

Ohio Retirement Study Council

ISSUE BRIEF

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Unfunded Actuarial Accrued Liability and its Amortization

Introduction

The single most well-known technical and legal requirement applying to the state retirement systems is the so-called “30-year amortization period.” It is ubiquitous in retirement system annual reports, news media, retirement system communications, retiree newsletters, and Ohio Retirement Study Council (ORSC) documents; however, there is rarely a thorough explanation of the term to the general reader. The objective of this issue brief is to provide a plain language explanation of the “30-year amortization period” in order to provide a common ground of understanding. Technical actuarial terms utilized in determining the amortization period are also explained, particularly the “present value of future benefits,” the “normal cost,” and “actuarial accrued liability.” This basic understanding of actuarial practices will clarify the meaning of the “30-year amortization period” and provide a framework for understanding how the retirement systems measure and fund retirement benefits.

Defined Benefit Plans and Retirement System Funding

The majority of benefits provided by the state’s five retirement systems to public employees are through a defined benefit plan. A defined benefit plan provides retirement benefits that are based on a formula of years of service (YOS) and a benefit multiplier, such as 2.2% of final average salary (FAS) multiplied by each year of service (for example, **2.2% x \$50,000 FAS x 30 YOS = \$33,000 annual benefit**). These benefits are funded through a combination of employee and employer contributions and investment earnings on those contributions, with the objective of prefunding retirement benefits; that is, the funding objective is that contributions and earnings made during the employee’s career will be sufficient to fund the member’s retirement benefit. Such an arrangement would ensure that each generation pays for its own benefits. An actuary assists the retirement systems in valuing retirement benefits and developing strategies for funding them.

Currently, none of the state's retirement systems have sufficient assets to date to cover the **actuarial accrued liability (AAL)** for committed benefits. All of the systems, therefore, have **unfunded actuarial accrued liability (UAAL)**. Ohio law requires that the systems have a plan to pay down this UAAL over a period not exceeding 30 years.

Actuarial Funding Method and Determination of AAL

Because defined benefit plans are based on a formula (for instance $2.2\% \times \text{FAS} \times \text{YOS}$), a retirement system can estimate the amount of money needed to be set aside to pay for future benefits. The job of the actuary is to properly measure these benefit costs and set a stable and sufficient level of contributions across time to fund those costs. Ideally, sufficient funds are set aside on a yearly basis to pre-fund the retirement system so that each generation pays for its own retirement benefits. The following sections detail this actuarial funding method.

The cost of benefits accrued during an employee's total career is referred to as the *present value of future benefits (PVFB)*.

Actuarial Funding Method: Present Value of Future Benefits (PVFB)

One of the primary questions facing an actuary is determining the eventual cost of benefits. Without an estimate on what the system will eventually pay in benefits, it is impossible to determine how much should be set aside in any individual year or measure a system's funding progress across time.

The cost of benefits accrued during an employee's total career is referred to as the *present value of future benefits (PVFB)*. PVFB takes into account the entirety of a career, both past service and anticipated future service. This figure includes a variety of actuarial assumptions, including mortality rates, future salary increases, anticipated future service, and earnings on investment: it is the best estimation of today's cost to provide a future benefit. Knowing eventual costs allows a retirement system to determine how to fund that benefit over time (normal cost) and measure funding progress across time (actuarial accrued liability).


Actuarial Funding Method: Normal Cost

Normal cost is the constant, steady level of contributions (in Ohio expressed as percent of payroll) that is required to fund the PVFB over the entirety of the employee's full career. Ideally, and if all actuarial assumptions are met, the annual normal cost contribution is sufficient to fund retirement benefits. The normal cost figure allows the retirement system, employers, and employees to know the stable level

of contributions that will be required on an annual basis to fund retirement benefits. A retirement system must also measure their total progress in funding benefits across time.

Actuarial Funding Method: Actuarial Accrued Liability (AAL)

PVFB estimates the total cost of a benefit and is composed of two parts: the first measures costs allocated to previous years (i.e., earned service credit in a retirement system), and the second measures the present value of benefits allocated to future years (i.e. future anticipated service credit). The first part can be expressed as the total value of all past normal costs; this is also referred to as the *actuarial accrued liability* (AAL). Another way of saying this is that AAL is the total amount that *should have been, or was planned on being*, collected through normal cost contributions (and earnings on those contributions), up to the present moment to fund retirement benefits. The second part of the PVFB should, if all assumptions are correct, be covered by future normal costs. Graphically, the relationship between PVFB, normal cost, and AAL can be expressed as follows:¹

Present Value of Future Benefits		
Actuarial Accrued Liability (total value of past normal cost)	Normal Cost	Present Value of Future Normal Costs
Past service (past contributions and earnings)	Current year (current contributions)	Future (future contributions and earnings)
Time 		

Unfunded Actuarial Accrued Liability (UAAL)

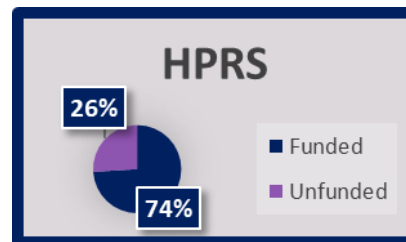
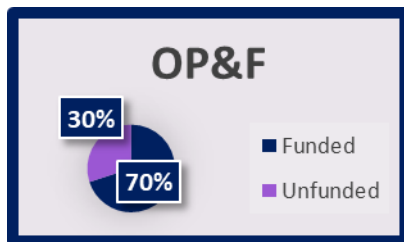
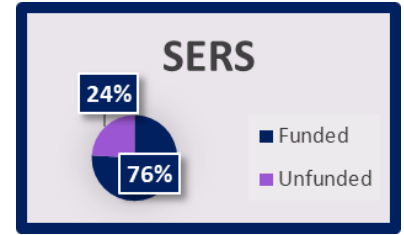
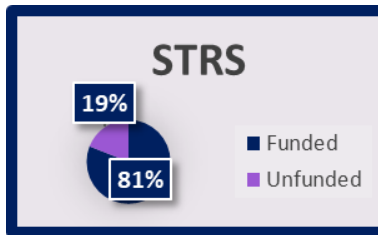
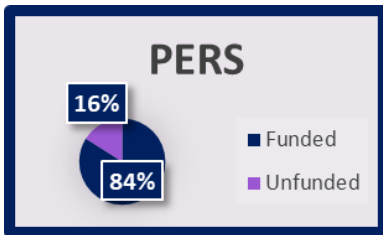
Frequently, if not always, existing assets are less than the AAL of the retirement system. When a pension fund's assets are less than AAL, the plan has *unfunded actuarial accrued liabilities* (UAAL). A system with UAAL does not currently have the targeted level of funds to fully cover benefits due in the future, according to its own actuarial funding method. Another way of putting this is that the system did not collect enough in previous year normal costs contributions (and earnings on those normal costs contributions) to achieve their funding objectives.

Conceptually, consider a runner that is planning on finishing a one mile race in eight minutes. To do so the runner sets a "pace" necessary to finish the run in eight minutes. If the runner is only half of the way through the run after six minutes but *planned on being* half of the way through the race after *four*

minutes, they are not “on pace.” A runner not at their targeted pace is less likely to complete the race at their desired time.

The normal cost is analogous to the *current pace* of the runner and the AAL figure is analogous to the *progress* of the runner in a race. A system that is not 100% funded (i.e., has some amount of UAAL) is not “on pace” in its funding goals. Note that a runner that is “on pace” is not “finished with the race;” the runner is instead “on pace” to complete the race at their desired time.

The following pie charts reflect the fiscal year 2022 ratio of funded to unfunded liabilities in each of Ohio’s five retirement systems, referred to as the **funded ratio**. If a retirement system does not have a funded ratio of 100% or above, it has UAAL. Each system has UAAL.



Calculation of UAAL and Funded Ratio

UAAL and funded ratio calculations are a snapshot of the retirement system and occur on an annual basis in the system’s actuarial valuation report. The funded ratio is an expression of the difference between assets set aside for future benefits and the projected amount needed to be set aside to provide for that future benefit. “100% funded” means there is no difference between these amounts at the time of measurement. The lower the funded ratio, the fewer assets that have been set aside for benefits relative to the system’s target level of assets.

UAAL and funded ratio are related. The UAAL is the specific dollar amount expressed in a system’s funded ratio. For instance, actuaries may estimate that the AAL is \$100. If the system has only \$80 in assets, the system would have a UAAL of \$20 ($\$100 - \$80 = \20) with a funded ratio of 80%. Put differently, for every dollar the system has targeted having in assets, the pension system is missing 20 cents. This matters because the lower the funded ratio, the higher the probability that *something* must change (whether it be

increased contributions, plan design changes, or benefit cuts) to balance what the system planned on having in assets and what they planned on providing in benefits, and that change will disproportionately be on the current generation of employees and employers. Considering the running example above, the runner must “speed up” their “pace” to catch up to where they expected to be to get back on track to completing the run in the desired time. The longer they wait to do this, the harder it will be to get back on pace.

To summarize the above: the retirement systems are able to estimate the total funds necessary to pay for future benefits (present value of future benefits; PVFB). The amount of the PVFB attributed to past service is the actuarial accrued liability (AAL). If current assets of the system do not equal the AAL, then the system has unfunded actuarial accrued liability (UAAL). A system that has UAAL is not “on pace” to funding projected benefits. This information can be expressed as both a UAAL dollar figure or as a funded ratio.

Each year a valuation is conducted to report this information, and every five years, a systematic review of those yearly valuation assumptions is conducted. Additionally, the ORSC conducts a 10-year actuarial audit to provide an outside review of those annual and 5-year reviews. It is vital that a retirement system provide an accurate measurement of UAAL and funded ratios as it determines the probability, without change, of providing benefits to its members into the future. Yet, even with this constant attention to UAAL and even with reasonable assumptions on its calculation, UAAL can change radically and quickly.

Changes in UAAL

Why does UAAL occur? The first is the most obvious and least helpful: UAAL already exists. Ida May Fuller was the first Social Security recipient. Her first benefit check of \$22.54 was issued on January 31, 1940.² Ms. Fuller lived until 1975, collecting a total of \$22,888.92. She contributed a total of \$24.75 during her three years of Social Security coverage.³ This is quite typical with the initiation of a pension plan. When created, pension plans included individuals working who were close to retirement. To the extent that a benefit is based on a formula, and that person has not contributed to the system for that benefit, there is the creation of a UAAL. The creation of a retirement plan that treats all employees equally will likely result in an initial UAAL. This is not uncommon.

UAAL may also be due to the actuarial assumptions not being realized. If mortality rates improve faster than anticipated (individuals live longer lives), this means retirees will receive benefits longer than originally anticipated, causing UAAL. More significantly, if the assumed rate of return, the rate used to calculate the present value of benefits, is too high (for instance a long term market decline), then UAAL is created not

because benefit payouts have changed, but because the *present value of those payments have increased*. Likewise, if contributions from employees and employers were not paid in accordance with the actuarial assumptions, it could result in additional UAAL—the system is “missing” money that they anticipated receiving. Conversely, UAAL can be reduced if retirees live shorter lives or if the assumed rate of return is too low. This is not a criticism of actuaries but an acknowledgement that demographic and economic predications going more than 30 years into the future are difficult. This is also why there are annual valuations that reevaluate the financial condition of the systems and their membership. Fluctuation of UAAL due to changing demographic and economic factors is expected.

UAAL can change radically and quickly.

Finally, UAAL can be caused by plan benefits changes. In Ohio and until 2012 pension reform, committed benefits only increased. This occurred in a myriad of ways: increasing the benefit formula multiplier, providing increased cost of living adjustments (COLAs), diverting required contributions to pay health care benefits, providing more generous disability benefits, expanded benefits for survivors, etc. Each time the benefit structure of the plans became more generous, it increased the costs to the systems. Since this was done without providing the new assets necessary to defray the new costs, increasing the benefit structure generated UAAL. Alternatively, UAAL decreased with 2012 pension reform as benefits were reduced, decreasing the amount necessary today to pay for (now reduced) future benefits.

While these are all different ways UAAL can change, they all have the same basic underlining problem: UAAL represents a mismatch between the funding targets and current assets and, fundamentally, occurs because insufficient funds were made available to pay for future benefits. Pension plans have a process, called amortization of UAAL, by which UAAL is reduced and ultimately eliminated over a set period of time.

Amortization of UAAL

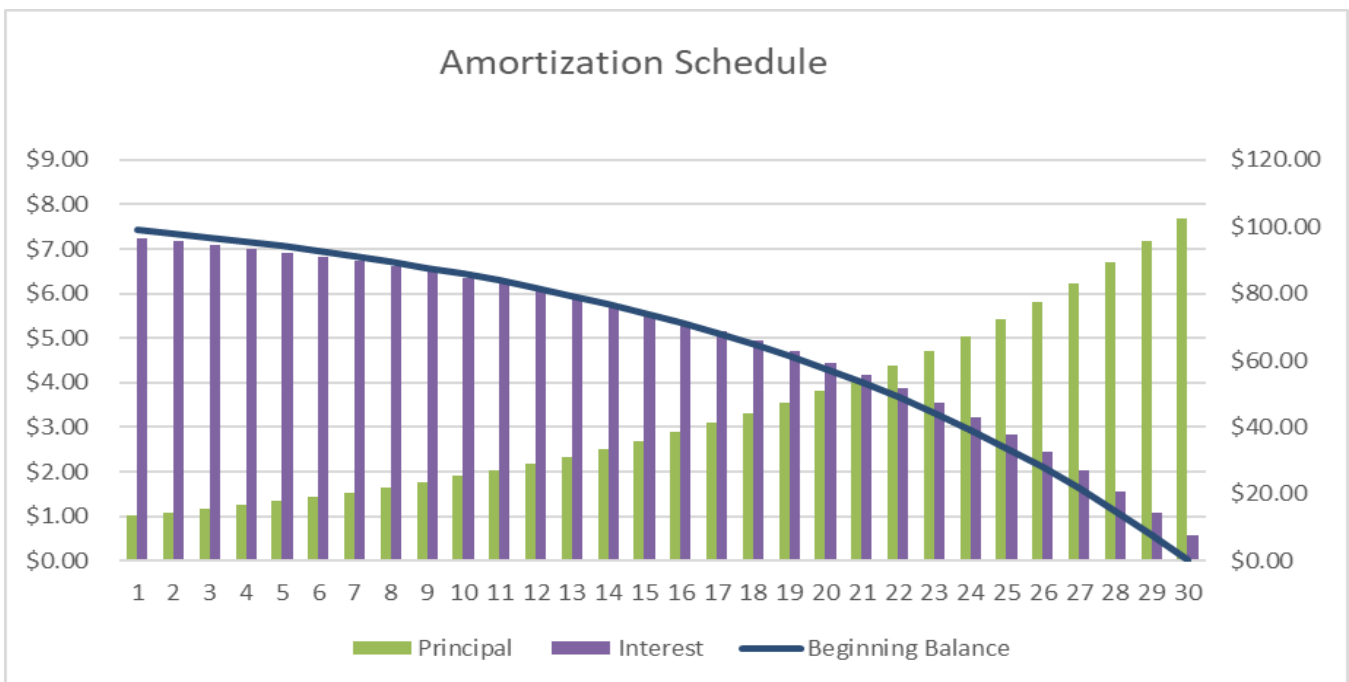
Eliminating UAAL requires that the current generation pay more in employee or employer contributions than is necessary to fund the current generation’s benefit: they must contribute both for their own future benefit and pay for the unfunded benefit of previous generations. This is not done immediately but over a period of time. This is the amortization of UAAL. To return to our running example, the current generation must run faster and harder to get the system’s funding back on pace. The amortization of UAAL is frequently compared to the amortization of a mortgage on a house. While technically imprecise, it is a

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useful conceptualization of how the UAAL is being funded over time. Ohio has required that all UAAL be funded over a 30-year period, meaning that at the end of a specified 30-year period UAAL would be \$0, the funded ratio would be 100%, and the amortization period would be 0 years (assuming that all assumptions are met and no new UAAL is incurred).⁴ If the systems are unable to amortize UAAL over a 30-year period, they are required to submit a plan to the ORSC that would enable them to amortize those liabilities over a 30-year period.⁵ This is often referred to as the “30-year funding plan.” This makes using the 30-year mortgage analogy useful.

Analogous to a mortgage, this payment has two components: interest on the existing principal and the principal itself. The largest individual component of funding for the systems is investment earnings and the “interest” in the mortgage conceptualization represents the lost investment gains from having an insufficient base of assets. And as with a mortgage, the more you owe (i.e., the less asset base you have), the greater the interest payment (i.e., the greater loss of potential investment earnings).

The initial mortgage payments are composed mostly of interest payments while a much smaller portion goes to paying the principal. As time goes by and the principal becomes smaller, more of a portion of each payment is directed towards principal reduction and less towards interest charges. This is the process of amortization, set for many home loans at 30-years. This is visually represented as follows:



In the valuation reports of the systems, analogous information to the payoff of a mortgage is found under the “UAAL” category. The UAAL payment is the “mortgage” cost necessary to pay for the combined “interest” (lost investment earnings) and “principal” (UAAL) over the stated amortization period. The UAAL payment will provide a steady amount of funds that will pay the interest (i.e., the payment of investment earnings that would have been earned on those missing assets in the current year) and an additional payment that will, over the amortization period, eliminate the difference between the AAL and value of existing assets (i.e., the “principal”).

Ohio Retirement Systems

The table below gives a top level summary of the actuarial condition of Ohio’s retirement systems in fiscal year 2022. Each system’s current normal cost, employee and employer contribution rates, and net employer normal cost for the defined benefit plan is displayed in the chart below. Also included is the amount, expressed as a percent of payroll, devoted to paying off the UAAL (“UAAL Rate”) and the amount of time it will take for this contribution to pay off the UAAL (“Amortization Period”).

As seen below, much of the burden of supporting the current generation’s benefit is borne by the members themselves. And in many cases very little, if any, of the employer contribution accrues to active member’s benefit. This is expressed by the employer net normal cost, which is the amount of the employer contribution that is necessary, in addition to the employee contribution, to fund the normal cost.⁶ The employer contributions are almost completely absorbed to pay for the UAAL, and will continue to be so for decades to come. Note that the negative normal cost of STRS means that existing active members are contributing more of their salary to the system than the normal cost of that benefit.

System	Normal Cost	Employee Contribution	Employer Contribution	Employer Net Normal Cost	UAAL Rate	Amortization Period
PERS	14.50%	9.79% ⁷	14.11%	4.54%	9.57%	16 years
OP&F	16.40%	12.25%	21.71% ⁸	4.21%	17.00%	27 years
STRS	10.61%	13.52% ⁹	14.00%	(2.91%)	16.91%	12 years
SERS	11.26%	10.00%	14.00%	1.26%	12.74%	22 years
HPRS	18.10%	14.00%	26.50%	7.46%	19.04%	21 years

ORSC Staff Comments: What the 30-Year Funding Period Does, and Does Not Mean

The 30-year funding period requirement, adopted in 1997 under Senate Bill 82 of the 121st General Assembly, has been an effective ceiling on system liabilities. The requirement was adopted as a way to prevent additional liabilities from simply being pushed into the future, as doing so would violate the core ORSC objective of maintaining intergenerational equality. As such, it has been a red-line used to require changes, such as with pension reform in 2012 when the retirement systems were required to present plans that would reduce the amortization of liabilities to 30-years. This has also avoided the systems running into the type of fundamental funding issues facing many other states.

But conceptualizing a system sitting at 30-year funding as “healthy,” as has become popularized in the general public, is simply incorrect. It would be more accurate to say that the 30-year requirement requires a plan to eventually get to a fully funded and healthy status, which ideally would be the objective. A retirement system without significant UAAL would provide more intergenerational equality and reduce the likelihood of future benefit changes.

As expressed by the ORSC’s actuary, PTA/KMS, in its 2012 pension reform review:

“We also believe that the 30-year plan benchmark is an acceptable standard, but should be considered an absolute minimum, not an ideal. We believe that the 30-year period should not be perpetually reset...Compared to pension systems around the country, the Ohio practice is strong due to adherence to a standard (while many other states simply ignore or defer the actuary’s recommended funding requirements), but the standard itself is not onerous, particularly with no current requirement for a declining 30-year funding standard.”¹⁰

From the perspective of ORSC staff, UAAL means that a retirement system does not presently have the targeted funds necessary to pay for future benefits. As a result, each system is forced to require current and future generation to contribute, in combined employer and employee contributions or expressed as benefit cuts, more than necessary to fund that generation’s benefit. Significant and long term structural UAAL is a violation of the core ORSC objective of maintaining intergenerational equality. Practically speaking, it also raises the cost of providing benefits to Ohio’s public employees to both members and employers. After all, employees and employers are having to pay investment earnings (the “interest” on borrowed money) on the unfunded portion that would otherwise be funded through investment earnings.

While it is true that the state retirement systems are currently below the legal limit of 30-years amortization, the objective should be a declining amortization period that has, as its ultimate objective, fully funded status. A core requirement of ORSC evaluations, intergenerational equality, simply cannot be maintained with significant amortization periods.

The 30-year period, as it has been commonly misunderstood, has been taken to mean that the systems are financially healthy if they perpetually sit at or near a 30-year amortization period. Worse, some outside interest groups have taken any reduction in the amortization period as evidence that additional benefits are warranted. This misconstrues the amortization period. This brief has outlined the burden such an expansion of benefits places on the current generation of employees and employers by describing what is meant by “amortization” and “unfunded actuarial accrued liability.” Adding additional benefits to a system that is not fully funded simply piles *additional* unfunded liabilities on the system and places significant costs, and risks, on the current generation of employees and employers, violating inter-generational equity.

A core requirement of ORSC evaluations, intergenerational equality, simply cannot be maintained with significant amortization periods.

¹ Modified from California Research Bureau, “Actuarially Speaking: A Plain Language Summary of Actuarial Methods and Practices for Public Employee Pension and Other Post-Employment Benefits” (2008). *California Agencies Paper 364*, page 10

² <https://www.ssa.gov/history/imf.html>

³ <https://www.ssa.gov/history/idapayroll.html>

⁴ Again, 100% funding does not mean that they system has all the funds necessary to cover projected benefits—there is no dollar for dollar accounting of assets to liabilities. It means instead that the system has the targeted level of funds necessary to pay those benefits in the future according to their actuarial funding method. They are “on track” or “on pace.”

⁵ R.C. 145.221, 742.16, 3307.512, 3309.221, and 5505.121.

⁶ Note that this figure is based on an assumed rate of return which is generally not attainable for individual investors. For instance, the SERS normal cost of 11.26% means that the anticipated cost of that future benefit is 11.26% of salary *based on investment returns of 7.00%*. As a “guaranteed” (assumed) investment return, this adds value to the employee beyond their own contributions that is not expressed in the normal cost figure.

⁷ PERS has different employee and employer contribution rates due to their varying employment groups, in addition to a combined plan member rate. The employee and employer contribution rate is therefore a blended rate for all members.

⁸ OP&F has different employer contributions rates for fire versus police members. The employer contribution rate is therefore a blended rate for all members. OP&F also allocated 0.5% of the employer rate to fund health care.

⁹ All STRS members contribute 14% of salary. However, because of combined plan participants and the mitigating rate, the contribution average for STRS members is reduced to 13.52% for actuarial purposes.

¹⁰ PTA/KMS, “Analyzing Retirement Systems’ 30-Year Plans and Alternative Pension Reform Solutions” (July 2012), 36.

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