

# **State Teachers Retirement System of Ohio**

## **Actuarial Valuation Report as of June 30, 2021**

**Produced by Cheiron**

**October 2021**

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October 14, 2021

Board of Trustees  
State Teachers Retirement System of Ohio  
275 East Broad Street  
Columbus, Ohio 43215

Dear Members of the Board:

This report presents the June 30, 2021 Actuarial Valuation of the State Teachers Retirement System of Ohio (“STRS Ohio”). In preparing our report, we relied on information, some oral and some written, supplied by the STRS Ohio. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

Included in the report are the follow supporting schedules prepared by Cheiron to be included in the Financial, Actuarial and Statistical sections of the STRS Ohio *Annual Comprehensive Financial Report*:

- Financial/Required Supplementary Information
  - o Schedule of Changes in Employers’ Net Pension Liability
  - o Schedule of Employers’ Net Pension Liability
  - o Schedule of Employers’ Contributions – Pension
  - o Notes to Required Supplementary Information – Pension
  - o Sensitivity of the Net Pension Liability to the Discount Rate Assumption
- Actuarial
  - o Schedule of Valuation Data – Active Members
  - o Schedule of Valuation Data – Retirees/Beneficiaries
  - o Benefit Recipients Added to and Removed from the Rolls
  - o Solvency Test
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- Statistical
  - o Actuarial Funded Ratio & Funding Period
  - o Selected Funding Information – Defined Benefit Plan
  - o Number of Benefit Recipients by Type
  - o Summary of Active Membership Data
  - o Benefit Payments by Type

Future actuarial measurements may differ significantly from the current measurements due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and changes in plan provisions or applicable law.

Members of the Board

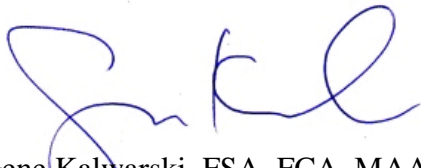
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This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This report was prepared for STRS Ohio for the purposes described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

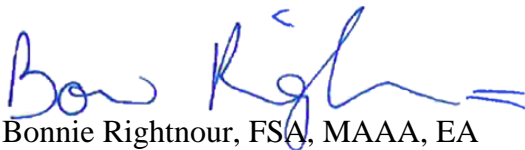
Sincerely,  
Cheiron



Gene Kalwarski, FSA, FCA, MAAA, EA  
Principal Consulting Actuary



Michael Noble, FSA, FCA, MAAA, EA  
Principal Consulting Actuary



Bonnie Rightnour, FSA, MAAA, EA  
Consulting Actuary

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**SECTION I – BOARD SUMMARY**

The primary purpose of the actuarial valuation and this report is to:

- Measure and disclose as of the valuation date, the financial condition of the Plan,
- Indicate trends, both historical and prospective, in the financial progress of the Plan,
- Identify, assess and disclose material risks of the Plan,
- Disclose details on STRS Ohio and Member contributions,
- Provide information to be included in the Annual Comprehensive Financial Report, and
- Provide information required for STRS Ohio’s financial reporting under GASB 67 and the collective employers’ disclosures under GASB 68.

In the balance of this Board Summary, we present (A) the key findings of this valuation including a summary of all key financial results, (B) a review of the historical trends, and (C) the projected financial outlook for STRS Ohio.

**Key Findings of this Valuation**

The key results of the June 30, 2021 Actuarial Valuation is as follows:

- The Unfunded Actuarial Liability (UAL) decreased from \$22.3 billion as of June 30, 2020 to \$20.8 billion as of June 30, 2021.
- The fixed State contribution rate of 14.0% of payroll for members in the Defined Benefit Plan and Combined Plan and 4.47% of payroll for participants in the Defined Contribution Plan and Alternative Retirement Plan, and member contributions of 14.0% of payroll for the Defined Benefit Plan and 2.0% of payroll for the Combined Plan, is expected to cover the cost of ongoing benefit accruals (i.e., normal cost) and amortize the UAL over 14.0 years.
- The STRS Ohio funded ratio, the ratio of the Actuarial Value of Assets over Actuarial Liabilities increased from 77.4% as of June 30, 2020 to 80.1% as of June 30, 2021.
- The Plan’s discount rate was decreased from 7.45% to 7.00%, which increased liabilities by \$ 4.4 billion.
- There was a net actuarial experience gain of \$ 5.4 billion and a composite gain of \$ 0.9 billion when factoring in the discount rate change.
  - During the year ended June 30, 2021, the Plan’s assets earned 29.04% (net of investment and administrative expenses) on a market value basis, but due to smoothing of prior investment gains and losses, the return on the Actuarial Value of Assets was 14.63% (as compared to 7.45% assumed for the period ending June 30, 2021). This resulted in an actuarial gain on investments of \$ 5,216 million.
  - On the liability side, the Plan experienced an actuarial experience gain of \$157 million.
- It is our understanding that under Ohio law the Board may consider certain plan changes that in the determination of the Board’s actuary do not materially impair the fiscal integrity of the retirement system. Given the Plan’s maximum statutory contribution rate and negative cash flows (contributions less benefits and expenses), we recommend exercising due caution

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before enacting any change in plan benefits or contributions. While the Plan experienced a strong return in FY21 which resulted in an actuarial one-year gain on investments, we would not recommend that any such plan changes be enacted prior to the completion of the Five-Year Actuarial Experience Review, which is anticipated to be in March of 2022.

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Following is Table I-1, which summarizes all the key results of the valuation with respect to the System’s membership, assets and liabilities, and contributions. The results are presented and compared for both the current and prior plan year.

<b>Table I-1 State Teachers Retirements System of Ohio Summary of Principal Results</b>					
	<b>June 30, 2021</b>			<b>June 30, 2020</b>	<b>%</b>
	<u>Defined Benefit</u>	<u>Combined</u>	<u>Total</u>	<u>Total</u>	<u>change</u>
<b>Counts</b>					
Active Members					
(i) Defined Benefit	159,568	6,859	166,427	167,838	(0.84%)
(ii) Defined Contribution	9,940	-	9,940	10,205	(2.60%)
Reemployed Retirees	17,734	-	17,734	19,553	(9.30%)
Inactive Members					
(i) Eligible for Allowances	19,813	700	20,513	19,511	5.14%
(ii) Eligible for Refunds Only	142,088	1,620	143,708	142,176	1.08%
Retirees and Beneficiaries	<u>156,518</u>	<u>403</u>	<u>156,921</u>	<u>156,907</u>	0.01%
<b>Total</b>	<b>505,661</b>	<b>9,582</b>	<b>515,243</b>	<b>516,190</b>	(0.18%)
Total Payroll					
(i) Defined Benefit Plan Members	\$ 11,173,250,221	\$ 436,765,943	\$ 11,610,016,164	\$ 11,392,012,792	1.91%
(ii) Defined Contribution Plan Members	491,553,457	-	491,553,457	468,458,670	4.93%
(iii) Alternative Retirement Plan Members	<u>828,273,857</u>	<u>-</u>	<u>828,273,857</u>	<u>810,736,525</u>	2.16%
<b>Total</b>	<b>\$ 12,493,077,535</b>	<b>\$ 436,765,943</b>	<b>\$ 12,929,843,478</b>	<b>\$ 12,671,207,988</b>	2.04%
Annual Allowances	\$ 7,005,574,228	\$ 3,846,442	\$ 7,009,420,670	\$ 6,970,696,792	0.56%
<b>Assets and Liabilities</b>					
Actuarial Liability (AL) <sup>1</sup>	\$ 104,193,978,965	\$ 397,427,411	\$ 104,591,406,376	\$ 98,672,288,072	6.00%
Actuarial Value of Assets (AVA)			<u>83,761,394,182</u>	<u>76,357,680,610</u>	9.70%
Unfunded Actuarial Liability (UAL)			\$ 20,830,012,194	\$ 22,314,607,462	(6.65%)
Funded Ratio (AVA basis)			80.1%	77.4%	
Market Value of Assets (MVA)			\$ 91,805,507,590	\$ 74,475,846,279	23.27%
Funded Ratio (MVA basis)			87.8%	75.5%	
Funding Period			14.0 years	14.9 years	(5.92%)
<b>Contribution Rates</b>					
			<b>Fiscal Year 2021</b>	<b>Fiscal Year 2020</b>	
Normal Cost	12.06%	4.50%	11.76%	10.60%	10.97%
Member Contribution Rate	14.00%	2.00%	13.53%	13.55%	(0.13%)
<b>Allocation of Employer Contribution Rate</b>					
Employer Normal Cost	(1.94%)	2.50%	(1.77%)	(2.95%)	(40.04%)
Unfunded Actuarial Accrued Liability	<u>15.94%</u>	<u>11.50%</u>	<u>15.77%</u>	<u>16.95%</u>	(6.97%)
Total Employer Pension Contribution	14.00%	14.00%	14.00%	14.00%	(0.00%)
Health Care	<u>0.00%</u>	<u>0.00%</u>	<u>0.00%</u>	<u>0.00%</u>	0.00%
Total Employer Contribution	14.00%	14.00%	14.00%	14.00%	(0.00%)

<sup>1</sup>Defined Benefit Actuarial Liability (AL) includes Defined Contribution Account Balances and prior Defined Contribution participants who have converted their account to an annuity.

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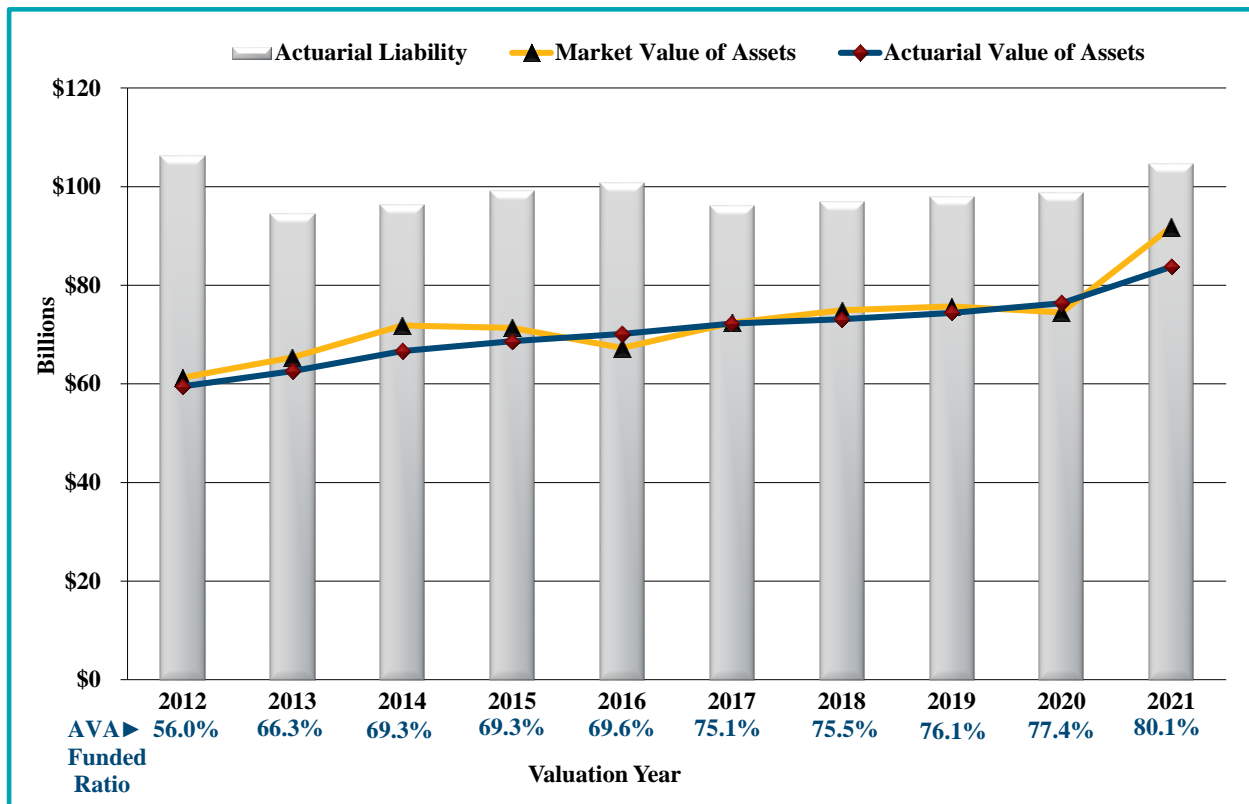
**Historical Trends**

It is important to take a step back from the latest results and view them in the context of the Plan’s recent history. On the next few pages, we present a series of charts which display key results in the valuations over the last few years.

**Assets and Liabilities**

The gray bars represent the Actuarial Liability (AL). The gold line is the Market Value of Assets (MVA), and the blue line is the Actuarial Value of Assets (AVA). The Plan’s funded ratio (ratio of AVA to AL) is shown below the x-axis where we show the valuation year.

While the Plan’s funded ratio has been steadily increasing since 2012, it still remains well below the target funded ratio of 100%. The drops in liability shown in 2013 and 2017 are due to pension reform changes including changes in retirement eligibility requirements and subsidies as well as benefits in 2013 and the reduction of the COLA to 0% in 2017. The Plan experienced favorable investment experience during the 2021 fiscal year, and liabilities increased for 2021 due to the change in discount rate from 7.45% to 7.00%.





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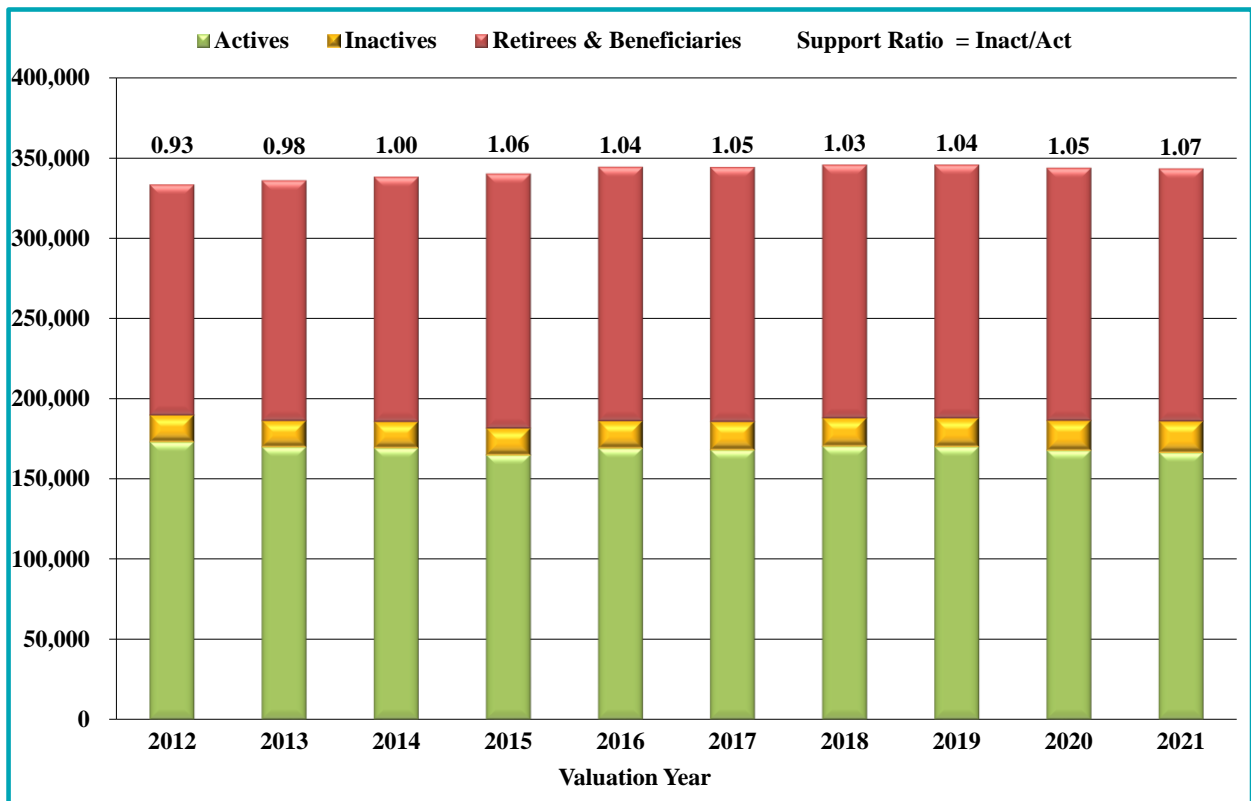
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Participant Trends

The chart below shows the membership counts of the Plan at successive valuations. The numbers which appear above each bar represent the ratio of the number of inactive members (retirees, reemployed retirees, and inactive members eligible for deferred allowances) to active members at each valuation date. We refer to this ratio as the support ratio.

The more retired and inactive members there are relative to active members, the more challenging it is for a plan to make up for experience losses (investment and liability) with contribution increases.

The support ratio has been generally increasing since 2012, which is common among mature systems.



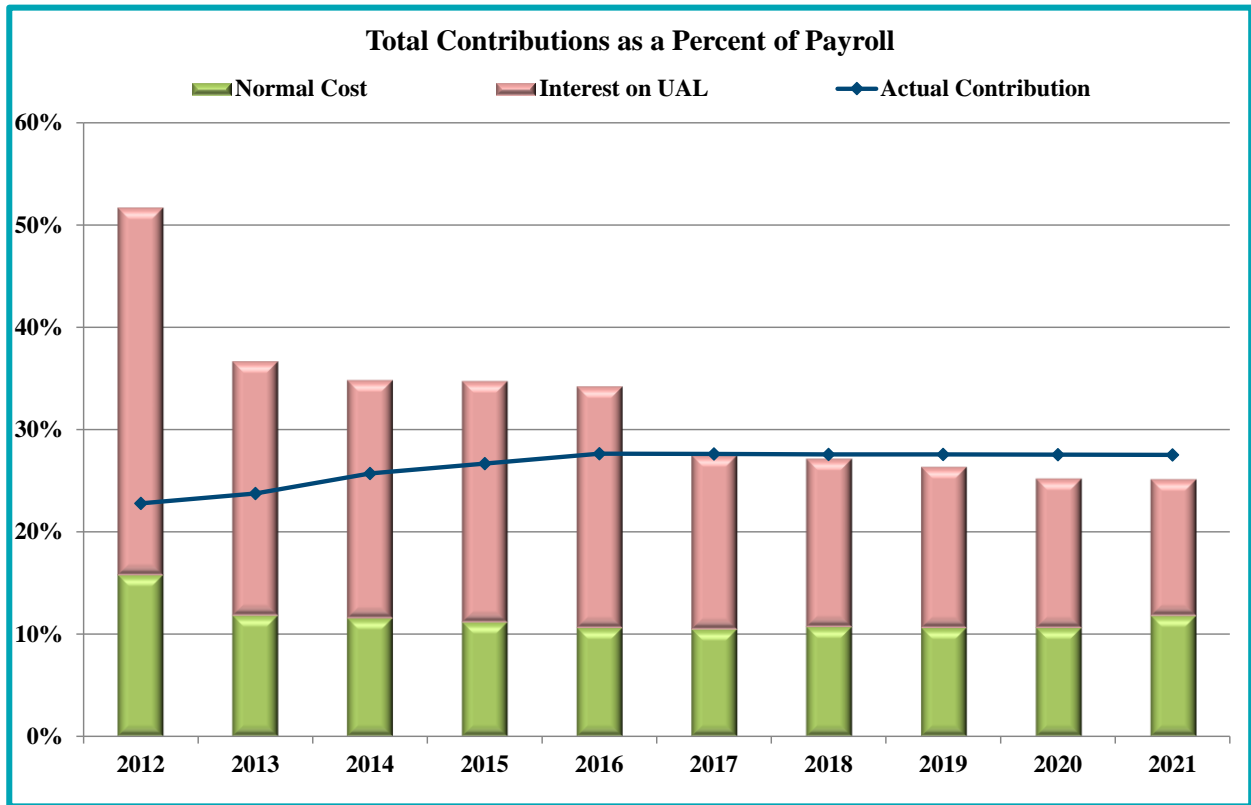
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Contributions versus Tread Water

The next chart compares the fixed employer contribution rate to a rate we refer to as the tread water rate. The tread water rate is that rate of payroll which if contributed would result in the UAL remaining the same in the following year if all experience exactly matched the assumptions. That happens when the full normal cost-plus interest on the UAL is contributed.

As can be seen in the following chart, the fixed employer contribution rate for all years shown in the chart was well below the tread water rate prior to 2017. Then, starting in 2017, the fixed employer contribution rate has exceeded the tread water rate and the excess has continued to grow slightly the past three years as the UAL has declined.

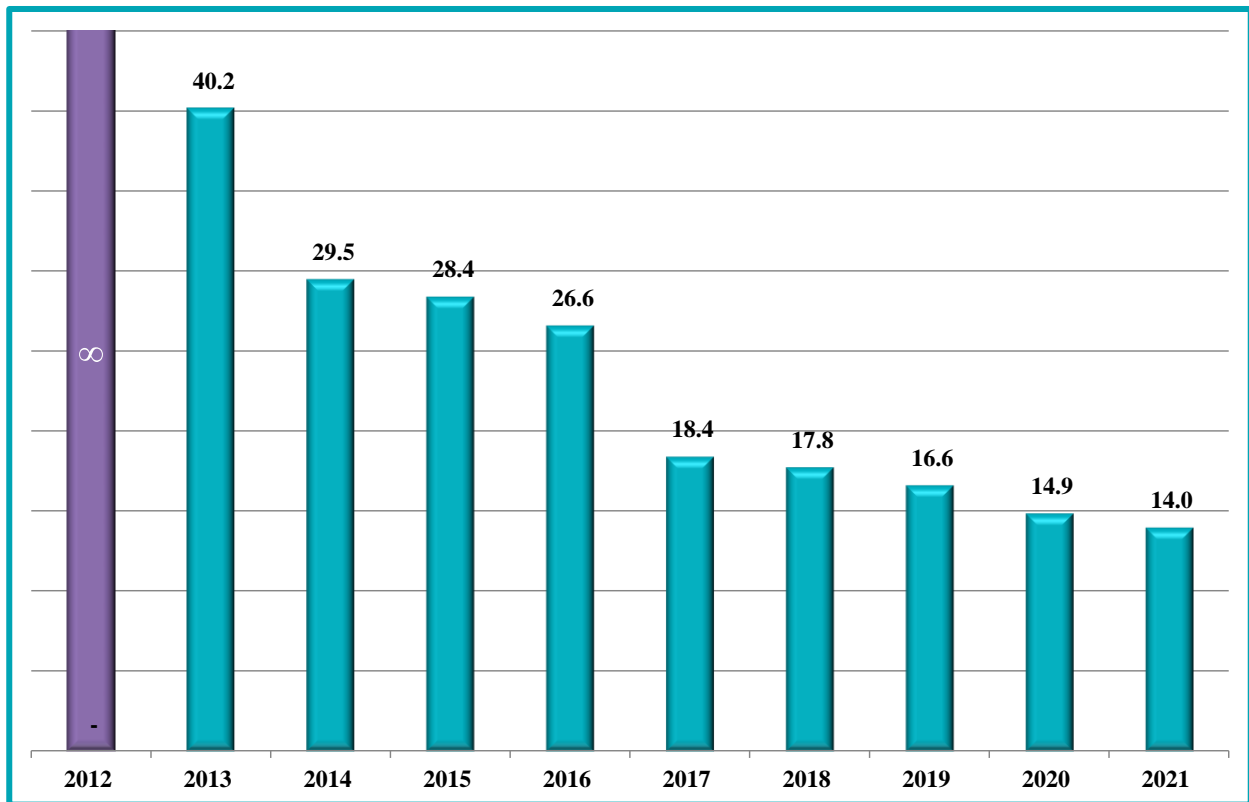


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**Amortization Periods**

The chart below shows the effective amortization period for funding the UAL based on the Actuarial Value of Assets on the valuation date. As can be seen in the chart, the fixed rate contributions for STRS Ohio in 2012 was not sufficient to amortize the UAL over any period. However, since then, there has been an effective amortization period and it has been steadily decreasing from 2013 through 2021. The pension reform changes in recent years, including allocation of the entire 14.0% employer contribution to pension and the reduction of the COLA to 0% have contributed to the decrease in the amortization period.



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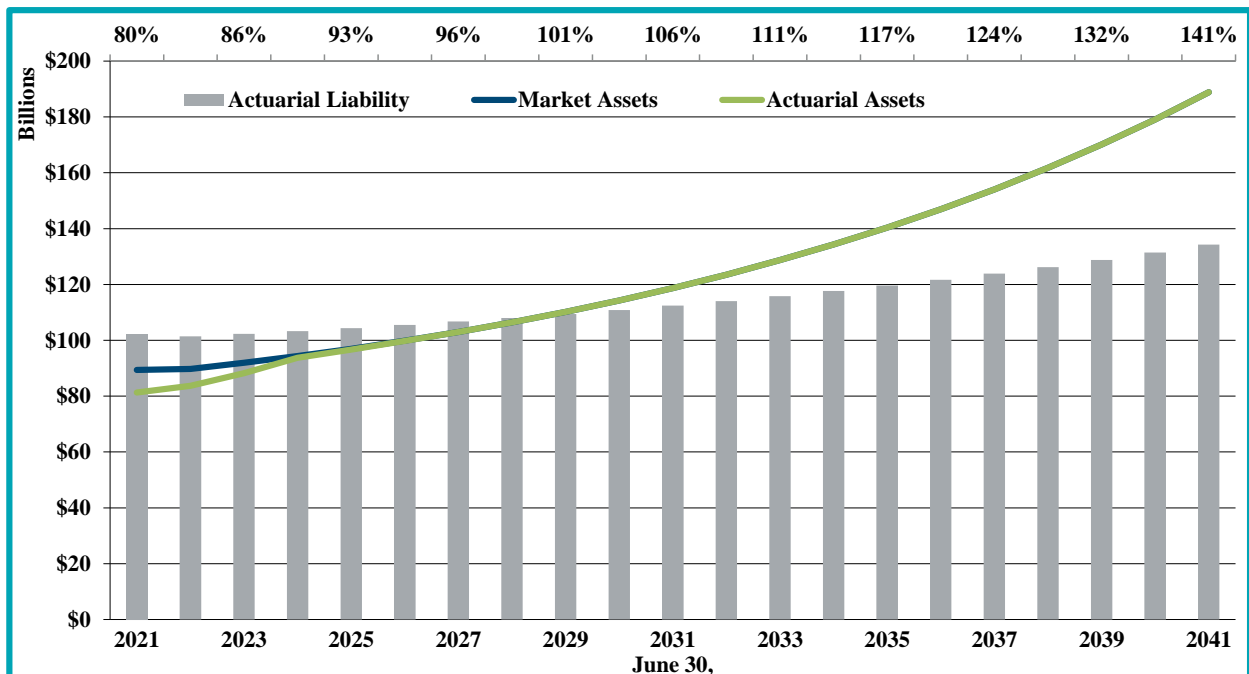
**Future Expected Financial Trends**

The analysis of projected financial trends is perhaps the most important component of this valuation. The chart presented in this section shows the expected progress of the System’s funded level over the next 20 years. Our baseline projection that follows is based on all results exactly matching assumptions, including that employers and members will continue to contribute the same percentage of payroll as they are currently contributing for all future years.

The following projection chart compares the Market Value of Assets (blue line) and the smoothed Actuarial Value of Assets (green line) to the System’s Actuarial Liabilities (gray bars). In addition, at the top of the chart, we show the System’s funded ratio on an Actuarial Value of Assets basis (ratio of Actuarial Value of Assets to Actuarial Liabilities). The years on the X-axis represent the valuation date as of June 30 of the corresponding year.

The System’s funded ratio on an Actuarial Value of Assets basis is projected to improve from the current level of 80% to 141% by the 2041 valuation and is projected to reach 100% funded in 2029. The current funded ratio of 80% differs from that shown in Table I-1 because these projections do not include Defined Contribution Account Balances.

This baseline projection assumes an annual return on the Market Value of Assets each year of 7.00% and the employer and employee contribution rates remain unchanged.



## SECTION II – DISCLOSURES RELATED TO RISK

### Introduction

Actuarial Standard of Practice (ASOP) No. 51 was published by the Actuarial Standards Board to provide guidance to actuaries on the assessment and disclosure of risks related to future pension plan experience deviating from assumptions. This section consolidates the information regarding assessment and disclosure of the pension Plan's risks and includes a number of additional items to help communicate and demonstrate these risks.

The pension Plan's actuarial valuation results are dependent on assumptions about future economic and demographic experience. Based on actuarial standards of practice, the assumptions represent a reasonable estimate for future experience. However, actual experience will not conform exactly to the assumptions and may differ significantly from the assumptions. This deviation is the risk that pension plan sponsors undertake in relying on a pension plan's actuarial valuation results.

This section of this report is intended to identify the primary drivers of these risks, provide background information and assessments about these identified risks and communicate the significance of these risks to this Plan.

### Identification of Risks

For pension plans, the three primary valuation results that can significantly differ from those expected are in assets, liabilities, and employer contributions. While there are several factors that could lead to these results being different, we believe the primary risks to this Plan are:

- Investment risk,
- Longevity and other demographic risks,
- Benefit change risk,
- Contribution risk, and
- Assumption change risk.

Other risks that we have not identified may also turn out to be important.

*Investment Risk* is the potential for investment returns to deviate from what is expected. When actual investment returns are lower than the investment assumption used in the actuarial valuation, the Unfunded Liability will increase and the period of time over which the Unfunded Liability is expected to be paid will increase. But, when actual returns exceed the assumption, the resulting Unfunded Liability measurements and resulting amortization period will be lower than anticipated.

*Longevity and Other Demographic Risk* is the potential for mortality or other demographic experience to be different than expected. Generally, longevity and other demographic risks emerge slowly over time as the actual experience deviates from expected. In addition, the

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extensive number of assumptions related to longevity and demographic experience often result in offsetting factors contributing to the Plan’s overall liability experience.

As such, these risks are often dwarfed by other risks, particularly those due to the investment returns. The following charts show that this has been true for this Plan, with the magnitude of the gains and losses from liability experience significantly smaller than those from investment experience, assumption changes, and benefit changes.

*Benefit Change Risk* is the potential for the provisions of the Plan to be changed such that the benefits and liabilities are changed materially. In addition to the actual payments to and from the Plan being changed, future valuation measurements can also be impacted, with benefit changes leading to deviations between actual future measurements and those expected by the current valuation.

*Contribution Risk* is the potential for actual future contributions to deviate from expected future contributions, or that the anticipated contributions will be inadequate to fund the Plan benefits. There are different sources of contribution risk ranging from the sponsor choosing to not make contributions in accordance with the funding policy to material changes in the contribution base (e.g., covered employees, covered payroll, sponsor revenue) that affect the amount of contributions the Plan will receive.

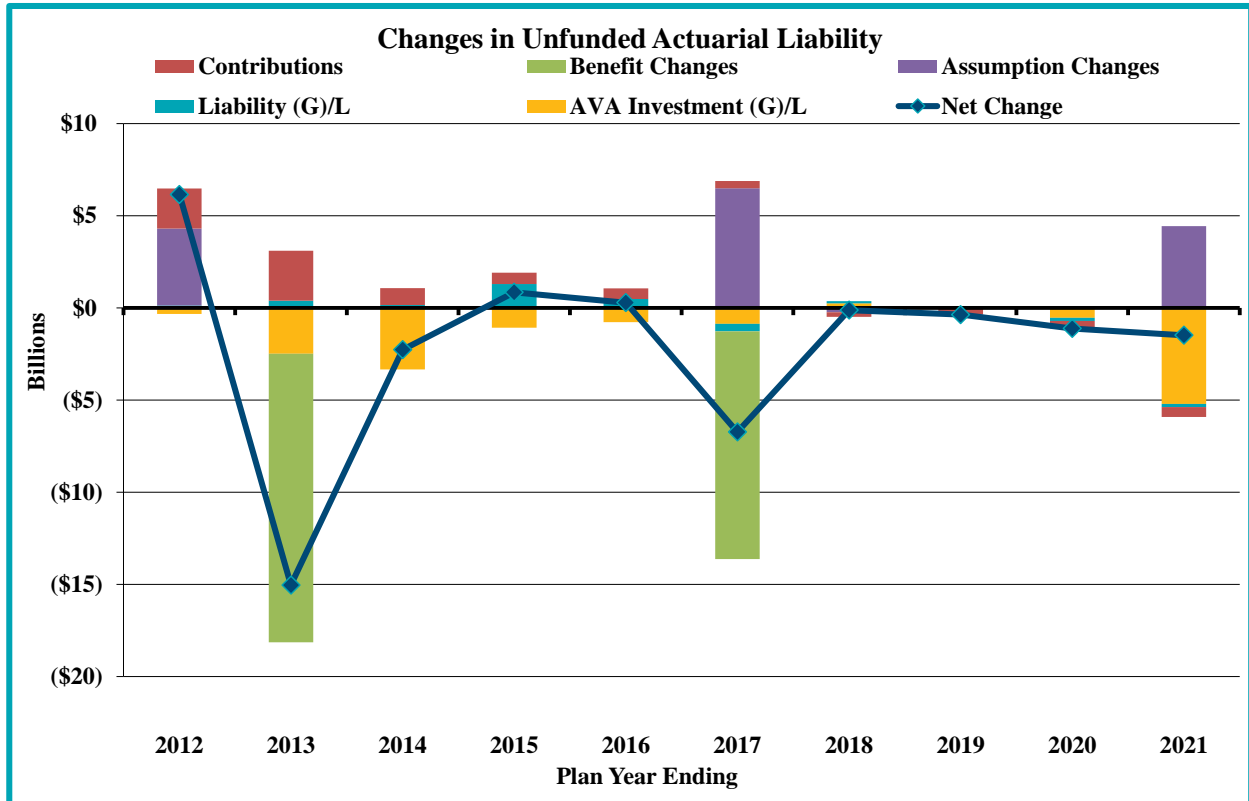
*Assumption Change Risk* is the potential for the environment to change such that future valuation assumptions are adjusted to be different than the current assumptions. For example, declines in interest rates over time may result in a change in the assumed rates of return used in the valuation. A healthier workforce may result in changes in employee behavior such that retirement rates are adjusted to reflect employees working longer. An experience study is scheduled to be performed before next year’s valuation which may modify assumptions. Assumption change risk is an extension of the risks previously identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in the environment when the current assumption is no longer reasonable. The historical review section will show that assumption change risk has been a relatively significant risk for this Plan.

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**Historical Review**

In understanding the impact of some of these risks, it is useful to look at what factors contributed to the Plan’s changes in Unfunded Actuarial Liability (UAL). These factors consist of annual actuarial experience gains and losses, assumption changes, benefit changes, and contribution shortfalls or excesses. The following chart shows how these factors have contributed, at each valuation date, to the change in the Plan’s UAL.

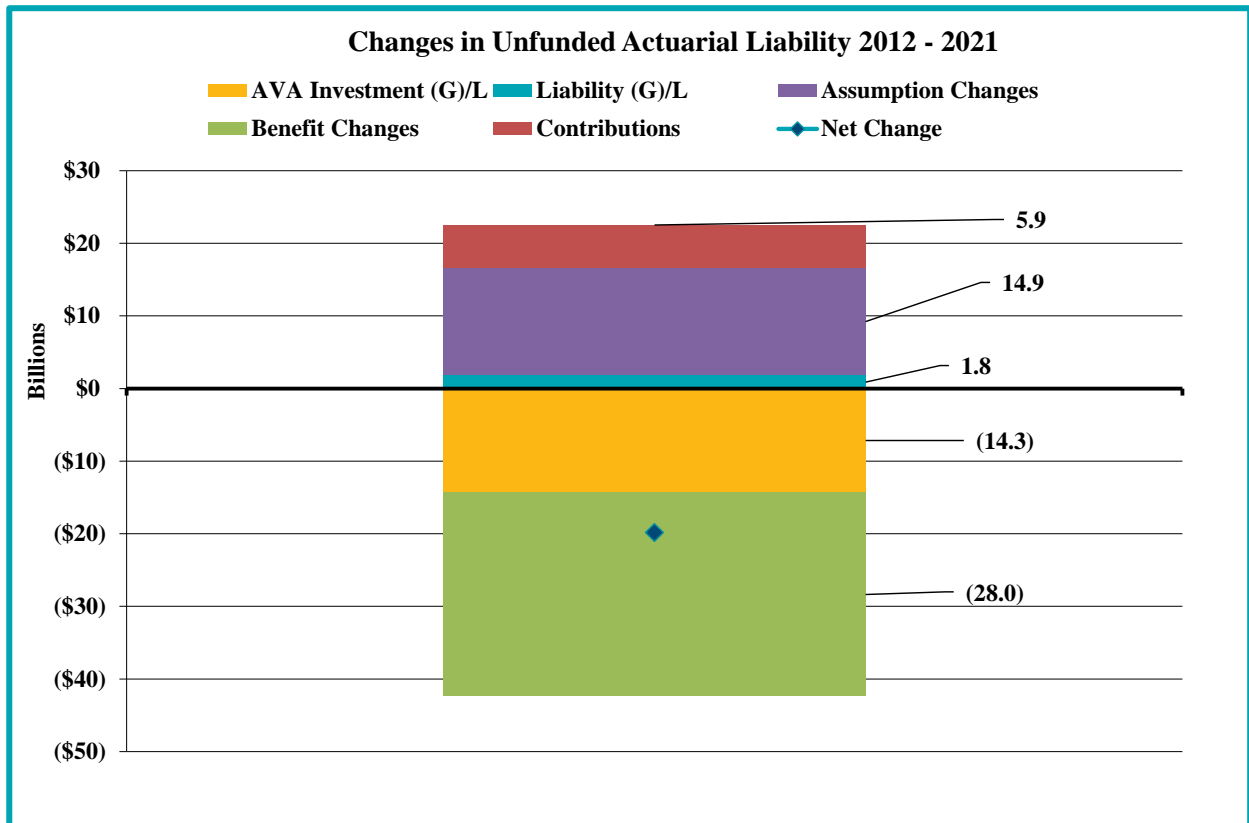


As described previously and is evident in this chart, benefit changes and assumption changes have been the most significant factors contributing to the changes in the Plan’s UAL. The next two most significant factors are the investment gains and losses and the fixed contribution shortfalls or excesses.

Another way to examine how each of the factors contributed to the change in the UAL is to look at the cumulative impact of each factor. The next chart shows this impact over the past ten years.

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Over this period, benefit changes and investment gains served to decrease the Unfunded Actuarial Liability by \$42.4 billion while contribution shortfalls, assumption changes, and liability losses served to increase the Unfunded Actuarial Liability by \$22.5 billion, resulting in a net reduction in the UAL of \$19.8 billion over this period. This decrease in the UAL from 2012 to 2021 has resulted in a decrease in the funding period from 2012 to 2021 as well as improvement of the funded status.



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**Plan Maturity Measures**

As pension plans become more mature, the identified risks become of more significant concern. As a result, it has become increasingly important to examine measures that indicate a pension Plan’s maturity level.

The balance of this section discloses and examines three maturity measures for the Plan: the asset leverage ratio, the support ratio, and the net cash flow ratio.

*Asset Leverage Ratio*

One of the more important plan maturity measures is the asset leverage ratio— the Market Value of Assets divided by the Plan’s payroll. As a plan matures, its assets increase. The greater the Plan’s assets are relative to payroll, the more vulnerable the Plan is to investment volatility. This can result in higher volatility of contribution rates when measured as a percent of payroll. The following example demonstrates this.

(\$ in millions)		
	Plan A	Plan B
<b>Plan Assets</b>	\$ 5,000	\$ 5,000
<b>Payroll</b>	\$500	\$1000
<b>Asset Leverage Ratio</b>	10.0	5.0
<b>10% Investment Loss</b>	\$500.0	\$500.0

This example shows two plans that both experience a 10% investment loss equaling \$500 million. Although their assets are the same, because of the size of payroll, Plan A’s asset leverage ratio is 10 and Plan B’s ratio is 5. This means that Plan A has to spread or amortize that loss over a payroll that is half as large as Plan B’s. To put it another way, other things being equal, Plan A would need to increase contributions as a percentage of payroll by twice the increase in contribution rate of Plan B in order to make up the same investment loss. Despite the fact that STRS Ohio’s on-going contributions are based on a fixed statutory rate and experience gains and losses are not amortized over payroll, the asset leverage ratio still provides some indication as to how the much statutory contribution rate would need to be changed if corrective actions were at some point ever necessary to maintain Plan solvency.

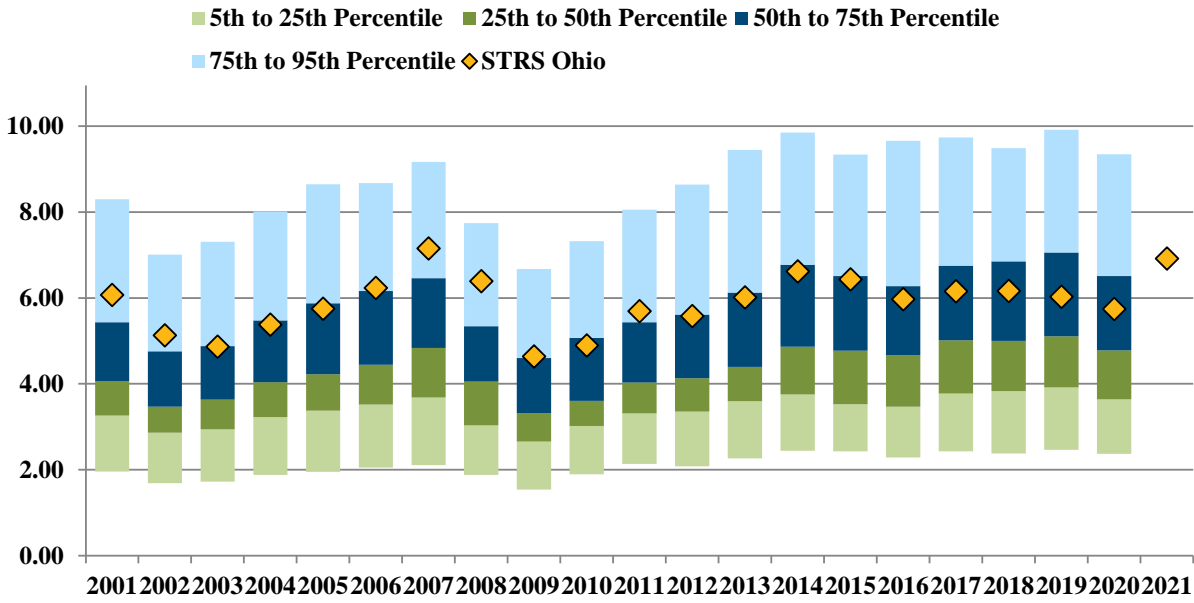
The Boston College’s Center for Retirement Research, NASRA and the Center for State and Local Government Excellence maintain the Public Plan Database that contains the majority of state plans as well as many large municipal plans. The database contains information for about 180 plans per year. The following chart shows the asset leverage ratios for all plans in this database since 2001. The colored bars represent the central 90% of the asset leverage ratios for the plans. STRS Ohio is represented by the gold diamond. From 2001 through 2016, Ohio’s asset leverage ratio was close to the 75<sup>th</sup> percentile of all plans. Since 2016, Ohio’s asset leverage ratio

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has stayed steady around 6.0 putting the Plan in just over the 60<sup>th</sup> percentile. This means that while STRS Ohio, by this measure, is more mature than 60 percent of all plans, which is a slight improvement when compared to being more mature than 75 percent of all plans back in 2001. The public plan data for FY21 is not available at this time but you can see an increase in the ratio for STRS Ohio based on this valuation. This is a result of the high investment returns experienced by the Plan and we would anticipate a similar increase for most plans in the database.

**Asset Leverage Ratio**



*Survey Data from Public Plans Database as of 6/28/2021*

Another leverage ratio that can be examined is the liability leverage ratio, the ratio of Actuarial Liabilities to payroll. Because liabilities have significantly less annual volatility or gains and losses than assets, this measure is less important.

*Support Ratio*

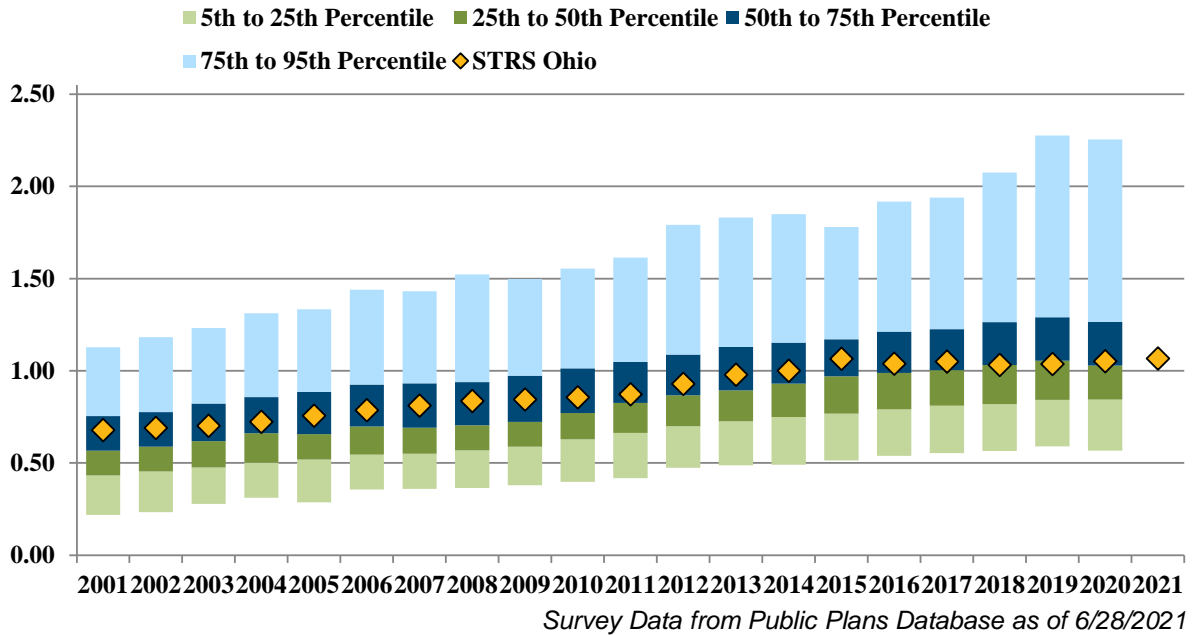
A commonly used measure of plan maturity is the Support Ratio, the ratio of retired and inactive members (those receiving benefits or entitled to a deferred benefit) to the number of active members (those currently accruing benefits) in the Plan. The greater this ratio, the more likely that the Plan will have negative cash flow. The chart on page 4 shows that the support ratio for STRS Ohio has grown over the last ten years.

The following chart shows the support ratio over time for the Plan compared to the Public Plan database.

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**Support Ratio**



The gold diamonds in this chart show that STRS Ohio’s support ratio for each year has generally increased over time and has gone from above the 60<sup>th</sup> percentile level to about the 50<sup>th</sup> percentile. This indicates that the Plan is maturing, as have most plans in this database over the years, but on this measure has done so at a slightly slower rate than the universe of plans.

*Net Cash Flow Ratio*

Another measure of plan maturity is the ratio of the net cash flow (contributions minus benefits and expenses) divided by the market value of plan assets. With shrinking workforces, aging Baby Boomers, and increasing life expectancies, plans pay out more in benefits than they receive in contributions, leading to negative net cash flows.

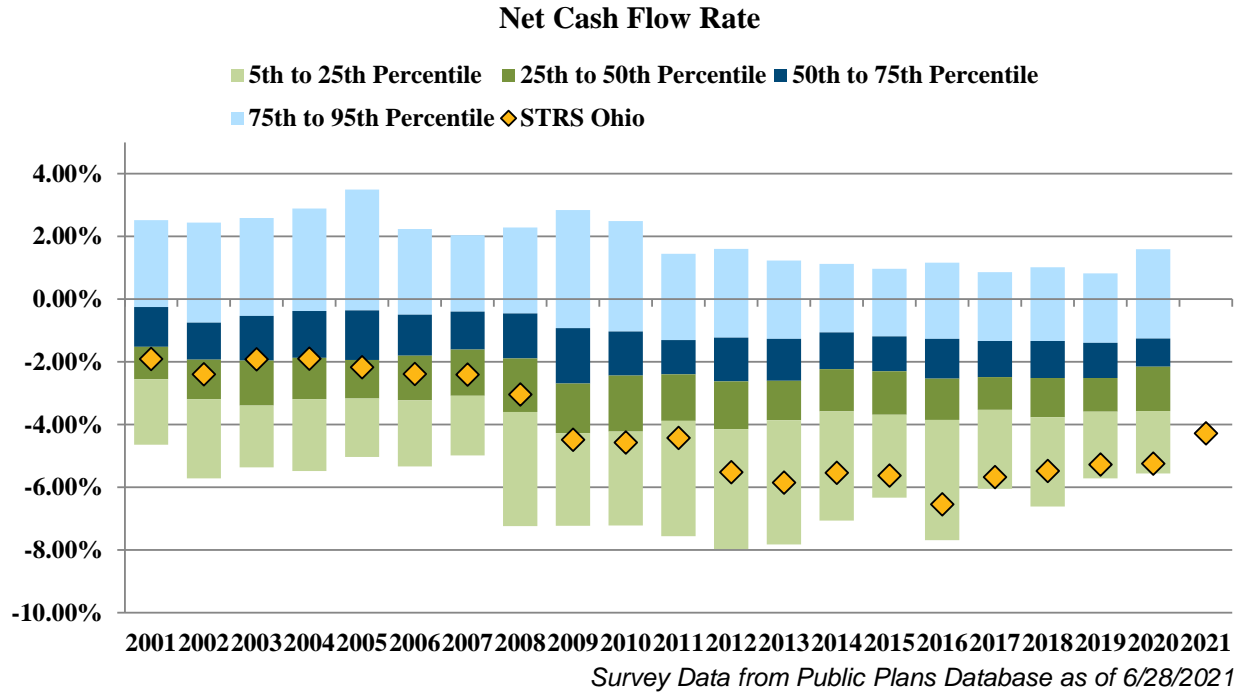
When plans with negative net cash flows suffer investment losses, they need to liquidate assets to pay for benefits and expenses that are in excess of contributions. That means these plans will need to earn higher returns to rebuild their assets to previous levels. Plans with significant negative cash flows are more vulnerable to market declines. In our opinion and based on our experience dealing with pension plans having negative cash flows, negative cash flows start becoming a concern once they exceed 5% of Plan assets, which was the case for STRS Ohio from 2012-2020.

This chart compares STRS Ohio’s net cash flow ratio to other plans from the Public Plan database from 2001 through 2020. In 2020 STRS Ohio’s negative cash flow was -5.2% which places the Plan at the 5<sup>th</sup> percentile of the Public Plan database. This demonstrates that on this measure STRS Ohio is maturing at a pace faster than other large public pension plans. Due to the

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**SECTION II – DISCLOSURES RELATED TO RISK**

higher market values, the negative cash flow increased to -4.2% for 2021. When the data becomes available, we anticipate other plans will have a similar increase.



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**SECTION II – DISCLOSURES RELATED TO RISK**

**Assessment of Future Risks**

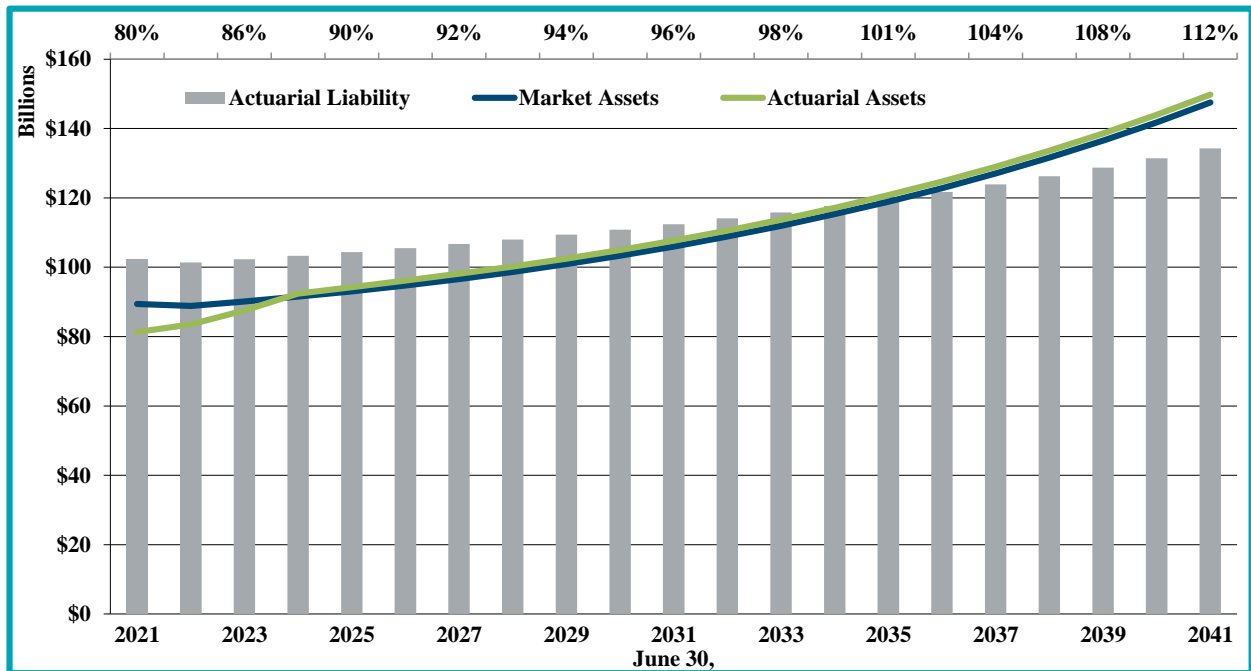
The fundamental risk to the Plan is that contributions will not adequately fund Plan benefits. In assessing this risk we perform stress testing on the Plan’s funded status and contribution adequacy.

*Stress Testing the Plan’s Funded Status*

One of the ways to assess the investment risk is to project the impact of future investment returns not matching the assumptions.

In Callan’s March 2021 Capital Market Assumptions report, they reported a 10-year median expected return of 6.0%, a 25<sup>th</sup> percentile return of 3.1% and 75<sup>th</sup> percentile return of 9.1%. The following three graphs project returns using these expectations for the next 20 years and can be compared with the baseline projection graph shown on page 8 to provide a sense of the risk associated with investment returns.

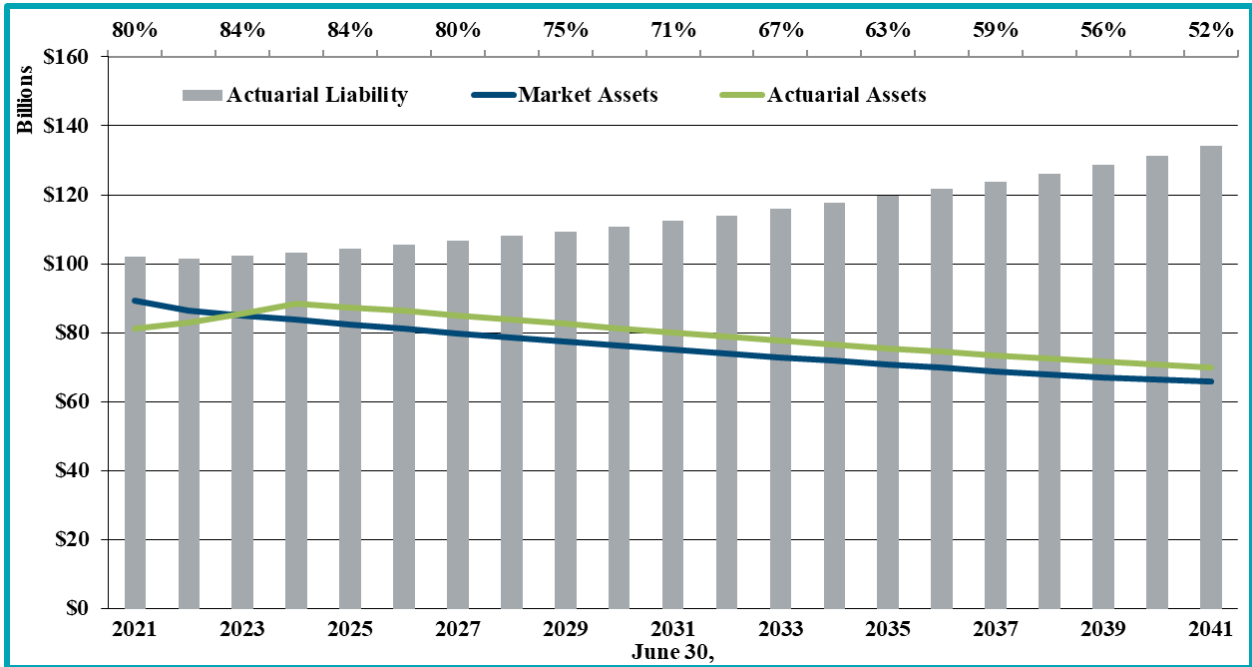
If we assume the median 6.0% return on the Market Value of Assets instead of the 7.0% assumption for our 20-year projection, the funded ratio in 2041 is expected to be 112% compared to 141% in the baseline projection.



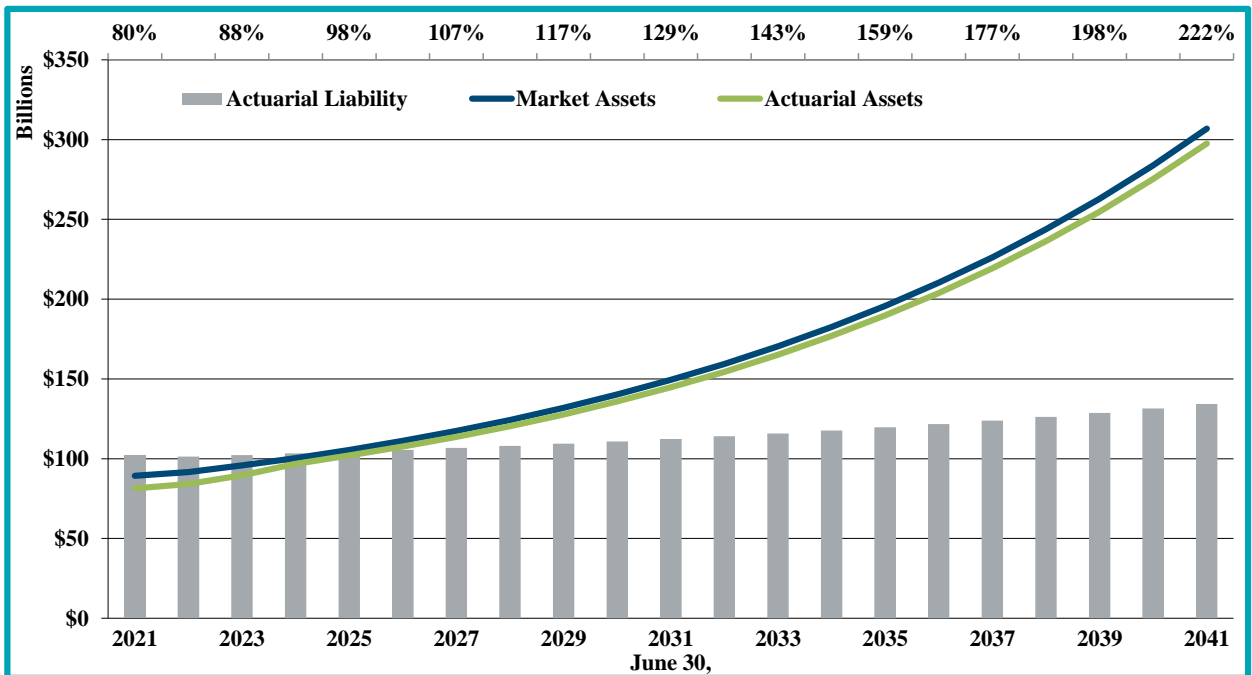
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Assuming an annual return each year of 3.1% results in the funded ratio being 52% in 2041.



Assuming an annual return each year of 9.1% results in the funded ratio being 222% in 2041.



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**SECTION II – DISCLOSURES RELATED TO RISK**

*Stress Testing the Plan's Contribution Adequacy*

In assessing contribution risk it is important to assess the adequacy of contributions, particularly in a plan with a fixed contribution rate. One way to assess adequacy is to compare the contributions to the Plan's tread water cost. As shown on page 6, the Plan's tread water rate has decreased in recent years due to the change in the benefits provided by the Plan. In addition, the contributions allocated to the pension Plan have increased so now the contribution rate is greater than the tread water rate.

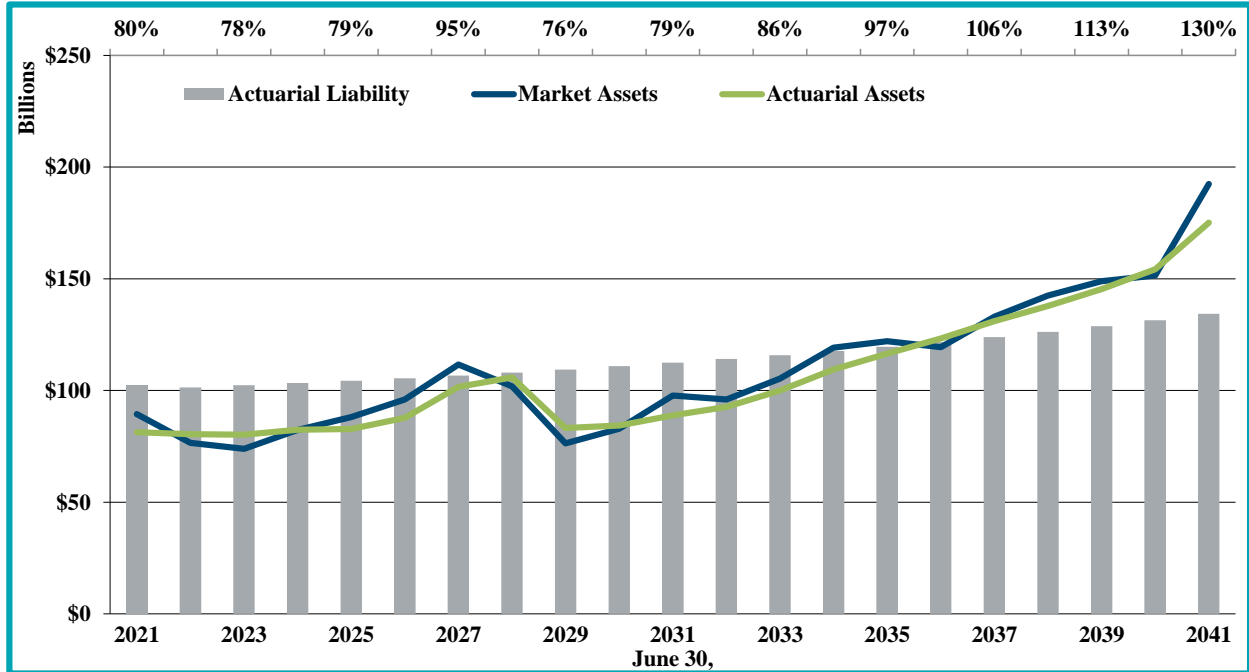
STRS Ohio also uses another measure to assess the adequacy of the current contribution rate. Since the contribution rate is fixed each year the System calculates the equivalent amortization period of a contribution based on amortizing the Unfunded Actuarial Liability. The chart on page 7 shows that the equivalent amortization period has decreased in recent years.

Assessing the future risk that the expected measurements produced by the actuarial valuations will deviate from the actual values over time is complex and can never be exactly known.

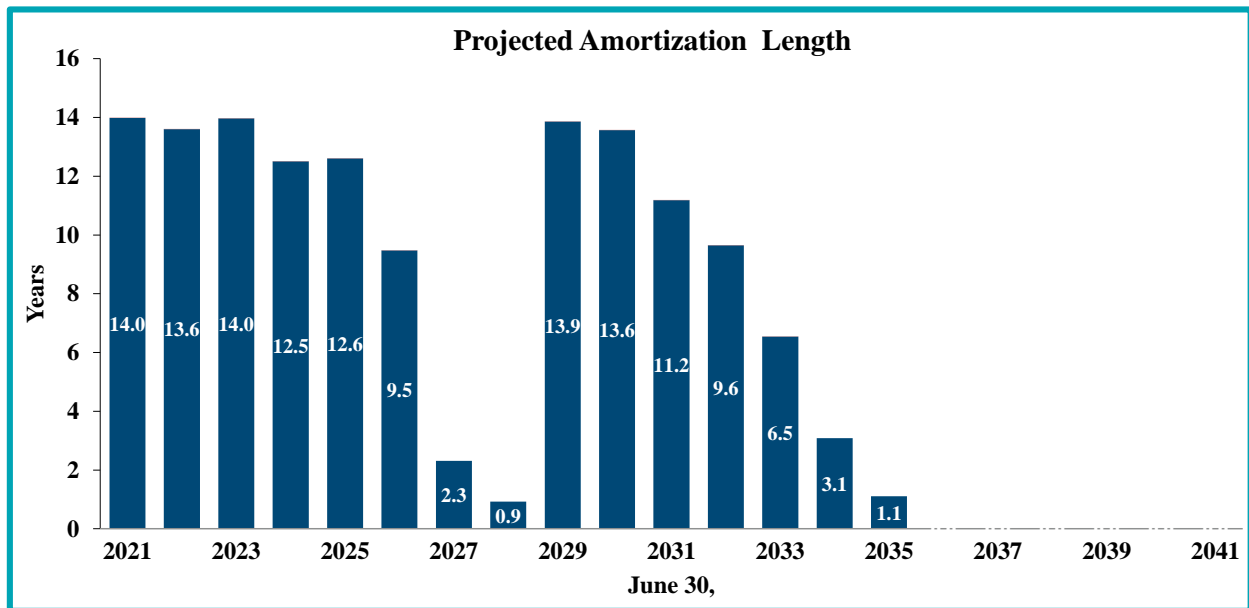
Page 8 shows the baseline projection of the Plan. It is important to note that baseline projections, while valid, are not going to occur as experience never conforms exactly to assumptions every year. As discussed in the Plan maturity section, as plans become more mature it becomes more difficult to recover from market declines even when the average investment return over a long period is equal to the expected return. As a demonstration of this, the following projection is included, which is based on assuming varying returns in the future on the Market Value of Assets. We based these varying returns on assuming the returns for the next 20 years will be the same as those that actually occurred during the 20-year period ending June 30, 2021, shown in Table III-5 on page 27. This results in an average return of 7.6% over the next 20 years, which is above the current assumed return.

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**SECTION II – DISCLOSURES RELATED TO RISK**



With varying annual earnings, one can see the volatility in the equivalent amortization period in the next chart. Note that this chart reflects an illustrative scenario and is not intended to reflect future expectations as the volatility of the equivalent amortization period will vary with the volatility of the returns.





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**SECTION III – ASSETS**

Pension plan assets play a key role in the financial operation of the Plan and in the decisions that the Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely impact benefit levels, employer contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on the Plan assets including:

- **Disclosure** of the Plan assets as of June 30, 2020 and June 30, 2021;
- Statement of the **changes** in market values during the year;
- Development of the **Actuarial Value of Assets**; and
- An assessment of **investment performance**.

**Disclosure**

There are two types of asset values disclosed in this valuation, the Market Value of Assets and the Actuarial Value of Assets. The market value represents a “snap-shot” or “cash-out” value, which provides the principal basis for measuring financial performance from one year to the next. The Actuarial Value of Assets are typically used by plans to smooth volatile market returns in order to provide for less volatile contributions. However, for plans like STRS Ohio that have a fixed contribution rate, the use of an Actuarial Value of Assets is not as relevant.

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**SECTION III – ASSETS**

Table III-1 below discloses and compares each asset value as of June 30, 2021 and June 30, 2020.

Table III-1 Statement of Market Value of Assets as of June 30,					
	2021			2020	% Change
	<u>Defined Benefit</u>	<u>Defined Contribution</u>	<u>Total</u>	<u>Total</u>	
<b>Assets</b>					
Cash & Short-Term Investments	\$ 1,313,583,767	\$ 178,594,064	\$ 1,492,177,831	\$ 1,979,806,950	(24.63%)
Receivables	1,147,350,835	127,500	1,147,478,335	939,168,303	22.18%
Fixed Income	17,540,529,200	290,196,472	17,830,725,672	14,679,529,756	21.47%
Domestic Equities	24,108,499,989	1,482,890,294	25,591,390,283	20,470,574,354	25.02%
International Equities	19,494,756,109	317,407,534	19,812,163,643	16,041,304,734	23.51%
Real Estate	9,307,429,773	157,253,859	9,464,683,632	9,073,568,657	4.31%
Alternative Investments	18,893,805,228	0	18,893,805,228	13,588,902,168	39.04%
Invested Securities Lending Capital	612,491,394	0	612,491,394	337,295,157	81.59%
Capital Assets	252,737,779	0	252,737,779	245,906,803	2.78%
Accumulated Depreciation	<u>(174,822,367)</u>	<u>0</u>	<u>(174,822,367)</u>	<u>(169,668,200)</u>	<u>3.04%</u>
<b>Total Assets</b>	<b>\$ 92,496,361,707</b>	<b>\$ 2,426,469,723</b>	<b>\$ 94,922,831,430</b>	<b>\$ 77,186,388,682</b>	<b>22.98%</b>
<b>Liabilities</b>					
Securities Purchased and Other Investment Liabilities	\$ (402,309,782)	\$ 0	\$ (402,309,782)	\$ (192,696,289)	108.78%
Debt on Real Estate Investments	(1,969,380,414)	0	(1,969,380,414)	(2,012,882,066)	(2.16%)
Accrued Expenses and Other Liabilities	(32,124,793)	0	(32,124,793)	(31,950,556)	0.55%
Obligations Under Security Lending Program	(612,240,111)	0	(612,240,111)	(337,146,795)	81.59%
Net Pension Liability	<u>(101,268,739)</u>	<u>0</u>	<u>(101,268,739)</u>	<u>(135,866,697)</u>	<u>(25.46%)</u>
<b>Total Liabilities</b>	<b>\$ (3,117,323,840)</b>	<b>\$ 0</b>	<b>\$ (3,117,323,840)</b>	<b>\$ (2,710,542,403)</b>	<b>15.01%</b>
<b>Market Value of Assets</b>	<b>\$ 89,379,037,867</b>	<b>\$ 2,426,469,723</b>	<b>\$ 91,805,507,590</b>	<b>\$ 74,475,846,279</b>	<b>23.27%</b>

Numbers may not add due to rounding

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**SECTION III – ASSETS**

**Actuarial Value of Assets**

The Actuarial Value of Assets represents a “smoothed” value developed by the actuary to reduce, or eliminate, volatile results which could develop from short-term fluctuations in the Market Value of Assets. For this Plan, the Actuarial Value of Assets is based on the Market Value of Assets with a four-year phase-in of actual investment return in excess of (or less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the Actuarial Value of Assets (adjusted for receipts and disbursements during the year). The actual investment return for this purpose is determined net of all investment and administrative expenses. The Actuarial Value is further adjusted, if necessary, to be within 9% of the market value. The June 30, 2021, Actuarial Value of Assets attributed to the Defined Benefit plan was adjusted to be within this 9% corridor of the market value.

The next three tables show how the Actuarial Value of Assets is developed. Table III-2 shows the changes in the market and Actuarial Value of Assets, Table III-3 shows the development of the gain/(loss) on assets for purposes of determining the Actuarial Value of Assets, and Table III-4 shows the development of the Actuarial Value of Assets.

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**SECTION III – ASSETS**

**Table III-2  
Changes in Value of Assets<sup>1</sup>**

	<u>Market Value of Assets</u>	<u>Actuarial Value of Assets</u>
<b>1. Value of Assets - June 30, 2020</b>	<b>\$ 72,728,360,185</b>	<b>\$ 74,610,194,516</b>
<b>2. Calculation of Net Cash Flow</b>		
(a) Member Contributions	\$ 1,585,508,577	\$ 1,585,508,577
(b) Employer Contributions	1,696,120,572	1,696,120,572
(c) Transfers between Plans/from Other Systems	83,062,216	83,062,216
(d) Benefit Payments and Refunds	(7,269,449,355)	(7,269,449,355)
<b>(e) Net Cash Flow</b>	<b>\$ (3,904,757,990)</b>	<b>\$ (3,904,757,990)</b>
<b>3. Value of Assets - June 30, 2021</b>	<b>\$ 89,379,037,867</b>	<b>\$ 81,334,924,459</b>
4. Net Investment Income [3. - 1. - 2.(e)]	\$ 20,555,435,672	\$ 10,629,487,933
5. Average Value of Assets [1. + 1/2*2.(e)]	\$ 70,775,981,190	\$ 72,657,815,521
6. Rate of Return [4. / 5.]	29.04%	14.63%
7. Assumed Rate of Return <sup>2</sup>	7.45%	7.45%
8. Expected Net Investment Income [5. * 7.]	\$ 5,272,810,599	\$ 5,413,007,256
9. Investment Gain/(Loss) [4. - 8.]	\$ 15,282,625,073	\$ 5,216,480,677

<sup>1</sup>Only includes assets for the Defined Benefit Plan. Defined Contribution Plan assets are not included.

<sup>2</sup>The 7% assumed rate of return is effective beginning 7/1/2021, this period ending 6/30/2021 uses 7.45%.

Numbers may not add due to rounding

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**SECTION III – ASSETS**

<b>Table III-3</b>	
<b>Development of Gain/(Loss) on Assets for Smoothing<sup>1</sup></b>	
1. Actuarial Value of Assets at June 30, 2020	\$ 74,610,194,516
2. Calculation of Net Cash Flow	
(a) Member Contributions	1,585,508,577
(b) Employer Contributions	1,696,120,572
(c) Transfers between Plans/from Other Systems	83,062,216
(d) Benefit Payments and Refunds	<u>(7,269,449,355)</u>
(e) Net Cash Flow	(3,904,757,990)
3. Average Actuarial Value of Assets [1. + 1/2 * 2.(e)]	72,657,815,521
4. Expected Income	5,413,007,256
5. Actual Income on Market Value of Assets	20,555,435,672
6. Gain/(Loss) for year ended June 30, 2021	\$ 15,142,428,416

<sup>1</sup>Only includes assets for the Defined Benefit Plan. Defined Contribution Plan assets are not included.

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**SECTION III – ASSETS**

<b>Table III-4</b>		
<b>Development of Actuarial Value of Assets</b>		
	<b>Original Gain/(Loss)</b>	<b>Deferred Portion</b>
Defer 0% of 2018 Gain/(Loss)	\$ 1,431,666,645	\$ -
Defer 25% of 2019 Gain/(Loss)	(482,718,633)	(120,679,658)
Defer 50% of 2020 Gain/(Loss)	(2,664,522,233)	(1,332,261,117)
Defer 75% of 2021 Gain/(Loss)	15,142,428,416	<u>11,356,821,312</u>
Total Deferred Gain/(Loss) for AVA Calculation		\$ 9,903,880,537
Market Value of Assets at June 30, 2021		\$ 89,379,037,867
Total Unrecognized Gain/(Loss)		<u>9,903,880,537</u>
Preliminary Actuarial Value of Assets at June 30, 2021		\$ 79,475,157,330
Adjustment for 91% / 109% corridor		<u>1,859,767,129</u>
Actuarial Value of Pension Assets at June 30, 2021		\$ 81,334,924,459
Defined Contribution Plan Assets at June 30, 2021		<u>2,426,469,723</u>
Total Actuarial Value of Assets at June 30, 2021		\$ 83,761,394,182
Actuarial Value as a Percent of Market Value		91.2%

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**SECTION III – ASSETS**

**Investment Performance**

The Market Value of Assets (MVA) earned 29.04% during the fiscal year ending June 30, 2021, which is more than the assumed 7.45% return for the period ending June 30, 2021. A return of 14.63% was experienced on the Actuarial Value of Assets (AVA), resulting in an actuarial gain for the year. Table III-5 shows the returns over the last 20 years.

<b>Table III-5 Historic Investment Return</b>		
<b>Year Ending June 30,</b>	<b>Market Value</b>	<b>Actuarial Value</b>
2021	29.0%	14.6%
2020	3.6%	8.2%
2019	6.6%	7.5%
2018	9.5%	7.1%
2017	14.1%	9.0%
2016	0.4%	8.9%
2015	5.2%	9.5%
2014	16.5%	13.3%
2013	13.5%	12.1%
2012	1.7%	8.5%
2011	22.5%	9.2%
2010	13.5%	6.6%
2009	-22.0%	-17.7%
2008	-5.6%	7.0%
2007	20.6%	18.4%
2006	13.5%	11.0%
2005	11.9%	5.7%
2004	17.2%	9.4%
2003	1.8%	1.6%
2002	-8.3%	-7.8%
<b>Average Returns</b>		
Last 5 years:	12.2%	9.2%
Last 10 years:	9.7%	9.8%
Last 15 years:	7.9%	7.8%
Last 20 years:	7.6%	6.8%

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SECTION IV – LIABILITIES

In this section, we present detailed information on the Plan liabilities including:

- **Disclosure** of the Plan liabilities as of June 30, 2020 and June 30, 2021, and
- Statement of **changes** in these liabilities during the year.

**Disclosure**

Two types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them.

- **Present Value of Future Benefits:** Used for measuring all future plan obligations, represents the amount of money needed today to fully fund all benefits of the Plan both earned as of the valuation date and those expected to be earned in the future by current plan participants, under the current plan provisions and current assumptions.
- **Actuarial Liability:** Used for funding calculations, this liability is calculated as of the valuation date as the Present Value of Benefits allocated to service prior to that date using the Entry Age Normal cost funding method.

These liability amounts are not appropriate for measuring a settlement of the Plan's liabilities either by purchase of annuities or payment of lump-sums.

Table IV-1, which follows, discloses each of these liabilities for the current and prior valuations.



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**SECTION IV – LIABILITIES**

<b>Table IV-1</b>				
<b>Liability Detail</b>				
	<u>June 30, 2021</u>			<u>June 30, 2020</u>
	<u>Defined Benefit</u>	<u>Combined</u>	<u>Total</u>	<u>Total</u>
<b><u>Present Value of Future Benefits</u></b>				
Active Member Benefits	\$ 45,245,074,360	\$ 604,063,654	\$ 45,849,138,014	\$ 40,607,846,766
Reemployed Retiree Benefits	281,191,638	-	281,191,638	295,639,758
Inactive Benefits				
(i) Deferred Annuity	1,563,704,759	17,903,154	1,581,607,913	1,423,539,978
(ii) Contribution Refund	395,302,507	1,336,444	396,638,951	376,124,969
Retiree & Beneficiary Benefits				
(i) Annuity & Pension Reserve Fund	67,988,885,028	44,807,991	68,033,693,019	66,074,399,009
(ii) Survivor's Benefit Fund	1,164,895,687	-	1,164,895,687	1,130,012,294
<b>Present Value of Future Benefits (PVB)<sup>1</sup></b>	<b>\$ 116,639,053,979</b>	<b>\$ 668,111,243</b>	<b>\$ 117,307,165,222</b>	<b>\$ 109,907,562,774</b>
<b><u>Actuarial Liability</u></b>				
Active Member Benefits	\$ 30,373,529,623	\$ 333,379,822	\$ 30,706,909,445	\$ 27,625,085,970
Reemployed Retiree Benefits	281,191,638	-	281,191,638	295,639,758
Inactive Benefits	1,959,007,266	19,239,598	1,978,246,864	1,799,664,947
Retiree & Beneficiary Benefits	69,153,780,715	44,807,991	69,198,588,706	67,204,411,303
Defined Benefit Plan Actuarial Liability	101,767,509,242	397,427,411	102,164,936,653	96,924,801,978
Defined Contribution Account Balances	2,426,469,723	-	2,426,469,723	1,747,486,094
<b>Total Actuarial Liability (AL)</b>	<b>\$ 104,193,978,965</b>	<b>\$ 397,427,411</b>	<b>\$ 104,591,406,376</b>	<b>\$ 98,672,288,072</b>
Actuarial Value of Assets (AVA)			\$ 83,761,394,182	\$ 76,357,680,610
<b>Net Unfunded/(Surplus) Actuarial Liability (AL-AVA)</b>			<b>\$ 20,830,012,194</b>	<b>\$ 22,314,607,462</b>

<sup>1</sup> Excludes the Defined Contribution Account Balances.

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**SECTION IV – LIABILITIES**

**Changes in Liabilities**

Each of the liabilities disclosed in the prior table are expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New hires since the last valuation
- Benefits accrued since the last valuation
- Plan amendments changing benefits
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, or dying at rates different than expected (demographic experience)
- Participants' salaries increasing at rates different than expected
- A change in actuarial or investment assumptions
- A change in the actuarial funding method

Unfunded Liabilities will change due to the liability changes described above and also from changes in plan assets resulting from:

- Employer contributions differing from expected
- Investment earnings differing from expected
- A change in the method used to measure plan assets

In each valuation, we report on those elements of change which are of particular significance, potentially affecting the long-term financial outlook of the Plan. Below we present key changes in liabilities since the last valuation.

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**SECTION IV – LIABILITIES**

In the table that follows, we show the components of the changes in the Actuarial Liability between June 30, 2020 and June 30, 2021.

<b>Table IV-2</b>	
<b>Changes in Defined Benefit Actuarial Liability</b>	
Liabilities as of June 30, 2020	\$ 96,924,801,978
Liabilities as of June 30, 2021	102,164,936,653
Liability Increase (Decrease)	5,240,134,675
Changes in Liability Due to:	
Method Changes	0
Benefit Changes	0
Assumption Changes	4,433,796,926
Experience (Gain)/Loss	(157,480,962)
Benefits Accumulated and Other Sources	963,818,711

The change in Actuarial Liability attributed to Experience (Gain)/Loss can be further broken down by source, as shown in Table IV-3 below.

<b>Table IV-3</b>	
<b>Experience (Gain)/Loss by Source as of June 30, 2021</b>	
Salary/Service Increase	\$ (236,538,838)
Retirement Experience	\$ 202,877,673
Retiree Mortality	\$ (208,368,646)
New Entrants	\$ 32,503,826
Data composition and other changes	<u>\$ 52,045,023</u>
Experience (Gain)/Loss	\$ (157,480,962)

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**SECTION V – CONTRIBUTIONS**

In the process of evaluating the financial condition of any pension plan, as the actuary, we analyze the assets and liabilities to determine what level of contributions is needed to properly maintain (or improve if below 100%) the funded status of the Plan. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

Under Chapter 3307 of the Ohio Revised Code, members of the Defined Benefit Plan contribute 14.00% of payroll and members of the Combined Plan contribute 2.00% of payroll. Employers contribute 14.00% of payroll for members in the Defined Benefit Plan and the Combined Plan. Beginning in fiscal year 2014, the Board allocated the total employer contribution rate towards pension and survivor benefits, and made no allocation to health care. Contributions in excess of the total normal cost are used to fund the Unfunded Actuarial Liability. Table V-1 shows the development of the employer contribution rates.

<b>Table V-1</b>				
<b>Development of Employer Contribution Rate</b>				
	<u>2021</u>			<u>2020</u>
	<u>Defined Benefit</u>	<u>Combined</u>	<u>Total</u>	<u>Total</u>
<b>Valuation Results</b>				
Total Actuarial Liability	\$ 104,193,978,965	\$ 397,427,411	\$ 104,591,406,376	\$ 98,672,288,072
Actuarial Value of Pension Assets			83,761,394,182	76,357,680,610
Unfunded Actuarial Liability			\$ 20,830,012,194	\$ 22,314,607,462
Total Normal Cost	\$ 1,324,603,133	\$ 20,163,641	\$ 1,344,766,774	\$ 1,189,663,517
Normal Cost Rate	12.06%	4.50%	11.76%	10.60%
Member Contribution Rate	14.00%	2.00%	13.53%	13.55%
Allocation of Employer Contribution Rate				
Employer Normal Cost Rate	(1.94%)	2.50%	(1.77%)	(2.95%)
Unfunded Actuarial Liability Rate	15.94%	11.50%	15.77%	16.95%
Total Employer Pension Contribution Rate	14.00%	14.00%	14.00%	14.00%
Health Care Rate	0.00%	0.00%	0.00%	0.00%
Total Employer Contribution Rate	14.00%	14.00%	14.00%	14.00%

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**SECTION V – CONTRIBUTIONS**

In addition to the above-mentioned contributions, employers contribute 4.47% of payroll for members of the Defined Contribution plan and the alternative retirement plan. These contributions are also used to fund the Plan’s Unfunded Actuarial Liability. Based on these contributions, the valuation indicates that the expected funding period to fully amortize the Unfunded Actuarial Liability is 14.0 years. Table V-2 shows the development of the funding period based on these contributions.

<b>Table V-2</b>		
<b>Development of Funding Period Based on Employer Contribution Rate</b>		
	<u>2021</u>	<u>2020</u>
	<b>Total</b>	<b>Total</b>
<b>Valuation Results</b>		
Total Defined Benefit Plan Payroll	\$ 11,979,686,300	\$ 11,759,956,599
STRS Defined Contribution Plan Payroll	\$ 506,300,061	\$ 482,512,431
Alternative Retirement Plan Payroll	\$ 853,122,073	\$ 835,058,620
Total Actuarial Accrued Liability	\$ 104,591,406,376	\$ 98,672,288,072
Actuarial Value of Pension Assets	<u>83,761,394,182</u>	<u>76,357,680,610</u>
Unfunded Actuarial Liability (UAL)	\$ 20,830,012,194	\$ 22,314,607,462
UAL Rate for Defined Benefit Plan*	15.77%	16.95%
Defined Benefit Plan UAL Contribution*	\$ 1,888,960,155	\$ 1,993,193,194
Defined Contribution Plan UAL Contribution*	22,631,613	21,568,306
Alternative Retirement Plan UAL Contribution*	<u>38,134,557</u>	<u>37,327,120</u>
Total Contribution for UAL*	\$ 1,949,726,324	\$ 2,052,088,620
Amortization Period*	14.0 Years	14.9 Years

\*Assumes payments are made throughout the year

Under the Board’s current funding policy, the Actuarially Determined Contribution contains two components: the employer normal cost and an amortization of the Unfunded Actuarial Liability (UAL). For this purpose, the funding method employed is the Entry Age Normal (EAN) actuarial cost method. Under this funding method, a total normal cost rate is determined as a level percentage of payroll for each active member. The normal cost rate multiplied by payroll equals the total normal cost for each member. The total anticipated member contributions for the year are then subtracted from the sum of the total normal cost to arrive at the employer normal cost.

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**SECTION V – CONTRIBUTIONS**

The EAN Actuarial Liability is the difference between the Present Value of Future Benefits and the Present Value of Future Normal Costs. The difference between this EAN Actuarial Liability and the Actuarial Value of Assets is the Unfunded Actuarial Liability (UAL). Under the Board’s funding policy, the UAL is amortized over a closed 30-year period that began July 1, 2015 as a level percent of pay, assuming a 3.00% annual payroll growth. As of June 30, 2021, the remaining amortization period is 24 years.

Table V-3 shows the development of an Actuarially Determined Contribution rate and contribution rate sufficiency. Based on this valuation, the Actuarially Determined Contribution rate for Fiscal 2022 is 8.94% of payroll, which is less than the 14.00% rate of payroll employers are currently contributing for members of the Defined Benefit and Combined Plans in that fiscal year. Therefore, as of this valuation, and assuming all assumptions are realized, the current employer contribution rate of 14.00% of payroll is sufficient to cover the Actuarially Determined Contribution Rate under the Board’s funding policy.

<b>Table V-3</b>		
<b>Actuarially Determined Contribution and Contribution Rate Sufficiency</b>		
	<u>2021</u>	<u>2020</u>
	<b>Total</b>	<b>Total</b>
<b>Valuation Results</b>		
Total Defined Benefit Plan Valuation Payroll	\$ 11,979,686,300	\$ 11,759,956,599
STRS Defined Contribution Plan Payroll	\$ 506,300,061	\$ 482,512,431
Alternative Retirement Plan Payroll	\$ 853,122,073	\$ 835,058,620
Total Actuarial Accrued Liability	\$ 104,591,406,376	\$ 98,672,288,072
Actuarial Value of Pension Assets	83,761,394,182	76,357,680,610
Unfunded Actuarial Liability	<u>\$ 20,830,012,194</u>	<u>\$ 22,314,607,462</u>
Amortization Period	24	25
Amortization Payment	\$ 1,344,174,756	\$ 1,467,801,105
Offset for Defined Contribution Contribution to UAL*	22,631,613	21,568,306
Offset for Alternative Retirement Plan Contribution to UAL*	38,134,557	37,327,120
UAL Amortization Payment from Defined Benefit Plan*	<u>\$ 1,283,408,586</u>	<u>\$ 1,408,905,679</u>
Defined Benefit Plan Rate to Amortize UAL	10.71%	11.98%
Employer Normal Cost Rate	(1.77%)	(2.95%)
<b>Actuarially Determined Contribution Rate*</b>	<b>8.94%</b>	<b>9.03%</b>
Statutory Employer Contribution	<u>14.00%</u>	<u>14.00%</u>
Contribution Sufficiency/(Deficiency)	5.06%	4.97%

\*Assumes payments are made throughout the year

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**SECTION VI – ACCOUNTING STATEMENT INFORMATION**

**GFOA Recommended Information**

The Government Finance Officers Association (GFOA) maintains a checklist of items to be included in a public retirement plan’s Annual Comprehensive Financial Report in order to receive recognition for excellence in financial reporting.

We have prepared the following exhibits:

- Table VI-1: Analysis of Financial Experience
- Table VI-2: Schedule of Funded Liabilities by Type
- Table VI-3: Actuarial Funded Ratio and Funding Period

<b>Table VI-1</b>					
<b>Analysis of Financial Experience (in thousands)</b>					
<b>Gains and (Losses) in Unfunded Actuarial Liability During Year Ended June 30</b>					
<b>Resulting from Differences Between Assumed Experience and Actual Experience</b>					
<b>Type of Activity</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Investment income	\$ 857,418	\$ (253,993)	\$ 3,515	\$ 532,022	\$ 5,216,481
Payroll growth	7,091	N/A	N/A	N/A	N/A
Salary increases	279,058	180,810	207,875	177,622	236,539
Retirement and other separation experience	(316,922)	(285,353)	(325,891)	(112,488)	(287,427)
Death after Retirement	27,307	(9,495)	152,788	110,833	208,369
Final plan reselection	(1,403)	N/A	N/A	N/A	N/A
Gain (or loss) during year	<u>\$ 852,549</u>	<u>\$ (368,031)</u>	<u>\$ 38,287</u>	<u>\$ 707,989</u>	<u>\$ 5,373,962</u>
Gain (or loss) due to assumption/method/plan amendment changes	<u>415,862</u>	<u>236,418</u>	<u>-</u>	<u>-</u>	<u>(4,433,797)</u>
Composite gain (or loss) during the year	<u>\$ 1,268,411</u>	<u>\$ (131,613)</u>	<u>\$ 38,287</u>	<u>\$ 707,989</u>	<u>\$ 940,165</u>

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**SECTION VI – ACCOUNTING STATEMENT INFORMATION**

Table VI-2

Schedule of Funded Liabilities by Type (Dollars in Thousands)\*

Valuation Date June 30,	Aggregate Actuarial Liabilities for			Actuarial Value of Assets (Excl Healthcare)	Portion of Actuarial Liabilities Covered by Actuarial Value of Assets		
	Active Member Contributions	Retirees & Beneficiaries	Active Members Employer Financed Portion		(1)	(2)	(3)
	(1)	(2)	(3)				
2021	\$ 18,479,943	\$ 69,479,780	\$ 16,631,683	\$ 83,761,394	100%	94%	0%
2020	\$ 17,591,257	\$ 67,500,051	\$ 13,580,980	\$ 76,357,681	100%	87%	0%
2019	\$ 16,454,187	\$ 68,412,083	\$ 12,974,674	\$ 74,411,836	100%	85%	0%
2018	\$ 15,440,336	\$ 68,911,073	\$ 12,552,648	\$ 73,115,358	100%	84%	0%
2017	\$ 13,668,834	\$ 69,723,394	\$ 12,734,213	\$ 72,216,212	100%	84%	0%
2016	\$ 12,498,469	\$ 74,282,592	\$ 13,975,362	\$ 70,114,637	100%	78%	0%
2015	\$ 11,473,309	\$ 74,340,699	\$ 13,200,646	\$ 68,655,999	100%	77%	0%
2014	\$ 11,477,457	\$ 69,776,259	\$ 14,913,341	\$ 66,657,175	100%	79%	0%
2013	\$ 10,962,886	\$ 68,075,440	\$ 15,328,367	\$ 62,590,786	100%	76%	0%
2012	\$ 10,985,246	\$ 68,111,175	\$ 27,205,420	\$ 59,489,508	100%	71%	0%

\*Includes Defined Contribution Plan



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**SECTION VI – ACCOUNTING STATEMENT INFORMATION**

**Table VI-3  
Actuarial Funded Ratio and Funding Period (Dollars in Thousands)**

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Liability (b)	Unfunded Actuarial Liability (b) - (a)	Funded Ratio (a) / (b)	Funding Period
6/30/2021	\$ 83,761,394	\$ 104,591,406	\$ 20,830,012	80.1%	14.0 years
6/30/2020	\$ 76,357,681	\$ 98,672,288	\$ 22,314,607	77.4%	14.9 years
6/30/2019	\$ 74,411,836	\$ 97,840,944	\$ 23,429,108	76.1%	16.6 years
6/30/2018	\$ 73,115,358	\$ 96,904,057	\$ 23,788,699	75.5%	17.8 years
6/30/2017	\$ 72,216,212	\$ 96,126,440	\$ 23,910,228	75.1%	18.4 years
6/30/2016	\$ 70,114,637	\$ 100,756,422	\$ 30,641,785	69.6%	26.6 years
6/30/2015	\$ 68,655,999	\$ 99,014,654	\$ 30,358,655	69.3%	28.4 years
6/30/2014	\$ 66,657,175	\$ 96,167,057	\$ 29,509,882	69.3%	29.5 years
6/30/2013	\$ 62,590,786	\$ 94,366,694	\$ 31,775,908	66.3%	40.2 years
6/30/2012	\$ 59,489,508	\$ 106,301,841	\$ 46,812,333	56.0%	Infinite Years

*\*note: Due to rounding, the assets plus the unfunded liabilities may not sum to the total liabilities*

**STATE TEACHERS RETIREMENT SYSTEM OF OHIO  
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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

**Overview**

The purpose of this section is to provide accounting and financial disclosure information under Governmental Accounting Standards Board Statements 67 and 68 (GASB 67 and 68) for the State Teachers Retirement System of Ohio as of June 30, 2021. This information includes:

- Determination of the Discount Rate,
- Change in Net Pension Liability,
- Sensitivity of the Net Pension Liability to changes in the discount rate,
- Schedule of Changes in the Net Pension Liability and Related Ratios,
- Schedule of Employer Contributions,
- Disclosure of Collective Deferred Inflows and Outflows, including a detailed schedule of deferred items, and
- Calculation of Collective Annual Pension Expense.

The membership data, actuarial assumptions, and plan provisions for the GASB 67 and 68 calculations are the same as those used throughout this valuation, as are described in Appendices A, B and C of this Actuarial Valuation Report.

**STATE TEACHERS RETIREMENT SYSTEM OF OHIO  
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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

**Determination of Discount Rate**

For purposes of determining the discount rate, we have performed a cash flow projection as described under Paragraph 41 of GASB Statement 67. With regard to the employer and employee contributions used for this projection, we have assumed that future employer and employee contributions would be made at the current rates set by State statute and that 100% of the contributions would be made to the pension plan, with none of these future contributions paid to the post-employment health care plan. Based upon these assumptions, the Plan's fiduciary net position was projected to be available to make all future benefit payments for current plan members as of June 30, 2021. Consequently, the single equivalent rate used to determine the Total Pension Liability as of June 30, 2021 is 7.00%, the long-term expected rate-of-return as defined by GASB 67 and 68 as of that date. By comparison, the single equivalent rate used to determine the Total Pension Liability as of June 30, 2020 was 7.45%.

**Note Disclosures**

The Table VII-1 shows the changes in the Total Pension Liability (TPL), the Plan Fiduciary Net Position (i.e., fair value of plan assets), and the Net Pension Liability (NPL) during the measurement year.

<b>Table VII-1</b>			
<b>Change in Net Pension Liability</b>			
	Increase (Decrease)		
	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) - (b)
<b>Balances at 6/30/2020</b>	\$ 98,672,288,072	\$ 74,475,846,279	\$ 24,196,441,793
<b>Changes for the year:</b>			
Service cost	1,189,663,517		1,189,663,517
Interest	7,171,679,614		7,171,679,614
Changes of benefits	0		0
Differences between expected and actual experience	451,180,317		451,180,317
Changes of assumptions	4,433,796,926		4,433,796,926
Contributions - employer*		1,803,178,224	(1,803,178,224)
Contributions - member		1,706,817,117	(1,706,817,117)
Net investment income		21,212,679,374	(21,212,679,374)
Benefit payments	(7,327,202,069)	(7,327,202,069)	0
Administrative expense		(65,811,335)	65,811,335
<b>Net changes</b>	<u>5,919,118,305</u>	<u>17,329,661,311</u>	<u>(11,410,543,006)</u>
<b>Balances at 6/30/2021</b>	<u>\$ 104,591,406,377</u>	<u>\$ 91,805,507,590</u>	<u>\$ 12,785,898,787</u>

\* Includes DC Plan Contributions as well as the ARP contributions that are allocated to the DB Plan.

Decreasing the discount rate from 7.45% to 7.00% resulted in an increase in the NPL of \$4,434 million. There were no changes in benefits during the year.

Favorable investment experience as well as total contributions and investment income being greater than the service cost, interest cost, liability losses and administrative expenses helped to offset the increases from assumption changes and resulted in a decrease in the NPL of \$ 11,411 million. The NPL remaining as of June 30, 2021 is \$12.8 billion.

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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

Changes in the discount rate affect the measurement of the TPL. Lower discount rates produce a higher TPL and higher discount rates produce a lower TPL. Because the discount rate does not affect the measurement of assets, the percentage change in the NPL can be very significant for a relatively small change in the discount rate. The table below shows the sensitivity of the NPL to the discount rate.

<b>Table VII-2</b>			
<b>Sensitivity of Net Pension Liability to Changes in Discount Rate</b>			
	<b>1% Decrease 6.00%</b>	<b>Discount Rate 7.00%</b>	<b>1% Increase 8.00%</b>
Total Pension Liability	\$ 115,748,710,912	\$ 104,591,406,377	\$ 95,163,508,240
Plan Fiduciary Net Position	<u>91,805,507,590</u>	<u>91,805,507,590</u>	<u>91,805,507,590</u>
Net Pension Liability	<u>\$ 23,943,203,322</u>	<u>\$ 12,785,898,787</u>	<u>\$ 3,358,000,650</u>
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	79.3%	87.8%	96.5%

A one percent decrease in the discount rate increases the TPL by approximately 10.7% and increases the NPL by approximately 87.3%. A one percent increase in the discount rate decreases the TPL by approximately 9.0% and decreases the NPL by approximately 73.7%.

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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

**Required Supplementary Information**

The schedules of Required Supplementary Information generally start with one year of information as of the implementation of GASB 67, and eventually build up to 10 years of information. The schedule below shows the changes in NPL and related ratios required by GASB for the current and prior year.

<b>Table VII-3</b>		
<b>Schedule of Changes in Net Pension Liability and Related Ratios</b>		
	FYE 2021	FYE 2020
<b><u>Total Pension Liability</u></b>		
Service cost	\$ 1,189,663,517	\$ 1,150,526,294
Interest (includes interest on service cost)	7,171,679,614	7,108,055,459
Changes of benefit terms	0	0
Differences between expected and actual experience	451,180,317	(133,569,121)
Changes of assumptions	4,433,796,926	0
Benefit payments, including refunds of member contributions	(7,327,202,069)	(7,293,668,957)
<b>Net change in total pension liability</b>	<b>\$ 5,919,118,305</b>	<b>\$ 831,343,675</b>
<b>Total pension liability - beginning</b>	<b>98,672,288,072</b>	<b>97,840,944,397</b>
<b>Total pension liability - ending</b>	<b>\$ 104,591,406,377</b>	<b>\$ 98,672,288,072</b>
<b><u>Plan fiduciary net position</u></b>		
Contributions - employer*	\$ 1,803,178,224	\$ 1,746,248,916
Contributions - member	1,706,817,117	1,670,405,908
Net investment income	21,212,679,374	2,692,076,337
Benefit payments, including refunds of member contributions	(7,327,202,069)	(7,293,668,957)
Administrative expense	(65,811,335)	(65,761,277)
<b>Net change in plan fiduciary net position</b>	<b>\$ 17,329,661,311</b>	<b>\$ (1,250,699,073)</b>
<b>Plan fiduciary net position - beginning</b>	<b>74,475,846,279</b>	<b>75,726,545,352</b>
<b>Plan fiduciary net position - ending</b>	<b>\$ 91,805,507,590</b>	<b>\$ 74,475,846,279</b>
<b>Net pension liability - ending</b>	<b>\$ 12,785,898,787</b>	<b>\$ 24,196,441,793</b>
<b>Plan fiduciary net position as a percentage of the total pension liability</b>	<b>87.78%</b>	<b>75.48%</b>
<b>Covered payroll*</b>	<b>\$ 12,929,843,478</b>	<b>\$ 12,671,207,987</b>
<b>Net pension liability as a percentage of covered payroll</b>	<b>98.89%</b>	<b>190.96%</b>

\*Includes Payroll for Defined Contribution and Alternative Retirement Plan Participants.

**STATE TEACHERS RETIREMENT SYSTEM OF OHIO  
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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

If an Actuarially Determined Contribution is calculated, the following schedule is required. An Actuarially Determined Contribution is a contribution amount determined in accordance with Actuarial Standards of Practice.

<b>Table VII-4 Schedule of Employer Contributions</b>					
	<b>FYE 2021</b>	<b>FYE 2020</b>	<b>FYE 2019</b>	<b>FYE 2018</b>	<b>FYE 2017</b>
Actuarially Determined Contribution* Contributions in Relation to the Actuarially Determined Contribution*	\$ 1,028,798,948	\$ 1,081,661,891	\$ 1,088,328,150	\$ 1,056,430,306	\$ 1,054,862,000
	<u>1,696,120,572</u>	<u>1,662,016,780</u>	<u>1,614,188,340</u>	<u>1,565,679,329</u>	<u>1,514,285,000</u>
Contribution Deficiency/(Excess)	<u>\$ (667,321,624)</u>	<u>\$ (580,354,889)</u>	<u>\$ (525,860,190)</u>	<u>\$ (509,249,023)</u>	<u>\$ (459,423,000)</u>
Covered Payroll*	\$ 11,610,016,164	\$ 11,392,012,792	\$ 11,088,784,826	\$ 10,775,526,239	\$ 10,459,706,000
Contributions as a Percentage of Covered Payroll	14.61%	14.59%	14.56%	14.53%	14.48%
	<b>FYE 2016</b>	<b>FYE 2015</b>	<b>FYE 2014</b>	<b>FYE 2013</b>	<b>FYE 2012</b>
Actuarially Determined Contribution* Contributions in Relation to the Actuarially Determined Contribution*	\$ 1,178,129,000	\$ 1,368,602,000	\$ 1,489,734,000	\$ 2,910,537,000	\$ 3,248,651,000
	<u>1,466,938,000</u>	<u>1,449,165,000</u>	<u>1,325,141,000</u>	<u>1,327,862,000</u>	<u>1,349,561,000</u>
Contribution Deficiency/(Excess)	<u>\$ (288,809,000)</u>	<u>\$ (80,563,000)</u>	<u>\$ 164,593,000</u>	<u>\$ 1,582,675,000</u>	<u>\$ 1,899,090,000</u>
Covered Payroll*	\$ 10,069,269,000	\$ 9,985,181,000	\$ 9,833,028,000	\$ 9,917,911,000	\$ 10,102,509,000
Contributions as a Percentage of Covered Payroll	14.57%	14.51%	13.48%	13.39%	13.36%

\*Excludes the Defined Contribution and Alternative Retirement Plans.

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SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021

The notes below summarize the key methods and assumptions used to determine the Actuarially Determined Contributions (ADC) for FYE 2021.

**Notes to Schedule**

Valuation Date: June 30, 2020

Timing: Actuarially Determined Contributions are calculated based on the actuarial valuation at the beginning of the fiscal year.

**Key Methods and Assumptions Used to Determine Contribution Rates**

Actuarial Cost Method: Entry Age Normal cost method

Asset Valuation Method: 4-year smoothed market

Amortization Method: For ADC - Closed 30-year level percent of pay amortization of Unfunded Actuarial Liability as of July 1, 2015

Discount Rate: 7.00%

Inflation: 2.50%

Salary Increases: From 2.5% to 12.5% based on age

Mortality: *Post-Retirement:* RP-2014 Annuitant Mortality Table with 50% of rates through age 69, 70% of rates between ages 70 and 79, 90% of rates between ages 80 and 84, and 100% of rates thereafter, projected forward generationally using mortality improvement scale MP-2016.

*Pre-Retirement:* RP-2014 Employee Mortality Table, projected forward generationally using mortality improvement scale MP-2016.

*Post-Retirement Disabled:* RP-2014 Disabled Mortality Table with 90% of rates for males and 100% of rates for females, projected forward generationally using mortality improvement scale MP-2016.

A complete description of the methods and assumptions used to Determine Contribution Rates for the year ending June 30, 2021 can be found in the June 30, 2020 Actuarial Valuation Report.

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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

**GASB 68 Information**

Employers that participate in STRS Ohio were required to implement GASB 68 for their first fiscal year that commenced after June 15, 2014. The amounts reported as of their fiscal year end (their reporting date) must be based on a measurement date up to 12 months and one day prior to their reporting date. Therefore, the GASB 68 schedules in this section, which are based on a June 30, 2021 measurement date, can be used for employers' reporting up until fiscal years ending June 30, 2022.

Because STRS Ohio is a cost-sharing multiple-employer pension fund, each employer participating in STRS Ohio must reflect a portion of the collective net pension liability, pension expense, deferred outflows, and deferred inflows in their financial statements. This section develops the collective amounts that are based on the aggregate of the employers, which will then be allocated to participating employers.

The impact of experience gains or losses and assumption changes on the TPL are recognized in expense over the average expected remaining service life of all active and inactive members of STRS Ohio. As of the measurement date, this recognition period was five years. During the measurement year, there was an experience loss of \$451.2 million and an assumption loss of \$4,433.8 million due to the decrease in discount rate from 7.45% to 7.00%.

The impact of investment gains or losses is recognized over a period of five years. During the measurement year, there was an investment gain of \$15,806.3 million.



**STATE TEACHERS RETIREMENT SYSTEM OF OHIO  
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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

The following table shows the detail related to the amounts of collective Deferred Outflows and Deferred Inflows for the current and prior years.

<b>Table VII-5</b>					
<b>Calculation of Deferred Items Schedule</b>					
Experience Recognition Year	Period	Total Amount	Remaining Years	Recognized in Pension Expense	Deferred Resources
<b>Recognition of Experience (Gains) and Losses</b>					
2021	5	\$ 451,180,317	5	\$ 90,236,063	\$ 360,944,254
2020	5	(133,569,121)	4	(26,713,824)	\$ (80,141,473)
2019	5	69,329,945	3	13,865,989	\$ 27,731,978
2018	5	31,731,963	2	6,346,393	\$ 6,346,391
2017	5	(239,322,183)	1	(47,864,435)	\$ 0
<b>Total</b>		<b>\$ 179,350,921</b>		<b>\$ 35,870,186</b>	<b>\$ 314,881,150</b>
<b>Recognition of Assumption Changes</b>					
2021	5	\$ 4,433,796,926	5	\$ 886,759,385	\$ 3,547,037,541
2017	5	\$ 6,494,407,977	1	\$ 1,298,881,597	\$ 0
<b>Total</b>		<b>\$ 10,928,204,903</b>		<b>\$ 2,185,640,982</b>	<b>\$ 3,547,037,541</b>
<b>Recognition of Investment (Gains) and Losses</b>					
2021	5	\$ (15,806,273,192)	5	\$ (3,161,254,638)	\$ (12,645,018,554)
2020	5	2,805,320,947	4	561,064,189	\$ 1,683,192,569
2019	5	586,060,713	3	117,212,143	\$ 234,424,284
2018	5	(1,457,979,231)	2	(291,595,846)	\$ (291,595,847)
2017	5	(4,180,129,249)	1	(836,025,849)	\$ 0
<b>Total</b>		<b>\$ (18,053,000,012)</b>		<b>\$ (3,610,600,001)</b>	<b>\$ (11,018,997,548)</b>

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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

The table below summarizes the current balances of collective Deferred Outflows and Deferred Inflows of resources along with the net recognition over the next five years.

**Table VII-6  
Schedule of Deferred Inflows and Outflows of Resources**

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	\$ 395,022,623	\$ 80,141,473
Changes in assumptions	3,547,037,541	-
Net difference between projected and actual earnings on pension plan investments	-	11,018,997,548
<b>Total</b>	<b><u>\$ 3,942,060,163</u></b>	<b><u>\$ 11,099,139,021</u></b>

Amounts reported as deferred outflows and deferred inflows of resources will be recognized in pension expense as follows:

**Measurement year ended June 30:**

2022	(1,804,080,149)
2023	(1,518,830,695)
2024	(1,649,908,824)
2025	(2,184,259,190)
Thereafter	\$ 0

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**SECTION VII - GASB 67 AND 68 INFORMATION AS OF JUNE 30, 2021**

The annual collective pension expense recognized by the participating employers can be calculated two different ways. First, it is the change in the amounts reported on the Statement of Net Position that relate to STRS Ohio and are not attributable to employer contributions. That is, it is the change in NPL plus the changes in Deferred Outflows and Deferred Inflows plus employer contributions.

Alternatively, annual pension expense can be calculated by its individual components. While GASB does not require or suggest the organization of the individual components shown in the table below, we believe it helps to understand the level and volatility of pension expense.

<b>Table VII-7 Calculation of Pension Expense</b>		
	<b>Measurement Year Ending</b>	
	<b>2021</b>	<b>2020</b>
Change in Net Pension Liability	\$ (11,410,543,006)	\$ 2,082,042,748
Change in Deferred Outflows	(1,412,212,173)	247,963,247
Change in Deferred Inflows	10,944,419,289	(1,021,841,113)
Employer Contributions	<u>1,803,178,224</u>	<u>1,746,248,916</u>
<b>Pension Expense</b>	<b>\$ (75,157,666)</b>	<b>\$ 3,054,413,798</b>
<b>Pension Expense as % of Payroll</b>	<b>-0.58%</b>	<b>24.11%</b>
<b>Operating Expenses</b>		
Service cost	\$ 1,189,663,517	\$ 1,150,526,294
Employee contributions	(1,706,817,117)	(1,670,405,908)
Administrative expenses	<u>65,811,335</u>	<u>65,761,277</u>
Total	\$ (451,342,265)	\$ (454,118,337)
<b>Financing Expenses</b>		
Interest cost	\$ 7,171,679,614	\$ 7,108,055,459
Expected return on assets	<u>(5,406,406,182)</u>	<u>(5,497,397,284)</u>
Total	\$ 1,765,273,432	\$ 1,610,658,175
<b>Changes</b>		
Benefit changes	\$ 0	\$ 0
Recognition of assumption changes	2,185,640,982	1,298,881,595
Recognition of liability gains and losses	35,870,186	51,179,034
Recognition of investment gains and losses	<u>(3,610,600,001)</u>	<u>547,813,331</u>
Total	\$ (1,389,088,833)	\$ 1,897,873,960
<b>Pension Expense</b>	<b>\$ (75,157,666)</b>	<b>\$ 3,054,413,798</b>

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**APPENDIX A – MEMBERSHIP INFORMATION**

		<b>Table A-1 Ohio State Teachers - Member Status Reconciliation</b>							
		Reemployed Inactive Eligible		Inactive Eligible					
		Actives	Retirees	for Allowance	for Refunds Only	Retired	Disabled Beneficiaries	Total	
1.	June 30, 2020 Valuation	<b>167,838</b>	<b>19,553</b>	<b>19,511</b>	<b>142,176</b>	<b>133,766</b>	<b>4,986</b>	<b>18,155</b>	<b>505,985</b>
2.	Additions								
	a. New Entrants	10,546	1,295	-	-	-	-	-	11,841
	b. Total	10,546	1,295	-	-	-	-	-	11,841
3.	Reductions								
	a. Benefits Expired	-	-	-	-	-	-	-	-
	b. Refunds	(1,872)	(2,936)	(822)	(4,561)	-	-	-	(10,191)
	c. Deaths with no Beneficiaries	(64)	(35)	(33)	-	(2,616)	(143)	(1,189)	(4,080)
	d. Total	(1,936)	(2,971)	(855)	(4,561)	(2,616)	(143)	(1,189)	(14,271)
4.	Changes in Status								
	a. Rehired	4,240	-	(891)	(3,340)	-	(9)	-	-
	b. Inactive Eligible for Allowance	(3,086)	-	3,157	-	-	(34)	-	37
	c. Inactive Eligible for Refunds Only	(7,713)	-	(5)	9,500	-	-	-	1,782
	d. Retired	(3,258)	(197)	(374)	(5)	3,678	(46)	-	(202)
	e. Reemployed Retiree	(2)	54	-	(1)	-	-	-	51
	f. Disabled	(95)	-	(15)	-	-	110	-	-
	g. Death with Beneficiaries	(106)	-	(20)	-	(1,373)	(100)	1,599	-
	h. Plan Reselection	-	-	-	-	-	-	-	-
	i. Data Corrections	(1)	-	5	(61)	77	25	35	80
	j. Total	(10,021)	(143)	1,857	6,093	2,382	(54)	1,634	1,748
5.	June 30, 2021 Valuation	<b>166,427</b>	<b>17,734</b>	<b>20,513</b>	<b>143,708</b>	<b>133,532</b>	<b>4,789</b>	<b>18,600</b>	<b>505,303</b>

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**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A-2</b>			
<b>Summary of Membership Data as of June 30, 2021 (\$ in thousands)</b>			
	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>1. Defined Benefit Plan Active Members</b>			
Number of Members	44,247	115,321	159,568
Annual Salaries (for period ending June 30, 2021)	\$ 3,162,389	\$ 7,477,668	\$ 10,640,057
Average Age	45.29	43.94	44.31
Average Service	13.90	13.69	13.75
<b>2. Combined Plan Active Members</b>			
Number of Members	1,522	5,337	6,859
Annual Salaries (for period ending June 30, 2021)	\$ 103,238	\$ 327,699	\$ 430,937
Average Age	43.52	41.25	41.75
Average Service	9.20	9.81	9.67
<b>3. Total Defined Benefit and Combined Plan Active Members</b>			
Number of Members	45,769	120,658	166,427
Annual Salaries (for period ending June 30, 2021)	\$ 3,265,627	\$ 7,805,368	\$ 11,070,995
Average Age	45.23	43.82	44.21
Average Service	13.74	13.52	13.58
<b>4. Defined Benefit Inactive Members</b>			
Eligible for Allowances	4,808	15,005	19,813
Eligible for Refunds Only	51,042	91,046	142,088
Total	55,850	106,051	161,901
<b>5. Combined Benefit Inactive Members</b>			
Eligible for Allowances	136	564	700
Eligible for Refunds Only	410	1,210	1,620
Total	546	1,774	2,320
<b>6. Total Inactive Members</b>			
Eligible for Allowances	4,944	15,569	20,513
Eligible for Refunds Only	51,452	92,256	143,708
Total	56,396	107,825	164,221

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**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A-2</b>			
<b>Summary of Membership Data as of June 30, 2021 (continued) (\$ in thousands)</b>			
	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>7. Retirees</b>			
Number of Members	43,024	90,508	133,532
Annual Allowance	\$ 2,330,235	\$ 3,937,424	\$ 6,267,659
Average Allowance (in dollars)	\$ 54,161	\$ 43,504	\$ 46,938
<b>8. Disabled Retirees</b>			
Number of Members	1,439	3,350	4,789
Annual Allowance	\$ 61,358	\$ 123,559	\$ 184,917
Average Allowance (in dollars)	\$ 42,639	\$ 36,883	\$ 38,613
<b>9. Beneficiaries Receiving Optional Allowances</b>			
Number of Members	3,628	9,202	12,830
Annual Allowance	\$ 89,654	\$ 342,936	\$ 432,590
Average Allowance (in dollars)	\$ 24,712	\$ 37,268	\$ 33,717
<b>10. Survivors' Benefit Fund Beneficiaries</b>			
Number of Members	2,685	3,085	5,770
Annual Allowance	\$ 49,707	\$ 74,548	\$ 124,255
Average Allowance (in dollars)	\$ 18,513	\$ 24,165	\$ 21,535
<b>11. Total Retirees and Beneficiaries</b>			
Number of Members	50,776	106,145	156,921
Annual Allowance	\$ 2,530,954	\$ 4,478,467	\$ 7,009,421
Average Allowance (in dollars)	\$ 49,845	\$ 42,192	\$ 44,668

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**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A-3</b>					
<b>Schedule of Valuation Data - Active Members</b>					
<b>Valuation Date</b>	<b>Number of</b>	<b>Annualized</b>	<b>Annual</b>	<b>% Increase</b>	
<b>June 30,</b>	<b>Active Members</b>	<b>Salaries*</b>	<b>Average Pay</b>	<b>in Average Pay</b>	
2021	166,427	\$ 11,404,226	\$ 68,524	7.37%	
2020	167,838	\$ 11,192,069	\$ 66,684	4.49%	
2019	170,004	\$ 10,849,863	\$ 63,821	2.73%	
2018	170,327	\$ 10,581,345	\$ 62,124	6.12%	
2017	168,132	\$ 9,842,388	\$ 58,540	3.59%	
2016	169,212	\$ 9,562,236	\$ 56,510	2.90%	
2015	164,925	\$ 9,057,095	\$ 54,916	1.62%	
2014	169,295	\$ 9,148,438	\$ 54,038	0.72%	
2013	169,945	\$ 9,118,036	\$ 53,653	-0.50%	
2012	173,044	\$ 9,330,845	\$ 53,922	-0.18%	
2011	177,897	\$ 9,609,723	\$ 54,018	-1.40%	

\*In thousands.

<b>Table A-4</b>					
<b>Schedule of Valuation Data - Retirees/Beneficiaries</b>					
<b>Fiscal Year</b>	<b>Number of</b>	<b>Annual</b>	<b>Annual Average</b>	<b>% Increase in</b>	
<b>Ended</b>	<b>Benefit Recipients</b>	<b>Allowances</b>	<b>Allowances</b>	<b>Annual Allowances</b>	
<b>June 30,</b>		<b>(in thousands)</b>			
2021	156,921	\$ 7,009,421	\$ 44,668	0.9%	
2020	156,907	\$ 6,970,697	\$ 44,426	0.0%	
2019	157,418	\$ 6,971,155	\$ 44,284	0.3%	
2018	157,422	\$ 6,949,422	\$ 44,145	-0.1%	
2017	158,039	\$ 6,955,309	\$ 44,010	0.9%	
2016	157,938	\$ 6,896,162	\$ 43,664	1.4%	
2015	158,116	\$ 6,801,181	\$ 43,014	6.3%	
2014	152,208	\$ 6,397,535	\$ 42,032	3.3%	
2013	149,221	\$ 6,190,182	\$ 41,483	6.4%	
2012	143,256	\$ 5,815,407	\$ 40,595	7.8%	
2011	138,088	\$ 5,393,372	\$ 39,057	8.8%	

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**APPENDIX A – MEMBERSHIP INFORMATION**

Table A-5 Schedule of Valuation Data - Retirees/Beneficiaries								
Fiscal Year Ended June 30,	Beginning Number of Benefit Recipients	Beginning Annual Allowances	Benefit Recipients Added	Payments Added	Benefit Recipients Removed	Payments Removed	Ending Number of Benefit Recipients	Ending Annual Allowance
2021	156,907	\$ 6,970,697	5,524	\$ 225,426	5,510	\$ 186,702	156,921	\$ 7,009,421
2020	157,418	\$ 6,971,155	4,363	\$ 165,151	4,874	\$ 165,609	156,907	\$ 6,970,697
2019	157,422	\$ 6,949,422	4,894	\$ 178,255	4,898	\$ 156,522	157,418	\$ 6,971,155
2018	158,039	\$ 6,955,309	3,847	\$ 128,494	4,464	\$ 134,381	157,422	\$ 6,949,422
2017	157,938	\$ 6,896,162	3,254	\$ 155,702	3,153	\$ 96,555	158,039	\$ 6,955,309
2016	158,116	\$ 6,801,181	2,675	\$ 177,665	2,853	\$ 82,684	157,938	\$ 6,896,162
2015	152,208	\$ 6,397,535	9,027	\$ 490,598	3,119	\$ 86,952	158,116	\$ 6,801,181
2014	149,221	\$ 6,190,182	5,550	\$ 283,768	2,563	\$ 76,415	152,208	\$ 6,397,535
2013	143,256	\$ 5,815,407	8,493	\$ 441,942	2,528	\$ 67,167	149,221	\$ 6,190,182
2012	138,088	\$ 5,393,372	8,761	\$ 512,952	3,593	\$ 90,917	143,256	\$ 5,815,407
2011	133,103	\$ 4,957,960	7,744	\$ 501,900	2,759	\$ 66,488	138,088	\$ 5,393,372



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**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A-6</b>				
<b>Benefit Payments by Type as of June 30, 2021</b>				
<b>Age Last Birthday</b>	<b>Number</b>	<b>Annual Allowance (in thousands)</b>		<b>Average Annual Allowance</b>
<b>Retirees</b>				
Under 60	4,262	\$	224,386	\$ 52,648
60-64	11,762		566,211	48,139
65-69	28,119		1,357,452	48,275
70-74	37,722		1,875,942	49,731
75-79	23,662		1,126,714	47,617
Over 79	28,005		1,116,954	39,884
<b>Total</b>	<b>133,532</b>	<b>\$</b>	<b>6,267,659</b>	<b>\$ 46,938</b>
<b>Disabled Retirees</b>				
Under 60	1,004	\$	35,971	\$ 35,828
60-64	622		24,287	39,047
65-69	712		29,981	42,108
70-74	1,030		43,577	42,308
75-79	704		27,779	39,459
Over 79	717		23,322	32,527
<b>Total</b>	<b>4,789</b>	<b>\$</b>	<b>184,917</b>	<b>\$ 38,613</b>
<b>Beneficiaries Receiving Optional Allowances</b>				
Under 60	17	\$	648	\$ 38,118
60-64	119		5,039	42,345
65-69	572		24,200	42,308
70-74	1,583		66,198	41,818
75-79	1,996		79,980	40,070
Over 79	8,543		256,525	30,028
<b>Total</b>	<b>12,830</b>	<b>\$</b>	<b>432,590</b>	<b>\$ 33,717</b>
<b>Survivors' Benefit Fund Beneficiaries</b>				
Under 60	1,340	\$	17,299	\$ 12,910
60-64	369		7,938	21,512
65-69	704		17,059	24,232
70-74	945		24,789	26,232
75-79	813		20,326	25,001
Over 79	1,599		36,844	23,042
<b>Total</b>	<b>5,770</b>	<b>\$</b>	<b>124,255</b>	<b>\$ 21,535</b>
<b>Grand Total</b>	<b>156,921</b>	<b>\$</b>	<b>7,009,421</b>	<b>\$ 44,668</b>

**STATE TEACHERS RETIREMENT SYSTEM OF OHIO  
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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

**A. Actuarial Assumptions**

**1. Mortality Rates**

*Post-Retirement:* RP-2014 Annuitant Mortality Table with 50% of rates through age 69, 70% of rates between ages 70 and 79, 90% of rates between ages 80 and 84, and 100% of rates thereafter, projected forward generationally using mortality improvement scale MP-2016 (Adopted effective July 1, 2017).

Sample 2014 mortality rates are as follows:

Age	Male	Female
50	0.20%	0.14%
55	0.29%	0.18%
60	0.39%	0.26%
65	0.55%	0.40%
70	1.17%	0.90%
75	1.88%	1.47%
80	4.02%	3.14%
85	7.75%	6.05%
90	13.59%	10.71%
95	21.86%	17.90%
100	31.40%	27.09%

*Pre-Retirement:* RP-2014 Employee Mortality Table, projected forward generationally using mortality improvement scale MP-2016 (Adopted effective July 1, 2017).

*Post-Retirement  
Disabled:*

RP-2014 Disabled Mortality Table with 90% of rates for males and 100% of rates for females, projected forward generationally using mortality improvement scale MP-2016 (Adopted effective July 1, 2017).

Sample 2014 mortality rates are as follows:

Age	Male	Female
45	1.53%	0.90%
50	1.84%	1.19%
55	2.10%	1.45%
60	2.39%	1.70%
65	2.85%	2.09%
70	3.63%	2.82%
75	4.89%	4.10%

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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

**2. Active Retirement Rates**

The following rates of retirement are assumed for members eligible to retire (Adopted effective July 1, 2017).

<b>Defined Benefit Plan – Grandfathered Male Rates</b>				
<b>Age</b>	<b>Under 25 Years of Service</b>	<b>25-29 Years of Service</b>	<b>30-34 Years of Service</b>	<b>35 or More Years of Service</b>
<=52	0%	0%	20%	30%
53	0%	0%	20%	30%
54	0%	0%	20%	40%
55	0%	6%	20%	40%
56	0%	6%	20%	40%
57	0%	6%	20%	40%
58	0%	6%	20%	40%
59	0%	7%	20%	40%
60	10%	7%	20%	40%
61	10%	7%	20%	40%
62	12%	8%	20%	40%
63	12%	8%	25%	35%
64	12%	12%	25%	25%
65	20%	20%	25%	25%
66	20%	20%	25%	25%
67	15%	20%	25%	25%
68	15%	20%	25%	20%
69	15%	20%	25%	20%
70	15%	20%	25%	20%
71	15%	20%	25%	20%
72	15%	20%	25%	20%
73	15%	20%	25%	20%
74	15%	20%	25%	20%
75+	100%	100%	100%	100%

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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

<b>Defined Benefit Plan – Grandfathered Female Rates</b>				
<b>Age</b>	<b>Under 25 Years of Service</b>	<b>25-29 Years of Service</b>	<b>30-34 Years of Service</b>	<b>35 or More Years of Service</b>
<=52	0%	0%	20%	35%
53	0%	0%	20%	35%
54	0%	0%	20%	40%
55	0%	9%	20%	40%
56	0%	9%	20%	40%
57	0%	9%	20%	40%
58	0%	9%	20%	40%
59	0%	10%	25%	40%
60	10%	10%	30%	45%
61	10%	10%	30%	45%
62	10%	12%	30%	45%
63	10%	12%	35%	45%
64	15%	20%	35%	45%
65	25%	30%	35%	45%
66	20%	30%	35%	45%
67	20%	20%	35%	45%
68	20%	20%	35%	45%
69	20%	20%	35%	45%
70	20%	20%	35%	40%
71	20%	20%	35%	40%
72	20%	20%	35%	40%
73	20%	20%	35%	40%
74	20%	20%	35%	40%
75+	100%	100%	100%	100%

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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

<b>Defined Benefit Plan – Non-grandfathered Male Rates</b>				
<b>Age</b>	<b>Under 25 Years of Service</b>	<b>25-29 Years of Service<sup>1</sup></b>	<b>30-34 Years of Service<sup>2</sup></b>	<b>35 or More Years of Service<sup>2</sup></b>
<=52	0%	3%	20%	20%
53	0%	3%	20%	20%
54	0%	3%	20%	20%
55	0%	3%	20%	20%
56	0%	3%	20%	20%
57	0%	3%	20%	20%
58	0%	3%	20%	20%
59	0%	5%	20%	20%
60	5%	5%	20%	25%
61	6%	6%	20%	25%
62	7%	7%	20%	25%
63	8%	8%	25%	25%
64	10%	10%	25%	25%
65	20%	20%	25%	25%
66	20%	20%	25%	25%
67	20%	20%	25%	25%
68	20%	20%	25%	20%
69	20%	20%	25%	20%
70	20%	20%	25%	20%
71	20%	20%	25%	20%
72	20%	20%	25%	20%
73	20%	20%	25%	20%
74	20%	20%	25%	20%
75+	100%	100%	100%	100%

<sup>1</sup> Rates prior to age 60 are zero if retirement eligibility requirements are not met.

<sup>2</sup> Use two times 25-29 Years of Service rates if not eligible for unreduced retirement (prior to age 65).

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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

<b>Defined Benefit Plan – Non-grandfathered Female Rates</b>				
<b>Age</b>	<b>Under 25 Years of Service</b>	<b>25-29 Years of Service<sup>1</sup></b>	<b>30-34 Years of Service<sup>2</sup></b>	<b>35 or More Years of Service<sup>2</sup></b>
<=52	0%	5%	20%	20%
53	0%	5%	20%	20%
54	0%	5%	20%	20%
55	0%	5%	20%	20%
56	0%	5%	20%	20%
57	0%	5%	20%	20%
58	0%	5%	20%	20%
59	0%	5%	25%	25%
60	10%	10%	30%	30%
61	10%	10%	30%	30%
62	10%	10%	30%	30%
63	10%	10%	35%	35%
64	15%	15%	35%	35%
65	30%	30%	35%	35%
66	30%	30%	35%	35%
67	20%	20%	35%	35%
68	20%	20%	35%	35%
69	20%	20%	35%	35%
70	20%	20%	35%	30%
71	20%	20%	35%	30%
72	20%	20%	35%	30%
73	20%	20%	35%	30%
74	20%	20%	35%	30%
75+	100%	100%	100%	100%

<sup>1</sup> Rates prior to age 60 are zero if retirement eligibility requirements are not met.

<sup>2</sup> Use two times 25-29 Years of Service rates if not eligible for unreduced retirement (prior to age 65).

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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

Combined Plan		
Age	Male	Female
60	13%	22%
61	7%	9%
62	7%	9%
63	7%	9%
64	9%	15%
65	17%	20%
66	15%	13%
67	12%	13%
68	12%	12%
69	12%	12%
70	12%	12%
71	12%	12%
72	12%	12%
73	12%	12%
74	12%	12%
75	100%	100%

**3. Inactive Vested Retirement Rates**

5% at each early retirement age through age 64 and 100% at age 65, or the first age at which unreduced benefits are available.

**4. Disability Rates**

Select rates are shown below (Adopted effective July 1, 2017):

Age	Unisex Rates
Under 30	0.01%
30	0.01%
35	0.03%
40	0.05%
45	0.10%
50	0.18%
55	0.22%
60	0.25%
65 and Over	0.25%

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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

**5. Termination Rates**

Termination rates based on service, for causes other than death, disability, or retirement (Adopted effective July 1, 2017).

Vested Terminations*		
Age	Male	Female
20	11.25%	13.25%
25	11.25%	12.50%
30	2.75%	3.75%
35	2.00%	2.00%
40	1.75%	1.50%
45	1.75%	1.25%
50	2.00%	1.75%
55	3.25%	3.00%
60	0.00%	0.00%

\*Termination rates stop at first retirement eligibility.

Non-Vested Terminations		
Service	Male	Female
Under 1 Year	30.00%	25.00%
1 to 2 Years	20.00%	20.00%
2 to 3 Years	15.00%	10.00%
3 to 5 Years	10.00%	10.00%

**6. Percent Electing a Deferred Termination Benefit**

50% of terminating members of the Defined Benefit Plan are assumed to elect a deferred termination benefit. The remaining 50% are assumed to take an immediate lump-sum.

**7. Percent Married:**

For valuation purposes, 80% of male members and 60% of female members are assumed to be married. Male members are assumed to be three years older than their spouses, and female members are assumed to be one year younger than their spouses. (The assumed age difference adopted effective July 1, 2012 and reaffirmed effective July 1, 2017.)

**8. Dependents for Survivor's Benefit**

The spouse is the only assumed beneficiary for the survivor's benefit.

**9. Missing Data**

Where data was missing, the field was populated with the prior year's data, if available, or the average value of similar members.



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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

**10. Investment Return Rate**

7.00% per annum, compounded annually and net of all expenses.

**11. Salary Increase Rates**

Inflation rate of 2.50% plus merit and seniority increase, as shown below for selected ages (Adopted effective July 1, 2017).

Age	Rate
20	12.50%
25	11.50%
30	7.75%
35	6.50%
40	5.25%
45	4.75%
50	4.00%
55	3.50%
60	2.75%
65	2.50%

**12. Payroll Growth Rates**

3.00% per annum (Adopted effective July 1, 2017).

**13. Defined Contribution Plan**

The Defined Contribution account balance is added to the Actuarial Liability and the Actuarial Value of Assets. If a member retires and elects to have the Defined Contribution Account balance paid as an annuity, then the account balance is transferred to the Defined Benefit Plan and the annuity is valued as part of the Defined Benefit Plan.

**14. Changes in Assumptions Since Last Valuation**

The investment return rate was decreased from 7.45% to 7.00% as of the June 30, 2021 valuation.

**15. Rationale for Assumptions**

The demographic actuarial assumptions were adopted by the Board based on recommendations from the prior actuary from an experience study covering plan experience for the period July 1, 2011 through June 30, 2016. Cheiron has reviewed this experience study dated March 3, 2017. While we consider these assumptions to be generally reasonable, we have not yet performed our own actuarial experience study. An experience study will be performed once a sufficient amount of recent data has been accumulated.

**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

**B. Actuarial Methods**

**1. Actuarial Value of Assets**

The Actuarial Value of Assets is based on the Market Value of Assets with a four-year phase-in of actual investment return in excess of (or less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the Actuarial Value of Assets (adjusted for receipts and disbursements during the year). The actual investment return for this purpose is determined net of all investment and administrative expenses. The actuarial value is further adjusted, if necessary, to be within 9% of the market value.

**2. Actuarial Funding Method**

The funding method for the valuation of liabilities used for this valuation is the Entry Age Normal (EAN) method. Under this funding method, a normal cost rate is determined as a level percentage of pay for each active participant. The normal cost rate multiplied by payroll equals the total normal cost for each participant. The normal cost contributions (Employer and Participant) will pay for projected benefits at retirement for each active participant.

The Actuarial Liability is the difference between the Present Value of Future Benefits and the Present Value of Future Normal Costs. The difference between this Actuarial Liability and the Actuarial Value of Assets is the Unfunded Actuarial Liability (UAL).

The portion of the actuarial liability in excess of plan assets, the UAL, is amortized to develop an additional cost that is added to each year's employer normal cost. Under this funding method, actuarial gains and losses are directly reflected in the size of the Unfunded Actuarial Liability. The amortization method is described below.

**3. Amortization Method**

The Actuarially Determined Contribution (ADC) is determined as the sum of (a) the employer normal cost rate, and (b) a level percentage of payroll required to amortize the Unfunded Actuarial Accrued Liability over the 30-year closed period that began July 1, 2015.

**4. Disclosure Regarding Modeling**

Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate the liabilities, normal costs and projected benefit payments. We have relied on WinTech as the developer of ProVal. We have reviewed ProVal and have a basic understanding of it and have used ProVal in accordance with its original intended purpose. We are not aware of any material inconsistencies, unreasonable

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**APPENDIX B – SUMMARY OF ASSUMPTIONS AND METHODS**

output resulting from the aggregation of assumptions, material limitations or known weaknesses that would affect this report.

Projections in this report were developed using P-scan, our proprietary tool for the intended purpose of developing projections. The projections shown in this report cover multiple individual scenarios and the variables are not necessarily correlated. We are not aware of any material inconsistencies, unreasonable output resulting from aggregation of assumptions, material limitations or known weaknesses that would affect the projections shown in this report.

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**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

**Defined Benefit Plan**

**1. Eligibility for Membership**

Immediate upon commencement of employment

**2. Service Retirement**

Eligibility: Age 65 with five years of service, or age 55 with 25 years of service, or 30 years of service regardless of age. Age and service requirements increased effective August 1, 2015.

Effective August 1, 2015, service credit requirements for retirement with an unreduced benefit increased as follows:

<b>Unreduced Benefit for Retirement Between:</b>	<b>Minimum Age and Years of Service</b>
Through 7/1/2015	Any age and 30 years; or age 65 and 5 years
8/1/2015–7/1/2017	Any age and 31 years; or age 65 and 5 years
8/1/2017–7/1/2019	Any age and 32 years; or age 65 and 5 years
8/1/2019–7/1/2021	Any age and 33 years; or age 65 and 5 years
8/1/2021–7/1/2023	Any age and 34 years; or age 65 and 5 years
8/1/2023–7/1/2026	Any age and 35 years; or age 65 and 5 years
8/1/2026 and later	Age 60 and 35 years; or age 65 and 5 years

Amount: For members eligible to retire on or before July 1, 2015 (i.e., age 60 with 5 years of service, age 55 with 25 years of service, or 30 years of service regardless of age), the annual amount is equal to the greater of (a) 2.2% of final average salary for the three highest years of earnings, multiplied by years of total Ohio service credit, or 2.5% of final average salary for the three highest years of earnings if the member has 35 or more years of service credit, multiplied by years of total Ohio service credit up to 30 years of service. For years of Ohio contributing service credit in excess of 30 years, the following percentages will apply:

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**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

Year	Percentage
31	2.5%
32	2.6
33	2.7
34	2.8
35	2.9
36	3.0
37	3.1
38	3.2
39	3.3

or (b) \$86 multiplied by years of service credit.

Effective August 1, 2015, the annual amount is equal to 2.2% of final average salary for the five highest years of earnings, multiplied by all years of service.

For members who were eligible to retire on July 1, 2015, the annual amount is greater of:

- a. the benefit amount calculated upon retirement under the new benefit formula, or
- b. the benefit amount the member would have received if he/she retired on July 1, 2015.

Annual salary is subject to the limit under IRC Section 401(a)(17).

For retirements prior to August 1, 2015, if the member has less than 30 years of service at retirement and is younger than age 65, the following reduction factors apply:

Attained Age	or	Years of Ohio Service Credit	% of Base Amount
58		25	75%
59		26	80
60		27	85
61			88
		28	90
62			91
63			94
		29	95
64			97
65		30 or more	100

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**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

For retirements on or after August 1, 2015, the age and service credit requirements for an actuarially reduced benefit are as follows:

Actuarially Reduced Benefit for Retirement Between:	Minimum Age and Years of Service
Through 7/1/2015	Age 55 and 25 years; or age 60 and 5 years
8/1/2015–7/1/2017	Any age and 30 years; or age 55 and 26 years; or age 60 and 5 years
8/1/2017–7/1/2019	Any age and 30 years; or age 55 and 27 years; or age 60 and 5 years
8/1/2019–7/1/2021	Any age and 30 years; or age 55 and 28 years; or age 60 and 5 years
8/1/2021–7/1/2023	Any age and 30 years; or age 55 and 29 years; or age 60 and 5 years
8/1/2023 and later	Any age and 30 years; or age 60 and 5 years

The actuarially reduced benefit reflects a reduction for each year that the member retires before meeting eligibility for an unreduced benefit.

The benefits as a percentage of final average salary, which reflect the early retirement reduction, are shown in the booklet entitled *Service Retirement and Plans of Payment for members enrolled in the Defined Benefit Plan 2017/2018*.

**3. Disability Retirement**

**Eligibility:** Membership before July 30, 1992, and election of this benefit, completion of five or more years of service, under age 60 and permanently incapacitated for the performance of duty.

**Amount:**

1. Annuity with a reserve equal to the member's accumulated contributions, plus
2. The difference between (1) and the greater of 2% of the average salary during the three highest years of earnings times total service plus years and months from date of disability to age 60. Maximum allowance is 75% of final average salary. Minimum allowance is 30% of final average salary.

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**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

**4. Disability Allowance**

**Eligibility:** Membership after July 29, 1992, or membership before July 30, 1992, and election of this benefit, completion of five or more years of qualifying service and permanently incapacitated for the performance of duty. For membership on and after July 1, 2013, completion of ten years of qualifying service and permanently incapacitated for the performance of duty.

**Amount:** The greater of 2.2% of the average salary times total service. Maximum allowance is 60% of final average salary. Minimum allowance is 45% of final average salary. The disability allowance payment terminates at age 65 (or later if payment begins after age 60). After termination of the disability allowance, the member may apply for service retirement.

**5. Death after Retirement**

Lump-sum payment of \$1,000 upon death after service or disability retirement.

**6. Survivor's Benefit**

**Eligibility:** Upon death after at least 1½ years of service credit for Ohio service with at least 1/4 year of such service in the 2½ years preceding death or upon death of a disability retiree. For membership on or after July 1, 2013, upon death after at least five years of service credit for Ohio service and died not later than one year after the date service terminated.

Qualified survivors will receive the highest benefit from among the following for which they are eligible: dependent-based benefit, service-based benefit, and retirement-based benefit.

Qualified beneficiaries are the spouse, dependent children, and/or dependent parents over age 65.

**Dependent-Based Benefit:** Monthly survivor benefits are determined according to the number of qualified survivors. These benefits are payable as a percentage of final average salary. The percentages are as follows:

<b>Number of Qualified Dependents</b>	<b>% of Final Average Salary</b>
1	25%
2	40
3	50
4	55
5 or more	60

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**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

**Service – Based Benefit:** If a member has 20 or more years of service before death, monthly survivor benefits are determined according to the number of years of service credit. These benefits are payable as a percentage of final average salary. The percentages are as follows:

Years of Service	% of Final Average Salary
20	29%
21	33
22	37
23	41
24	45
25	48
26	51
27	54
28	57
29 or more	60

**Retirement–Based Benefit:** If a member dies after meeting service retirement eligibility, the monthly survivor benefit is determined as if the member had actually retired and provided a 100% Joint and Survivor benefit to the qualified survivor. Early retirement reduction applies if the member is not eligible for unreduced benefit.

The primary beneficiary may withdraw the deceased member’s account in lieu of receiving monthly benefits if there are no children who are qualified survivors.

**7. Lump - Sum Withdrawal Option**

In lieu of any other pension or survivor benefits, a member who leaves the System can receive his/her member contributions with interest in a lump-sum according to the following schedule:

Credit Service	Lump-Sum
Less than 3 Years	Member Contributions with 2% Interest
3 or More Years and Less than 5 Years	Member Contributions with 3% Interest
5 Years or More	150% of Member Contributions with 3% Interest

The Board has the authority to modify the interest credited to member contributions.



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APPENDIX C – SUMMARY OF PLAN PROVISIONS

**8. Plans of Payments**

Benefits can be paid under the following forms of payment:

- Single Life Annuity;
- Joint and Survivor Annuity -100%, 50% or other; with or without pop-up; with one or multiple beneficiaries;
- Annuity certain and;
- Partial lump-sum option – from six to 36 times the monthly Single Life Annuity as a lump-sum with the remainder as an annuity.

**9. Cost-of-Living Benefits**

The basic benefit is increased each year by 2% of the original COLA. For members retiring on or after August 1, 2013, the 2% COLA is paid on the fifth anniversary of the retirement benefit. Future annual increases are calculated on the original benefit and are not compounded.

Effective July 2017, the COLA has been reduced to zero.

**10. Contributions**

By Members: 14% of salary.

By Employers: 14% of salaries of their employees who are members.

Rehired Retirees: Rehired retirees who return to employment after retirement and their employers both contribute to the System. These contributions fund an additional benefit payable after termination of employment. The contributions and interest are paid as a lump-sum or converted to an additional annuity.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

**Combined Plan**

**1. Eligibility for Membership**

New members hired on or after July 1, 2001, may elect in writing to participate in the Combined Plan.

**2. Service (Normal) Retirement**

Eligibility: Age 60 with five years of service.

Amount: The balance in the member's defined contribution account plus an annual amount equal to 1% of final average salary for the three highest paid years multiplied by years of total Ohio service credit.

Effective August 1, 2015, final average salary will be average of the member's five highest salary years.

Annual salary is subject to the limit under IRC Section 401(a)(17).

**3. Early Retirement**

Eligibility: Before age 60 with five years of service

Amount: The normal retirement benefit commencing at age 60. At age 50 or later, a member who elects to withdraw the full value of the member's defined contribution account may receive the withdrawal value of the formula benefit in a single sum, or leave the formula benefit on account for a benefit payable at age 60.

**4. Vesting**

Eligibility: Completion of five years of service credit for the Defined Benefit portion. Member contributions and earnings are 100% vested at all times.

Amount: A member who terminates with five or more years of service credit can receive the actuarial equivalent present value of the Defined Benefit formula. Prior to age 50, a withdrawal must include both the Defined Benefit and defined contribution portions of the account.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

**5. Late Retirement**

Eligibility: After age 60 with five years of service.

Amount: The formula benefit described in the normal retirement section based on service credit and final average salary at termination without any actuarial adjustments.

**6. Disability Allowance**

Eligibility: Completion of five or more years of service and permanently incapacitated for the performance of duty. For membership on or after July 1, 2013, completion of ten years of qualifying service credit with STRS Ohio.

Amount: Members have the option of receiving disability benefits under the disability allowance program of the Defined Benefit Plan. All contributions and investment gains in the member's defined contribution account are used to fund the benefit. At age 65, the disability allowance converts to a service retirement benefit based on the 2.2% formula. Alternatively, the member can withdraw his/her defined contribution account in lieu of receiving the disability allowance.

**7. Survivor's Benefit**

Eligibility: Upon death after at least 1½ years of credit for Ohio service with at least 1/4 year of such service in the 2½ years preceding death or upon death of a disability retiree. For membership on or after July 1, 2013, upon death at least five years of qualifying service credit.

Amount: Qualified survivors have the option of receiving dependent-based, service-based, or retirement-based benefits described under the Defined Benefit plan. Both employer contributions and the member's contributions and any investment gains in the member's defined contribution account are used to fund the benefit. Survivors also have the option to withdraw the Defined Contribution and Defined Benefit portions of the Combined Plan account in lieu of receiving a monthly benefit.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

**8. Forms of Payment of Defined Benefit Portion**

If the member withdraws his/her defined contribution account prior to age 50, then the formula defined benefit must be paid in a lump-sum. If the member is at least age 50, then the benefit can be paid as a Single Life Annuity, a Joint and Survivor Annuity as described under the Defined Benefit Plan, or as a lump-sum. All alternative forms of payment are the actuarially equivalent of the Single Life Annuity benefit payable at age 60.

**9. Forms of Payment of Member's Defined Contribution Account**

If the member withdraws his/her defined contribution account prior to age 50, then the account must be paid in a lump-sum. If the member is at least age 50, then the member can elect that the actuarial equivalent of the Defined Contribution account be paid as a Single Life Annuity or a Joint and Survivor Annuity as described under the Defined Benefit plan.

**10. Cost-of-Living Benefits**

Not available on the service retirement benefit. For disability and survivor benefits, the basic benefit is increased by the increase in the Consumer Price Index each year, but not to exceed 2% of the original base benefit. Effective July 2017, the COLA has been reduced to zero.

**11. Contributions**

By Members: 14% of salary.

12.0% of salary is deposited into the member's defined contribution account and 2.0% is applied to the defined benefit portion of the Combined Plan.

By Employers: 14% of salary is used to fund the defined benefit formula.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

**Defined Contribution Plan**

**1. Eligibility for Membership**

New members hired on or after July 1, 2001, may elect in writing to participate in the Defined Contribution Plan.

**2. Service (Normal) Retirement**

Eligibility: Termination after age 50.

Amount: The balance in the member's defined contribution account.

**3. Early Retirement**

Eligibility: Termination before age 50.

Amount: The balance in the member's defined contribution account.

**4. Vesting**

Eligibility: Members vest 20% per year in employer contributions and all gains and losses on those contributions. Member contributions and earnings are 100% vested immediately.

Amount: The balance in the member's defined contribution account.

**5. Disability Allowance**

Eligibility: Permanently incapacitated for the performance of duty and termination of employment.

Amount: The balance in the member's defined contribution account. At age 50, other payment options are available, but employment must first be terminated.

**6. Survivor's Benefit**

Eligibility: Upon death.

Amount: The balance in the member's defined contribution account. A spouse may either continue to manage the member's defined contribution account or withdraw the account.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

**7. Optional Forms of Payment**

The actuarial equivalent of the member's defined contribution account can be paid on or after age 50 as a Single Life Annuity or as a Joint and Survivor Annuity as described in the Defined Benefit Plan.

**8. Cost-of-Living Benefits**

Not available.

**9. Contributions**

By Members: 14% of salary is deposited into the member's defined contribution account.

By Employers: Effective July 1, 2017, 9.53% of salary is deposited into the member's defined contribution account. 4.47% of salaries are used to amortize The Unfunded Actuarial Liability of the Defined Benefit Plan.

In addition, 4.47% of salary of the salaries of Alternative Retirement Plan members is used to fund the Unfunded Actuarial Liability of the Defined Benefit Plan.

**APPENDIX D – GLOSSARY OF TERMS**

**Funding**

**1. Actuarial Assumptions**

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disability, and retirement; changes in compensation; inflation; rates of investment earnings, and asset appreciation or depreciation; and other relevant items.

**2. Actuarial Cost Method**

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a normal cost and an Actuarial Liability.

**3. Actuarial Gain/(Loss)**

A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular actuarial cost method.

**4. Actuarial Liability**

The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future normal costs. It represents the value of the past normal costs with interest to the valuation date.

**5. Actuarial Present Value (Present Value)**

The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe \$100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you will not be obligated to pay him. If the assumed investment return is 10%, the Actuarial Present Value is:

$$\begin{array}{ccccccc}
 \text{Amount} & & \text{Probability of} & & \text{1/(1+Investment Return)} & & \\
 & & \text{Payment} & & & & \\
 \$100 & \times & (1 - .01) & \times & 1/(1+.1) & = & \$90
 \end{array}$$

**6. Actuarial Valuation**

The determination, as of a specified date, of the normal cost, Actuarial Liability, Actuarial Value of Assets, and related \ for a pension plan.

**APPENDIX D – GLOSSARY OF TERMS**

**7. Actuarial Value of Assets**

The value of cash, investments and other property belonging to a pension plan as used by the actuary for the purpose of an actuarial valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way long-term costs are not distorted by short-term fluctuations in the market.

**8. Actuarially Equivalent**

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of actuarial assumptions.

**9. Amortization Payment**

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

**10. Entry Age Normal Actuarial Cost Method**

A method under which the Actuarial Present Value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between Entry Age and assumed exit ages.

**11. Funded Percentage**

The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

**12. Investment Return Assumption**

The assumed interest rate used for projecting dollar related values in the future.

**13. Mortality Table**

A set of percentages which estimate the probability of death at a particular point in time. Typically, the rates are annual and based on age and sex.

**14. Normal Cost**

That portion of the Actuarial Present Value of pension plan benefits and expenses, which is allocated to a valuation year by the actuarial cost method.



**APPENDIX D – GLOSSARY OF TERMS**

**15. Projected Benefits**

Those pension plan benefit amounts which are expected to be paid in the future under a particular set of actuarial assumptions, taking into account such items as the effect of advancement in age and increases in future compensation and service credits.

**16. Unfunded Actuarial Liability**

The excess of the Actuarial Liability over the Actuarial Value of Assets.

**GASB**

**1. Actuarially Determined Contribution**

A target or recommended contribution for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.

**2. Actuarial Valuation Date**

The date as of which an actuarial valuation is performed. This date may be up to 24 months prior to the measurement date and up to 30 months prior to the employer's reporting date.

**3. Deferred Inflow of Resources**

An acquisition of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience gains on the Total Pension Liability, assumption changes reducing the Total Pension Liability, or investment gains that are recognized in future reporting periods.

**4. Deferred Outflow of Resources**

A consumption of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience losses on the Total Pension Liability, assumption changes increasing the Total Pension Liability, or investment losses that are recognized in future reporting periods.

**APPENDIX D – GLOSSARY OF TERMS**

**5. Entry Age Actuarial Cost Method**

The actuarial cost method required for GASB 67 and 68 calculations. Under this method, the Actuarial Present Value of the Projected Benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between Entry Age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the service cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future service costs is called the Total Pension Liability.

**6. Measurement Date**

The date as of which the Total Pension Liability and Plan Fiduciary Net Position are measured. The Total Pension Liability may be projected from the actuarial valuation date to the measurement date. The measurement date must be the same as the reporting date for the Plan.

**7. Net Pension Liability**

The liability of employers and nonemployer contributing entities for employees for benefits provided through a defined benefit pension plan. It is calculated as the Total Pension Liability less the Plan Fiduciary Net Position.

**8. Plan Fiduciary Net Position**

The fair or Market Value of Assets.

**9. Reporting Date**

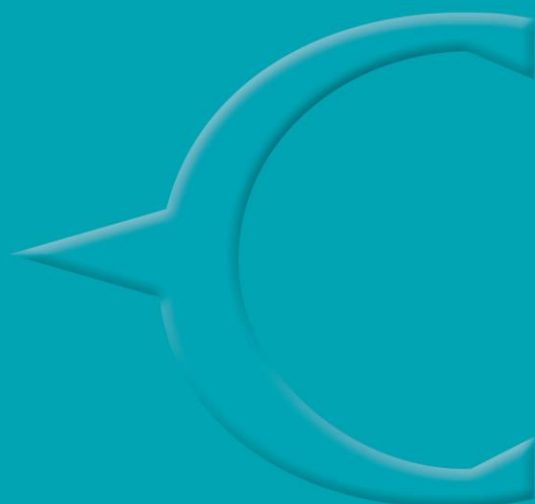
The last day of the Plan or employer's fiscal year.

**10. Service Cost**

The portion of the Actuarial Present Value of Projected Benefit payments that is attributed to the current period of employee service in conformity with the requirements of GASB 67 and 68. The service cost is the normal cost calculated under the Entry Age actuarial cost method.

**11. Total Pension Liability**

The portion of the Actuarial Present Value of Projected Benefit payments that is attributed to past periods of employee service in conformity with the requirements of GASB 67 and 68. The Total Pension Liability is the Actuarial Liability calculated under the Entry Age actuarial cost method. This measurement generally is not appropriate for estimating the cost to settle the Plan's liabilities.



# **State Teachers Retirement System of Ohio**

## **Actuarial Valuation Report as of June 30, 2021**

**Produced by Cheiron**

**October 2021**



*Classic Values, Innovative Advice*