIABILITY:

The present value of benefits payable in the future less the present value of future normal costs for present members.

ACTUARIAL VALUE OF ASSETS:

The market value of assets of the System adjusted to recognize investment earnings above or below the investment return assumption uniformly over a five-year period.

ACTUARIAL ASSUMPTIONS:

Assumptions as to future experience under the System. Assumptions include future fund earnings rates, rates of future salary increases, and rates of death (both before and after retirement), disability, retirement, and withdrawal.

ACTUARIALLY DETERMINED:

Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

ACTUARIAL GAIN OR ACTUARIAL LOSS:

A measure of the difference between actual experience and assumed experience of the System. The actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, actuarial liabilities emerge which may be the same as forecasted or they may be larger or smaller than projected. Actuarial gains are due to favorable experience, i.e., the System's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the unfunded actuarial accrued liability while actuarial losses will lengthen the funding period.

ACTUARIAL LIABILITIES:

The actuarially determined present value of future benefits to be provided by the System. There are separate actuarially determined present values for retired members and non-retired members. When applied to active members, benefits which will be earned through future service and future salary increases are taken into account.

APPENDIX B (Continued)

DEFINED BENEFITS:

Benefits which are defined by a specific formula applied to a specific member's compensation and/or specific years of service. The amount of the benefit is not a function of contributions or actual earnings on those contributions.

FUTURE BENEFITS:

Benefits specified in the law which will become payable at some time in the future when the member satisfies the requirement to receive such benefits.

FUTURE CONTRIBUTIONS:

Contributions to be made by the member or the State in the future, as required by the law.

FUNDING PERIOD:

The number of years in the future that will be required to fund (i.e., pay off or eliminate) the unfunded actuarial accrued liability, based on the actuarial assumptions and assuming no future actuarial gains or losses.

NORMAL COST:

The average annual actuarial cost of the benefits provided by the System for the current employees.

PRESENT VALUE:

The actuarially determined lump sum value as of the valuation date of a series of payments to be made in the future, where the lump sum value is equal to the sum of the discounted value of each future payment. The discounted value of each payment is the product of (a) the amount of the payment, (b) the probability that the payment will be made (based on the current actuarial assumptions as to the future experience), and (c) the time value of money (based on the current assumed interest rate).

UNFUNDED ACTUARIAL ACCRUED LIABILITY:

That portion of the actuarial accrued liability (including the present value of benefits presently being paid to retired members and the value of any miscellaneous liabilities) that exceeds the value of current assets.

FUNDED RATIO:

The ratio of the actuarial value of assets to the actuarial accrued liability. The funding ratio is a measure of the funded status of the plan.

Arkansas State Highway Employees Retirement System
Development of UAAL - 6/30/2021

	2019 Val Report	2020 Val Report	No Legis. Change No Assump Change Prelim 2021 Val Results	w/Legis. Change Before Assump Prelim 2021 Val Results	w/Legis. Change Salary only Prelim 2021 Val Results	w/Legis. Change TO only Prelim 2021 Val Results	w/Legis. Change Mort only Prelim 2021 Val Results	w/Legis. Change All Demo. changes Prelim 2021 Val Results	w/Legis. Change All Demo. changes Prelim 2021 Val Results - 7.5%	w/Legis. Change All Demo. changes Prelim 2021 Val Results - 7.75%
A Actuarial Accrued Liabilities-Active										
1 PVFB	461,816,172	472,652,336	482,127,875	466,017,885	449,314,788	461,941,700	452,230,563	432,474,559	476,051,802	453,534,791
2 Less PVFNC	<u>137,160,511</u>	<u>142,982,919</u>	<u>155,586,077</u>	<u>150,668,851</u>	<u>139,144,687</u>	<u>146,250,886</u>	<u>147,361,767</u>	<u>132,464,706</u>	<u>150,419,854</u>	<u>141,076,631</u>
3 AAL - Active	324,655,661	329,669,417	326,541,798	315,349,034	310,170,101	315,690,814	304,868,796	300,009,853	325,631,948	312,458,160
B. Actuarial Accrued Liabilities-DROP										
1 PVFBenefits	181,243,020	175,103,321	172,903,169	172,903,169	172,903,169	172,903,169	173,270,427	173,270,427	180,512,201	176,822,304
2 Payout of DROP accounts	194,376,904	210,008,619	218,972,852	218,972,852	218,972,852	218,972,852	218,972,852	218,972,852	225,377,548	222,142,456
3 Less PV Future ER Contrib	11,505,779	11,157,370	5,139,426	15,563,701	15,563,701	15,563,701	15,563,701	15,563,701	15,903,363	15,731,987
4 Less PV Future EE Contrib			<u>4,469,066</u>	<u>4,469,066</u>	<u>4,469,066</u>	<u>4,469,066</u>	<u>4,469,066</u>	<u>4,469,066</u>	<u>4,588,446</u>	<u>4,528,171</u>
5 AAL - DROP	364,114,145	373,954,570	382,267,529	376,312,320	376,312,320	376,312,320	376,679,578	376,679,578	389,986,386	383,232,773
C. AAL - Inactives	8,290,823	8,627,777	8,993,715	8,993,715	8,993,715	8,993,715	8,993,715	8,993,715	9,378,373	9,183,511
D. Actuarial Accrued Liabilities-Retirees										
1 Regular Retirees	896,492,642	886,289,903	874,994,826	874,994,826	874,994,826	874,994,826	876,853,374	876,853,374	913,501,140	894,828,023
2 Disableds	78,516,156	78,422,389	75,552,254	75,552,254	75,552,254	75,552,254	72,447,222	72,447,222	75,509,575	73,948,369
3 Beneficiaries	<u>64,311,398</u>	<u>65,097,567</u>	<u>67,612,292</u>	<u>67,612,292</u>	<u>67,612,292</u>	<u>67,612,292</u>	<u>70,566,351</u>	<u>70,566,351</u>	<u>73,160,779</u>	<u>71,840,727</u>
4 AAL - Retirees	1,039,320,196	1,029,809,859	1,018,159,372	1,018,159,372	1,018,159,372	1,018,159,372	1,019,866,947	1,019,866,947	1,062,171,494	1,040,617,119
E. Total Actuarial Accrued Liabilities	<u>1,736,380,825</u>	<u>1,742,061,623</u>	<u>1,735,962,414</u>	<u>1,718,814,441</u>	<u>1,713,635,508</u>	<u>1,719,156,221</u>	<u>1,710,409,036</u>	<u>1,705,550,093</u>	<u>1,787,168,201</u>	<u>1,745,491,563</u>
F. Actuarial Value of Assets	1,410,043,327	1,434,541,444	1,524,084,987	1,524,084,987	1,524,084,987	1,524,084,987	1,524,084,987	1,524,084,987	1,585,298,568	1,554,041,089
G. UAAL	326,337,498	307,520,179	211,877,427	194,729,455	189,550,522	195,071,234	186,324,050	181,465,106	201,869,633	191,450,474
H. Funded Percentage	81.21%	82.35%	87.79%	88.67%	88.94%	88.65%	89.11%	89.36%	88.70%	89.03%
I. Market Value of Assets		1,407,173,769	1,715,093,810	1,715,093,810	1,715,093,810	1,715,093,810	1,715,093,810	1,715,093,810	1,715,093,810	1,715,093,810
Funded Percentage on MVA		80.78%	98.80%	99.78%	100.09%	99.76%	100.27%	100.56%	95.97%	98.26%
J. Various Changes in UAAL Due to:				-17,147,973 Plan Changes				-13,264,348 Demo. Assump Changes	81,618,109 Add 7.5% Disc.	39,941,470 Add 7.75% Disc.

Arkansas State Highway Employees Retirement System
 Calculation of Actuarial Value of Assets for 6/30/2021 Valuation

	<u>7/1/2019</u>	<u>7/1/2020</u>	<u>7/1/2021</u>		<u>7/1/2021</u>
Investment income for year	4,559,025	110,541,618	398,230,408	7.50% Adjustment for Change in Discount	316,612,299
Expenses and fees for year	<u>74,348</u>	<u>129,016</u>	<u>93,505</u>	81,618,109	93,505
Net investment income	4,484,677	110,412,602	398,136,903		316,518,794
Market Value beginning of year	1,472,472,865	1,386,076,598	1,407,173,769		1,407,173,769
Contributions during year	<u>28,531,322</u>	<u>33,474,207</u>	<u>35,519,843</u>		<u>35,519,843</u>
Benefits paid during year	<u>119,412,266</u>	<u>122,789,638</u>	<u>125,736,705</u>		<u>125,736,705</u>
Expected investment inc 8%					
On market value	117,797,829	110,886,128	112,573,902		112,573,902
On contributions	1,141,253	1,338,968	1,420,794		1,420,794
On benefits	<u>4,776,491</u>	<u>4,911,586</u>	<u>5,029,468</u>		<u>5,029,468</u>
Total	114,162,591	107,313,510	108,965,228		108,965,228
Investment gain for year	(109,677,914)	3,099,092	289,171,675		207,553,566
Deferral of investment gain					
Current year (75%)	(82,258,436)	2,324,319	216,878,756		155,665,175
Current year - 1 (50%)	50,293,926	(54,838,957)	1,549,546	##	1,549,546
Current year - 2 (25%)	<u>7,997,781</u>	<u>25,146,963</u>	<u>(27,419,479)</u>	## ##	<u>(27,419,479)</u>
Total	(23,966,729)	(27,367,675)	191,008,824	## ##	129,795,243
Market Value end of year	1,386,076,598	1,407,173,769	1,715,093,810		1,715,093,810
Preliminary AVA end of year	1,410,043,327	1,434,541,444	1,524,084,987		1,585,298,568
20% upper limit	1,663,291,918	1,688,608,523	2,058,112,572		2,058,112,572
20% lower limit	1,108,861,278	1,125,739,015	1,372,075,048		1,372,075,048
Final AVA	1,410,043,327	1,434,541,444	1,524,084,987		1,585,298,568
	76,758,539	113,942,564	179,853,910		241,067,491
	5.57%	8.35%	12.94%		17.35%

Arkansas State Highway Employees Retirement System
 Calculation of Actuarial Value of Assets for 6/30/2021 Valuation

	<u>7/1/2019</u>	<u>7/1/2020</u>	<u>7/1/2021</u>		<u>7/1/2021</u>
Investment income for year	4,559,025	110,541,618	398,230,408		358,288,938
Expenses and fees for year	<u>74,348</u>	<u>129,016</u>	<u>93,505</u>		93,505
Net investment income	4,484,677	110,412,602	398,136,903		358,195,433
Market Value beginning of year	1,472,472,865	1,386,076,598	1,407,173,769		1,407,173,769
Contributions during year	28,531,322	33,474,207	35,519,843		35,519,843
Benefits paid during year	119,412,266	122,789,638	125,736,705		125,736,705
Expected investment inc 8%					
On market value	117,797,829	110,886,128	112,573,902		112,573,902
On contributions	1,141,253	1,338,968	1,420,794		1,420,794
On benefits	<u>4,776,491</u>	<u>4,911,586</u>	<u>5,029,468</u>		<u>5,029,468</u>
Total	114,162,591	107,313,510	108,965,228		108,965,228
Investment gain for year	(109,677,914)	3,099,092	289,171,675		249,230,205
Deferral of investment gain					
Current year (75%)	(82,258,436)	2,324,319	216,878,756		186,922,654
Current year - 1 (50%)	50,293,926	(54,838,957)	1,549,546	##	1,549,546
Current year - 2 (25%)	<u>7,997,781</u>	<u>25,146,963</u>	<u>(27,419,479)</u>	## ##	<u>(27,419,479)</u>
Total	(23,966,729)	(27,367,675)	191,008,824	## ##	161,052,722
Market Value end of year	1,386,076,598	1,407,173,769	1,715,093,810		1,715,093,810
Preliminary AVA end of year	1,410,043,327	1,434,541,444	1,524,084,987		1,554,041,089
20% upper limit	1,663,291,918	1,688,608,523	2,058,112,572		2,058,112,572
20% lower limit	1,108,861,278	1,125,739,015	1,372,075,048		1,372,075,048
Final AVA	1,410,043,327	1,434,541,444	1,524,084,987		1,554,041,089
	76,758,539	113,942,564	179,853,910		209,810,012
	5.57%	8.35%	12.94%		15.10%

Arkansas State Highway Employees Retirement System

Development of Contribution Rates - 6/30/2021

Pro Forma of Page 11 of Valuation

	2019 Val Report	2020 Val Report	Before Changes Before Assump Prelim 2021	With Legis. Changes Before Assump Prelim 2021	With Legis. Changes Salary only Prelim 2021	With Legis. Changes TO only Prelim 2021	With Legis. Changes Mort only Prelim 2021	With Legis. Changes All 3 Demo changes Prelim 2021	With Legis. Changes All 3 Demo changes Prelim 2021 @7.5%	With Legis. Changes All 3 Demo changes Prelim 2021 @7.75%
A. Expected Contributions										
1 Annualized salaries (excludes DROPs)	144,750,560	158,254,471	165,245,622	165,245,622	164,696,825	165,245,622	165,245,622	164,696,825	164,696,825	164,696,825
2 Projected payroll for upcoming fiscal year	154,451,494	159,121,521	166,224,229	166,224,229	165,298,590	166,224,229	166,224,229	165,298,590	165,298,590	165,298,590
T1 salaries		23,365,060	16,012,521	16,012,521	16,012,521	16,012,521	16,012,521	16,012,521	16,012,521	16,012,521
T2 salaries		6,055,209	4,305,223	4,305,223	4,305,223	4,305,223	4,305,223	4,305,223	4,305,223	4,305,223
3 Current Employee Contribution Rate	6.50%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%
4 Current Employer Contribution Rate	14.90%	14.90%	14.90%	14.90%	14.90%	14.90%	14.90%	14.90%	14.90%	14.90%
5 Total Contribution Rate	21.40%	21.90%	21.90%	21.90%	21.90%	21.90%	21.90%	21.90%	21.90%	21.90%
6 Contribution in Dollars (A2 X A5+A2bcXA4)	33,052,620	34,847,613	36,403,106	36,403,106	36,200,391	36,403,106	36,403,106	36,200,391	36,200,391	36,200,391
7 Expected Contribution from DROP	718,598	781,122	555,374	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657
8 Total Expected Contributions	33,771,218	35,628,735	36,958,480	39,688,763	39,486,048	39,688,763	39,688,763	39,486,048	39,486,048	39,486,048
B. Unfunded Actuarial Accrued Liability										
	326,337,498	307,520,179	211,877,427	194,729,455	189,550,522	195,071,234	186,324,050	181,465,106	201,869,633	191,450,474
C. Calculation of 30-year Payoff Rate										
1 30-year Amortization of UAAL at mid-year	20,707,504	19,513,465	13,444,525	12,356,413	12,027,788	12,378,101	11,823,054	11,514,734	12,130,304	11,824,444
2 Less Expected Tier II Contributions	718,598	781,122	555,374	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657
3 Contribution Needed to meet goal (C1 – C2)	19,988,906	18,732,343	12,889,151	9,070,756	8,742,131	9,092,443	8,537,397	8,229,077	8,844,647	8,538,786
4 C3 as percentage of payroll (C3/A2)	12.94%	11.77%	7.75%	5.46%	5.29%	5.47%	5.14%	4.98%	5.35%	5.17%
5 Normal Cost	11.73%	11.82%	12.34%	11.95%	11.37%	11.81%	11.68%	11.01%	12.17%	11.57%
6 Total Contribution Needed to meet goal	24.67%	23.59%	20.09%	17.41%	16.66%	17.28%	16.82%	15.99%	17.52%	16.74%
		38,321,629	33,956,595	32,220,209	30,822,238	32,009,182	31,238,044	29,714,109	32,247,143	30,949,491
D. Calculation of 18-year Payoff Rate										
1 18-year Amortization of UAAL at mid-year	26,322,414	25,796,792	17,773,656	16,335,172	15,900,730	16,363,843	15,630,072	15,222,473	16,330,774	15,772,832
2 Less Expected Tier II Contributions	718,598	781,122	555,374	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657	3,285,657
3 Contribution Needed to meet goal (D1 – D2)	25,603,816	25,015,670	17,218,282	13,049,515	12,615,073	13,078,186	12,344,415	11,936,815	13,045,116	12,487,174
4 D3 as percentage of payroll (D3/A2)	16.58%	15.72%	10.36%	7.85%	7.63%	7.87%	7.43%	7.22%	7.89%	7.55%
5 Normal Cost	11.73%	11.82%	12.34%	11.95%	11.37%	11.81%	11.68%	11.01%	12.17%	11.57%
6 Total Contribution Needed to meet goal	28.31%	27.54%	22.70%	19.80%	19.00%	19.68%	19.11%	18.23%	20.06%	19.12%
E. Calculation of Funding Period										
1 Total Expected Contributions (A8) *	34,543,475	35,628,735	36,958,480	39,688,763	39,486,048	39,688,763	39,688,763	39,486,048	39,486,048	39,486,048
2 Amount needed to pay Normal Cost	18,117,160	18,808,164	20,512,070	19,863,795	18,794,450	19,631,081	19,414,990	18,199,375	20,116,838	19,125,047
3 Amount remaining to payoff UAAL (E1 – E2)	16,426,315	16,820,571	16,446,410	19,824,968	20,691,599	20,057,682	20,273,773	21,286,674	19,369,210	20,361,002
4 Years to fund UAAL using amount in E3 Based on 3% payroll growth	53.22	39.52	19.14	12.79	11.64	12.62	11.69	10.59	13.40	11.87
F. Discount Rate Assumed										
Total Payroll Increase Assumption	8.00000%	8.00000%	8.00000%	8.00000%	8.00000%	8.00000%	8.00000%	8.00000%	7.50000%	7.75000%
Effective UAAL Amortization Rate	3.00000%	3.00000%	3.00000%	3.00000%	3.00000%	3.00000%	3.00000%	3.00000%	3.00000%	3.00000%
	4.85437%	4.85437%	4.85437%	4.85437%	4.85437%	4.85437%	4.85437%	4.85437%	4.36893%	4.61165%