Pension Integrity Project at Reason Foundation
Gold Standard in Public Retirement System Design Series—No. 5

BEST PRACTICES FOR PENSION DEBT AMORTIZATION

by Truong Bui, Jen Sidorova, and Anthony Randazzo

September 2022

Reason Foundation's mission is to advance a free society by developing, applying, and promoting libertarian principles, including individual liberty, free markets, and the rule of law. We use journalism and public policy research to influence the frameworks and actions of policymakers, journalists, and opinion leaders.

Reason Foundation's nonpartisan public policy research promotes choice, competition, and a dynamic market economy as the foundation for human dignity and progress. Reason produces rigorous, peer-reviewed research and directly engages the policy process, seeking strategies that emphasize cooperation, flexibility, local knowledge, and results. Through practical and innovative approaches to complex problems, Reason seeks to change the way people think about issues, and promote policies that allow and encourage individuals and voluntary institutions to flourish.

The "Gold Standard in Public Retirement System Design Series" reviews the best practices of state-level public pensions and provides a design framework for states that are struggling under a burden of postemployment benefit debt. This fifth entry in the Gold Standard series looks at best practices for amortization schedules of unfunded liabilities. This analysis examines how public plan sponsors can best design and implement amortization policy that puts their plan on solvency track and minimizes unfunded liability growth.

Gold Standard Brief #1: Best Practices in Incorporating Risk Sharing into Public Sector Defined Benefit Pension System Design

Gold Standard Brief #2: Best Practices in the Design and Utilization of Public Sector Defined Contribution Plans

Gold Standard Brief #3: Best Practices in Cost-of-Living Adjustment Designs in Public Pension Systems

Gold Standard Brief #4: Best Practices in Hybrid Retirement Plan Design

Gold Standard Brief #5: Best Practices for Pension Debt Amortization

EXECUTIVE SUMMARY

State and local public pensions in the U.S. in 2020 faced a total unfunded actuarial liability (UAL) of about $1.4 trillion, and the average pension plan was only 73% funded. Although preliminary data suggest that the current average funded status is closer to 85%, thanks to the substantial investment returns in 2021, the *2022 Public Pension Forecaster* finds aggregate unfunded liabilities will jump back over $1 trillion if 2022 investment results end up at or below 0%. However, despite funding developments from year to year, public pension plans remain subject to an uncertain economic climate, and the next downturn can quickly widen the unfunded gap.

While there are several answers for resolving the enormous debt accrued by pension plans, the standard solution employs a systematic plan to pay off the debt over many years. Usually, UAL is not paid off as a lump sum but is "amortized" over some time.

While the two most common amortization methods are level-dollar and level-percent, only the level-dollar method ensures predictable amortization contributions from year to year. It requires lower payment in the initial years of the schedule because it creates a predictable path to solvency through ensuring that specific amounts are paid each year.

When it comes to open and closed amortization schedules, this analysis graphically illustrates that closed amortization schedules ensure a timely repayment of UAL. Open amortization schedules, on the contrary, run the risk of keeping the amortization payment

continually below the interest expense. This leads to perpetual negative amortization and makes it impossible for the pension plan to pay out UAL.

It is also important to keep the amortization period short. For longer amortization horizons, like 25 years, the interest exceeds amortization, leading to wasteful spending. Keeping an amortization schedule at 15 years ensures the intergenerational equity principle, that is, to pay off UAL within the average remaining working lifetime of active members of a pension plan.

The analysis that goes into calculating the amortization schedule relies on an assumption about the payroll growth rate and discount rate to be realized. Notably, the level-dollar amortization does not rely on an assumption about payroll growth, highlighting another advantage of the method. The discount rate, however, plays a critical role in the amortization of pension debt regardless of the method chosen. Setting the proper discount rate reduces the chance that the annual payments will not earn enough returns to pay off the debt eventually.

After thoroughly evaluating these policies, best practices for amortizing pension debt call for several recommendations. These include using level-dollar amortization, a closed schedule that does not exceed 15 years, and setting appropriate discount rates. Plan sponsors should adhere to these principles to ensure the pension plan is equipped to fulfill its promises to existing retirees, as well as to assure the future robust functioning of the plan.

TABLE OF CONTENTS

TABLE OF FIGURES

PART 1

INTRODUCTION

A typical defined benefit (DB) pension plan is designed to be prefunded.[1] Unlike a pay-as-you-go system like Social Security, a DB plan does not pay its current benefits with its current contributions. Instead, employers and employees make contributions that grow through investment returns over decades. Over the years, all the contributions and accumulated interest have to build enough funds for the pension plan to cover the promised retirement benefits.

> *Implementing a successfully funded DB plan requires the pension system to plan years ahead.*

Implementing a successfully funded DB plan requires the pension system to plan years ahead. First, the plan sponsors are required to estimate the future retirement benefits. This calculation is based on variables that go into determining the benefits (working lifetime, salary level, salary growth rate, life expectancy, etc.). These assumptions vary by plan and are typically stipulated in the plan's actuarial valuation report. The actuary then calculates

[1] Anthony Randazzo, "How Public Sector Defined Benefit Plans Are Funded," Reason Foundation, 28 March 2016. http://bit.ly/29DTPkd (accessed 23 July 2022)

the present value of the future benefits by applying a discount rate that usually reflects the long-term expected rate of return. The present value of future benefits already accrued in past years is the pension liability. On the other side of the equation are pension assets expected to pay for the retirement benefits when the benefit is due.

Each year, the pension liability grows as active employees accrue benefits. Suppose all assumptions are realized, meaning that investments perform precisely as expected, and other variables that go into calculating liabilities are also predicted correctly. In that case, the pension's assets will match the ultimate cost, and the pension fund will have enough money to pay out pension benefits when the employees retire. But, of course, it is impossible to predict the future perfectly, so it is very common for pensions to see their assets dip below the amount estimated as their liability.

In this brief, amortization policy is analyzed considering all the assumptions that go into calculating amortization schedules. Part 2 explains the amortization schedule as a concept within the context of defined benefit pension plans. Importantly, it also explains the origins of unfunded liability and the role of amortization schedules in paying it off. Part 3 discusses the differences between various types of amortization policy tools, using a hypothetical plan scenario that is carried throughout the paper. Part 4 explores the appropriate timeline for amortization policy, while Part 5 explains why other plan assumptions, such as payroll assumption and discount rate, are critical to the success of amortization policy. Finally, Part 6 lays out the best practices for amortization policy.

PART 2

AMORTIZATION SCHEDULES IN CONTEXT OF DEFINED BENEFIT PENSION PLANS

2.1 SOURCES OF UNFUNDED LIABILITIES

Plan experience often deviates from actuarial assumptions, creating unfunded actuarial liability (UAL). These unexpected events generally come from four sources:

(1) **Contribution Deficiency**: When employers in a plan fail to pay 100% of the actuarially required contributions on time, the assets will grow more slowly than the liability, creating UAL.

(2) **Unfavorable Actuarial Experience**: UAL can occur when the plan's experience differs from the actuarial assumptions. For example, if investment returns are lower than assumed, the assets will grow more slowly than the liability, amassing UAL. Similarly, suppose retirees live longer than the life expectancy assumed for the plan. In that case, benefit payments will be larger than the predicted value of accrued

liabilities, and assets will be drained off faster than expected, creating unfunded liabilities.

(3) **Changes in Actuarial Assumptions and Funding Methods**: If a plan's board decides to lower the long-term risk of unexpected costs by adopting a lower discount rate, it leads to a higher pension liability valuation. Similarly, a higher life expectancy assumption raises the UAL, as it increases the expected retirement benefits relative to the current assets.

(4) **Changes to Existing Benefits**: When a state legislature retroactively increases benefits for years already served, it will increase the present value of current liabilities. Save for rare cases when this cost increase can be paid with surplus assets, this kind of change will generate UAL.

Since public pensions are incredibly likely to face some or all of the above situations, plan sponsors typically set debt servicing (or amortization) policies to determine precisely how the plan will pay for funding shortfalls.

2.2 THE ROLE OF AMORTIZATION IN FUNDING UAL

A pension plan with an unfunded liability needs a timeline for paying it off. Otherwise, it risks running out of money to pay promised retirement benefits. Technically, a pension board could opt to pay off all of the debt every year but doing so could require a large amount of budgetary flexibility, especially in cases of significant increases in UAL. For instance, a drop in investment income in a single year could require an unexpectedly large amount of needed resources. To avoid such fluctuations in annual funding requirements, most pension plans amortize unfunded liabilities, spreading the payments over some period of time.

> *"... pension plans can have growth in their unfunded liabilities each year, even if they make actuarially required annual payments in full."*

When a pension plan has unfunded liabilities, the plan actuary can calculate periodic amortization payments over time such that the plan sponsors can have a target date to be free of the pension debt. However, pension plans can have growth in their unfunded

liabilities each year, even if they make actuarially required annual payments in full. This is because there are several ways a plan can experience unfunded liabilities (see section 2.1), and these experiences stack up yearly.

Thus, pension plans have created several different methods for amortizing their unfunded liabilities. These include: adopting a “level-dollar” or “level-percent of payroll” method, amortizing over an “open” or “closed” period, and any combination of these methods, selecting a given number of years for the amortization schedule. Part 3 discusses each of these elements in turn.

PART 3

TYPES OF AMORTIZATION POLICIES

3.1 LEVEL-DOLLAR VS. LEVEL-PERCENT METHODS

Level-Dollar Amortization Method: Unfunded liabilities can be amortized over a given number of years such that the plan expects to pay the same nominal dollar amount each year of the schedule.

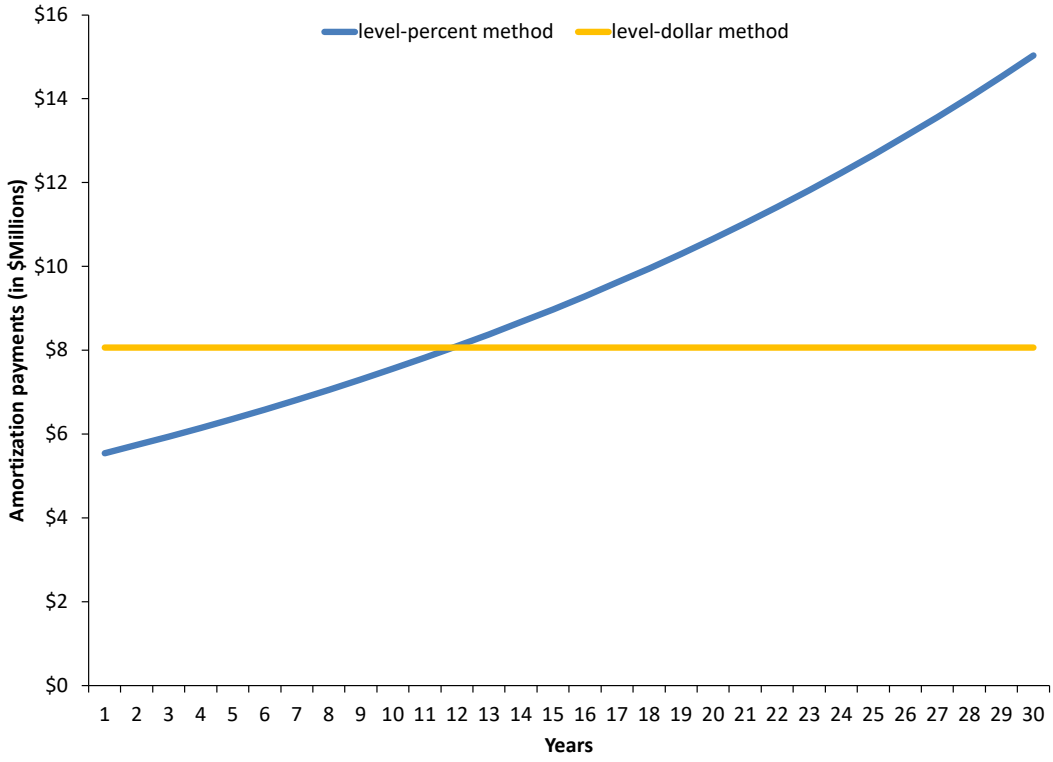
This method works like a fixed-rate mortgage. The amortization payment is a stable dollar amount every year. For example, if the unfunded liability is $100 million and the plan is using a level-dollar method over 30 years, the employers in the pension plan would have to pay an annual amount of $8,058,640 for 30 years to pay off the debt, assuming a discount rate of 7%.

Level-Percent Amortization Method: Unfunded liabilities can also be amortized over a given number of years for the plan to pay the same percentage of payroll each year of the schedule.

This method works like a student loan payment where the annual amount is tied to the borrower's income. The actual dollar value of the amortization payment fluctuates over time to equal a percentage of what employers pay employees in salary. The approach requires an estimate of payroll growth due to inflation and raises. For example, if a plan's unfunded liability were $100 million, using a level-percent method over 30 years with an assumed payroll growth rate of 3.5%, the first year's amortization payment would be $5,544,294, assuming a discount rate of 7%. The following year's amortization payment would be 3.5% higher in dollar terms but the same amount as a percentage of plan payroll. The following year would be 3.5% higher again, and so on.

There are important differences between these methods, as illustrated in Figure 1. Level-dollar typically means higher payments in the early years of an amortization schedule compared to the level-percent method. However, the later years of a level-dollar schedule require a lower contribution rate than level-percent. The flip side is that the level-percent method requires lower payments in the initial years of a schedule, but those payments ramp up in nominal dollar terms over time.

FIGURE 1: PROGRESSION OF ANNUAL PAYMENTS FOR LEVEL-DOLLAR VS. LEVEL-PERCENT



Source: Authors' calculation using hypothetical plan scenario

In the Figure 1 example, the starting unfunded liability is $100 million. The first-year payment for the level-percent method is about $2.5 million less than the level-dollar method. At the end of the amortization period, though, the level-percent amortization payment is $15 million, nearly double the level-dollar payment amount of $8 million.

3.2 CHALLENGES OF LEVEL-PERCENT AMORTIZATION

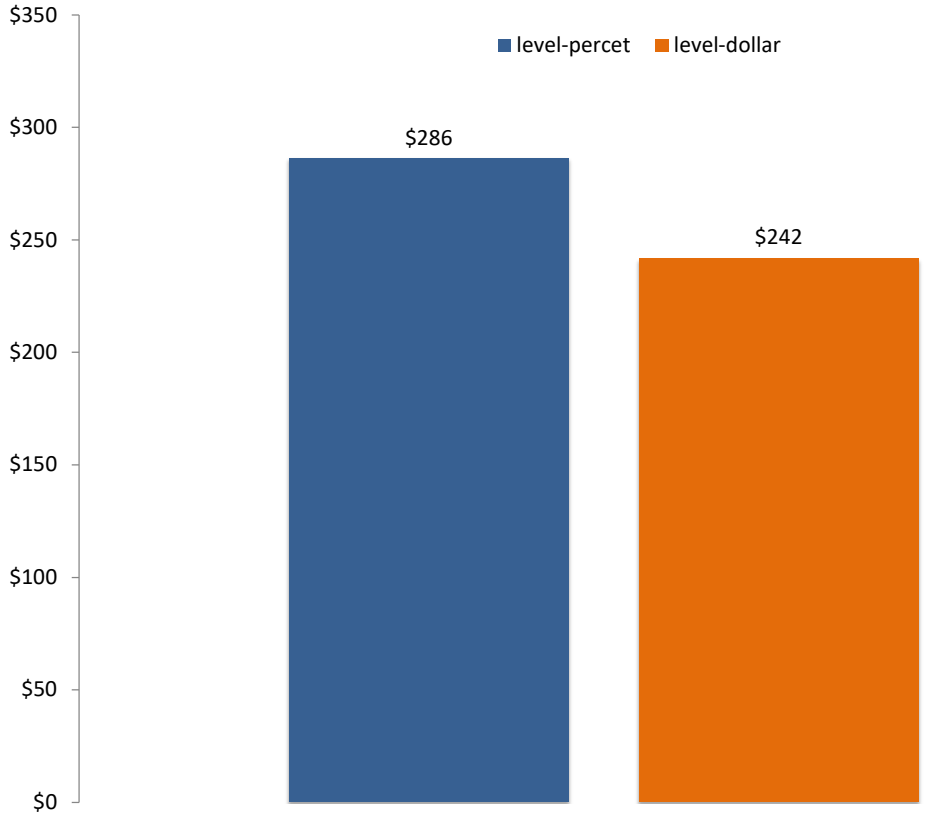
Importantly, contribution rates under the level-percent method are sensitive to payroll growth assumptions. If payroll grows slower than the rate assumed, it will take longer than originally planned to pay off the UAL unless contribution rates are revised; if payroll grows faster than the assumed rate, the debt will be paid off quicker than planned. (For more details, see Part 4 of this analysis.)

The level-percent method can also lead to annual required amortization payments being less than the interest accumulated on the unfunded liabilities, e.g., "negative amortization."

> **Negative amortization** is when annual required amortization payments are less than the interest accumulated on the unfunded liabilities. Debt amortization usually means paying off a loan with regular payments. As a result, the amount owed goes down with each payment. Negative amortization, on the contrary, means that even when you pay, the amount you owe will still go up because you are not paying enough to cover the interest.

While both methods target paying off debt, pension boards must consider the tradeoffs of front-loading or back-loading pension payments. As shown in Figure 2, over the lifetime of a 30-year amortization, the level-dollar method requires $242 million in payments on the $100 million debt. The level-percent method requires $286 million in payments, about 18% more than the alternative.

FIGURE 2: TOTAL AMORTIZATION PAYMENTS FOR LEVEL-PERCENT VS. LEVEL-DOLLAR



Source: Authors' calculation using hypothetical plan scenario

The level-dollar method is preferable, as it requires the lowest total amount of contributions over time and is not susceptible to negative amortization or a misapplied payroll growth assumption.

3.3 CLOSED VS. OPEN APPROACHES

The previous section's comparison of level-percent versus level-dollar methods of amortizing unfunded liabilities assumed a "closed" approach, meaning that the timeline for amortizing the debt is finite. However, in practice, an alternative method called "open amortization" is sometimes used by pension plans.

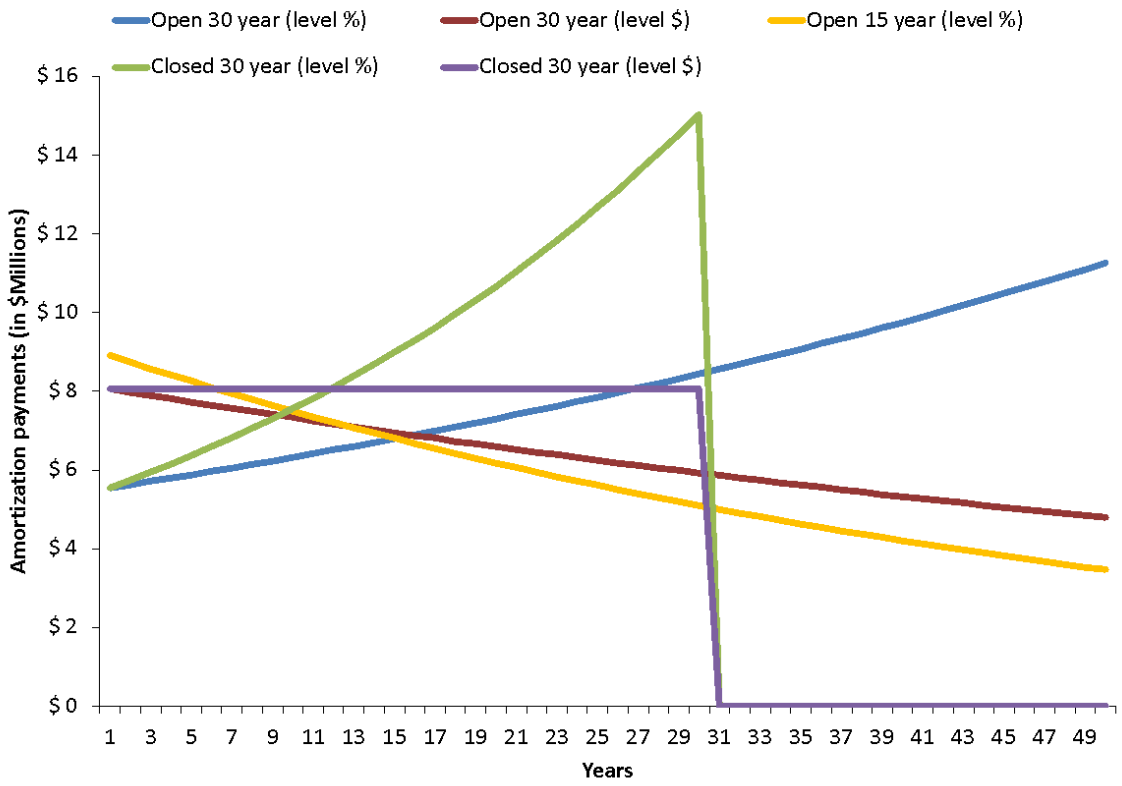
Open Amortization Method: If an amortization schedule is “open,” the amortization payments are reset each year, like refinancing a mortgage each year. As a result, this approach pretty much guarantees the pension debt will never be paid off. In addition, it often leads to negative amortization, meaning contributions toward unfunded liabilities each year don’t even cover the interest on the debt.

Closed Amortization Method: If an amortization schedule is “closed,” that means the plan is targeting a particular date for eliminating unfunded liabilities. Each year the plan pays off a portion of the unfunded liabilities, the schedule moves one year closer to its end date. However, suppose the plan experiences additional actuarial losses during the schedule that add to the unfunded liabilities that need to be paid down. In that case, the amounts owed in each year of the schedule increase, rather than the number of years in the schedule increasing.

A public sector pension plan can also choose to amortize pension debt using either method over a given number of years but on an "open" schedule. For example, under an "open" amortization funding policy, a plan might amortize its unfunded liabilities using the level-percent method over 30 years while resetting the schedule each year for a new 30-year schedule. Alternatively, a pension plan might pay off debt on a 30-year level-dollar schedule for nine years, but after, year 10 reset the schedule to 30 years.

Figure 3 illustrates the variance in paths of annual payments for different combinations of amortization methods. For example, the closed level-percent and level-dollar methods proceed for 30 years and then stop requiring payments at the end of their amortization periods. In contrast, all the open methods keep paying amortization costs ad infinitum.

FIGURE 3: ANNUAL AMORTIZATION PAYMENT BY AMORTIZATION METHOD

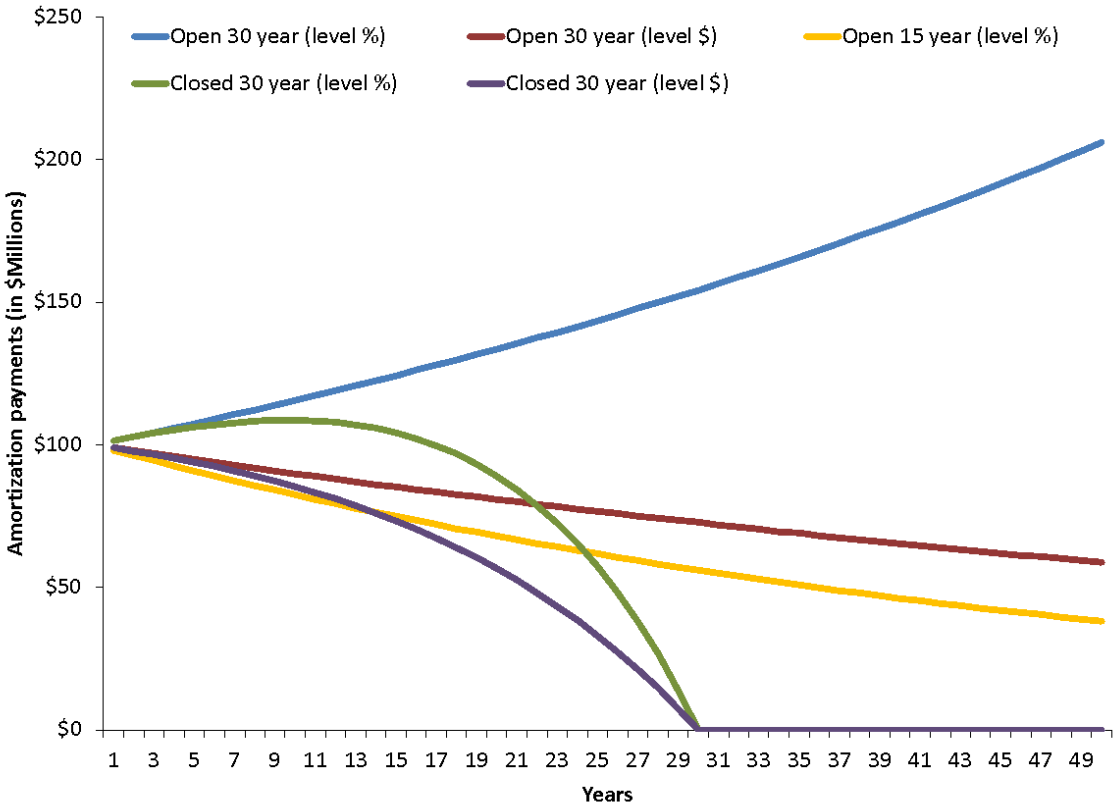


Source: Authors' calculation using hypothetical plan scenarios

The open 30-year level-dollar method has its annual payments on a downward sloping curve, while the annual payments for the open 30-year level-percent counterpart are on an upward sloping curve due to perpetual negative amortization. However, perpetual negative amortization does not happen to the open level-percent method if the amortization period is short enough. Therefore, as seen in the graph, the annual payments for the open 15-year level-percent method decrease over time (though they never reach zero because of the constant resetting).

Figure 4 illustrates the same trends from the perspective of the remaining balance of the unfunded liability. Again, the closed methods pay off the pension debt at the end of the amortization period, while the open methods never will.

FIGURE 4: CLOSED VS. OPEN AMORTIZATION POLICIES



Source: Authors' calculation using hypothetical plan scenarios

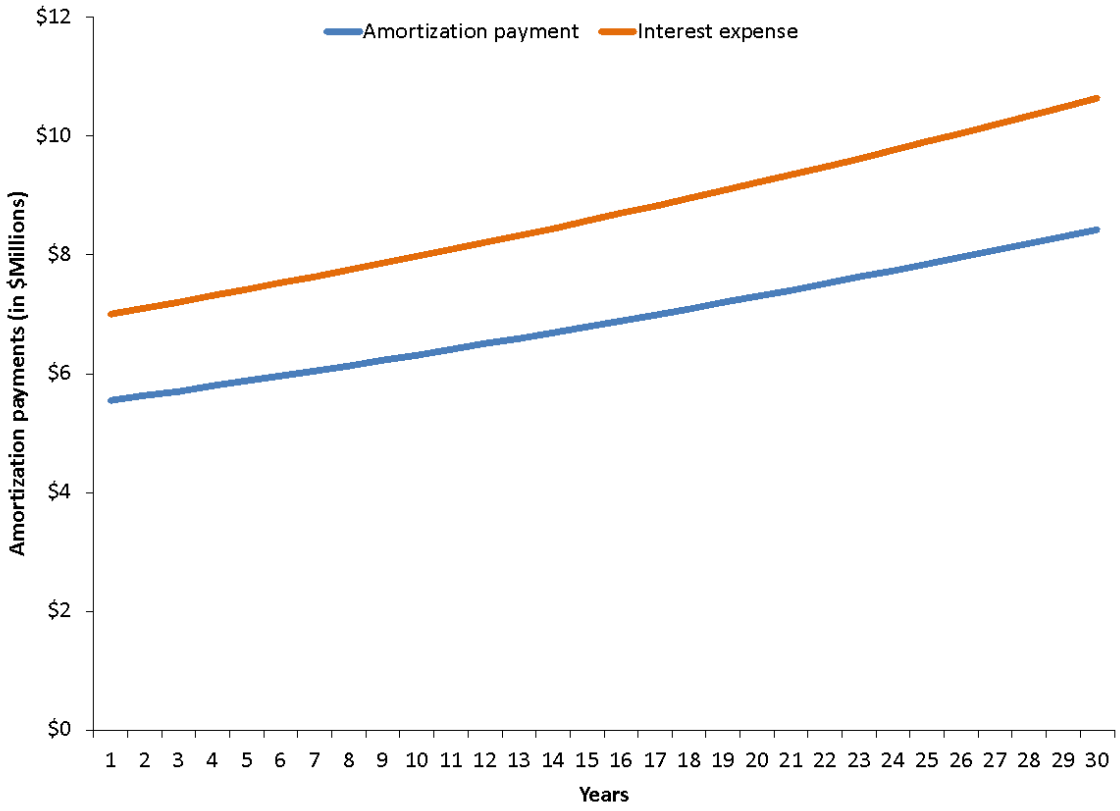
As shown in Figure 4, due to perpetual negative amortization, at no time does the open 30-year level-percent method reduce the debt, which instead increases infinitely. The open approach reduces the unfunded liability only when the level-dollar method is used or when the level-percent method is used with a short enough amortization period (see the yellow line). However, while the unfunded liability is reduced in these cases, it is never entirely paid off because of the constant resetting mechanism that puts new debt on a new schedule each time.

3.4 CHALLENGES OF OPEN AMORTIZATION FUNDING POLICY

From the perspective of policy intended to promote plan solvency, there are several problems with the open amortization approach. Not only does it never pay off the unfunded liability by design, but it also violates principles of intergenerational equity by continuously shifting out debt payments on today's unfunded liabilities to tomorrow.

The least advantageous approach is an open, level-percent method combined with a long amortization period (i.e., more than 20 years), the effect of which is to extend the unfunded liability out to infinity. In this scenario, each year's amortization payment is less than the interest on the pension debt, e.g., negative amortization. Figure 5 shows a scenario with a 30-year open amortization. The constant resetting of the amortization period keeps the amortization payment continually below the interest expense, creating perpetual negative amortization.

FIGURE 5: INTEREST EXPENSE VS. AMORTIZATION PAYMENT IN 30-YEAR OPEN AMORTIZATION



Source: Authors' calculation using hypothetical plan scenarios

3.5 AMORTIZATION LAYERS

The most common argument in favor of the "open" approach is that when unfunded liabilities are added over time to a closed amortization schedule, they cause required payments to spike, creating budgetary pressures. A pension board might take this into its consideration when setting an amortization policy.

A solution to this concern is to create "layers" of amortization schedules as new unfunded liabilities occur. A plan's unfunded liability does not have to all be in the same amortization schedule. Unfunded liabilities over various time frames (such as every five years) could each be amortized over their own respective closed time frame, ensuring that all pension debt is paid off but avoiding spikes in annual contributions.

PART 4

FINDING AN APPROPRIATE AMORTIZATION TIMELINE

Having an appropriate amortization period is crucial to the soundness of a pension plan. One key principle of public finance is that taxpayers served by today's government employees should pay for those employees' benefits. This principle ensures intergenerational equity. Having tomorrow's taxpayers pay for today's employee benefits violates this principle because future taxpayers receive little benefit from today's public sector employees.

Taxpayers pay for government employees' retirement benefits not when those employees retire (as would be required by a pay-as-you-go system such as Social Security) but when they are still working (through the prefunding of benefits with normal cost). Ideally, contributions should be made so that when the employee retires, the pension fund has enough money to deliver the promised benefits. If the pension fund does not have enough money at that time, additional funds have to come from future taxpayers to make up for the gap.

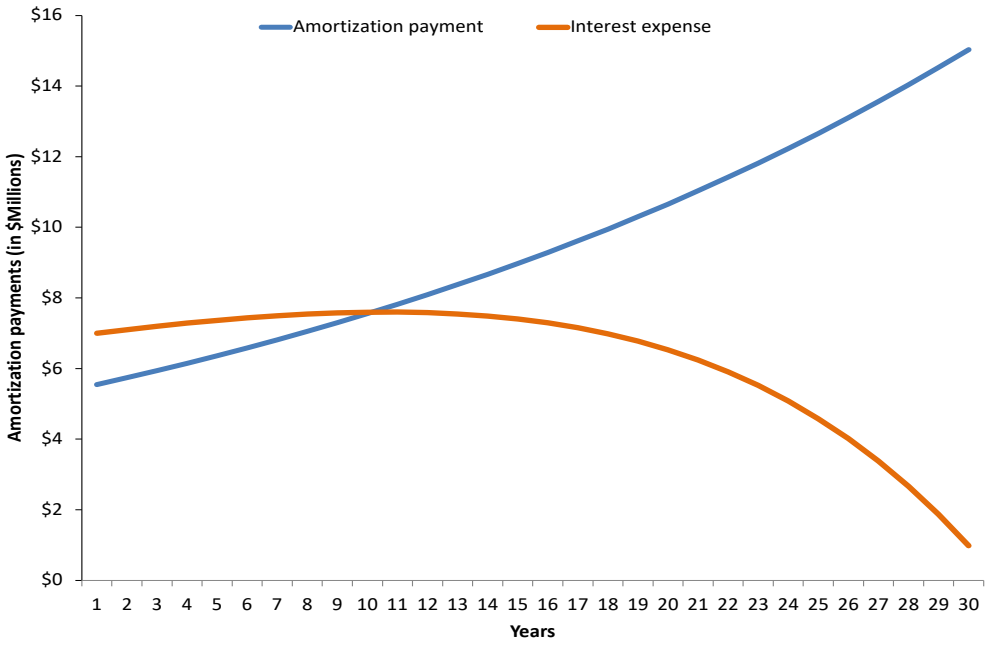
The most effective way for amortization policy to adhere to the intergenerational equity principle is to pay off accrued unfunded liabilities within the average remaining working

lifetime of active members of a pension plan. For most pension plans today, this means an amortization schedule of 15 years or less.[2]

In contrast, the average number of years in an amortization schedule for state-administrated pension plans is currently 21 years for 2020 and median is 22. And 44% of state pension plans have amortization schedules equal to or larger than 25 years as of 2020 fiscal year.[3]

Level-percent amortization combined with long schedules is particularly problematic because it can result in negative amortization at the beginning of the amortization schedule, pushing a substantial part of the liability to the future. Figure 6 illustrates this point by showing the amount of interest compared to the payment required on a 30-year, closed level-percent amortization schedule for $100 million in unfunded liabilities.

FIGURE 6: INTEREST EXPENSE VS. AMORTIZATION PAYMENT, LEVEL-PERCENT METHOD OVER 30 YEARS



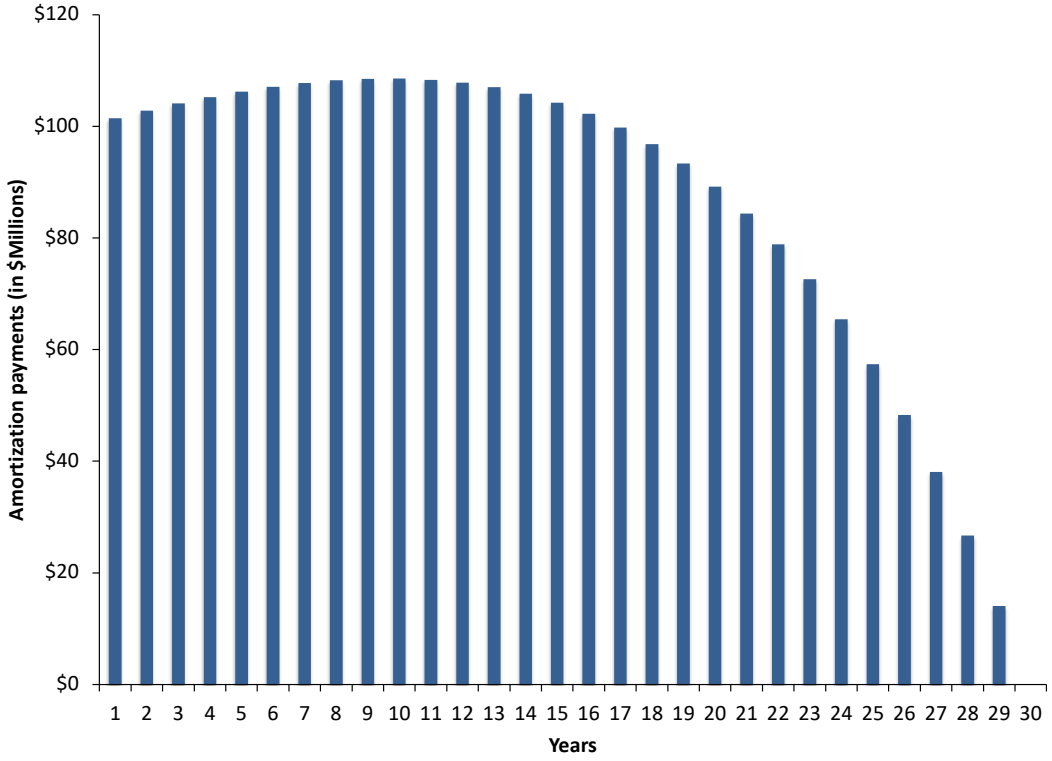
Source: Authors' calculation using hypothetical plan scenarios

2 "Blue Ribbon Panel on Public Pension Plan Funding," *Society of Actuaries*, https://www.soa.org/blueribbonpanel/#sthash.3M0f0EQS.dpbs.

3 Reported numbers are from the Pension Integrity Project database sourced from publicly available valuation reports, ACRFs, and other publications. For 2021, median is 23.5 and mean 22.6 (based on 74 plans that data are available for)—roughly 61% of full sample of data on pension plans.

The amortization payments shown in this example are lower than the interest expense during the first 10 years of the amortization schedule, making the unfunded liability grow during the same time. And as further shown in Figure 7, only after year 10, when the amortization payment first exceeds the interest expense, does the unfunded liability start to drop.

FIGURE 7: UAL BALANCE SIMULATION USING THE LEVEL-PERCENT METHOD OVER 30 YEARS



Source: Authors' calculation using hypothetical plan scenario

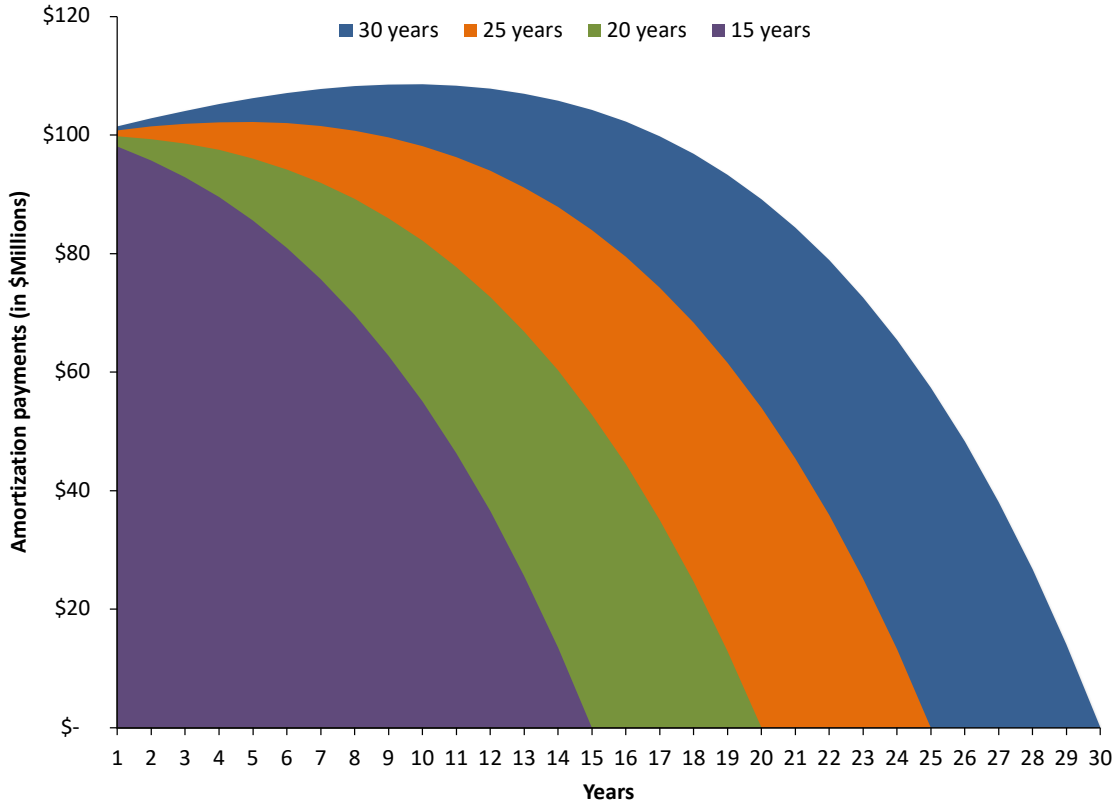
Adopting a shorter amortization schedule could avoid this problem because if the number of years used to spread the unfunded liability payments over is short enough, no negative amortization will occur.[4]

[4] Negative amortization however is not a problem in and of itself. If the amortization period is within the average remaining working lifetime of plan members, negative amortization poses no ill effect regarding intergenerational equity, since current taxpayers pay roughly all the amortization costs. However, if the amortization period is too long, negative amortization exacerbates the costs to future taxpayers.

Under the same assumptions used in the previous level-percent example (3.5% payroll growth rate, 7% discount rate), no negative amortization will occur if the amortization period is 20 years or less. Figure 8 illustrates how shorter amortization periods lead to less (and eventually no) negative amortization. When the amortization period is 25 years, negative amortization occurs in the first five years. When the amortization period drops to 20 or 15 years, there is no negative amortization at all—the UAL does not increase from interest exceeding amortization at any point of time during these periods.

Those thresholds are dependent on a plan's assumptions, however. Higher discount rate and payroll growth rate assumptions require shorter amortization periods to avoid negative amortization. For example, if the discount rate is 8% and the payroll growth rate is 4% in the previous illustration, the 20-year amortization period does produce negative amortization in the first two years.

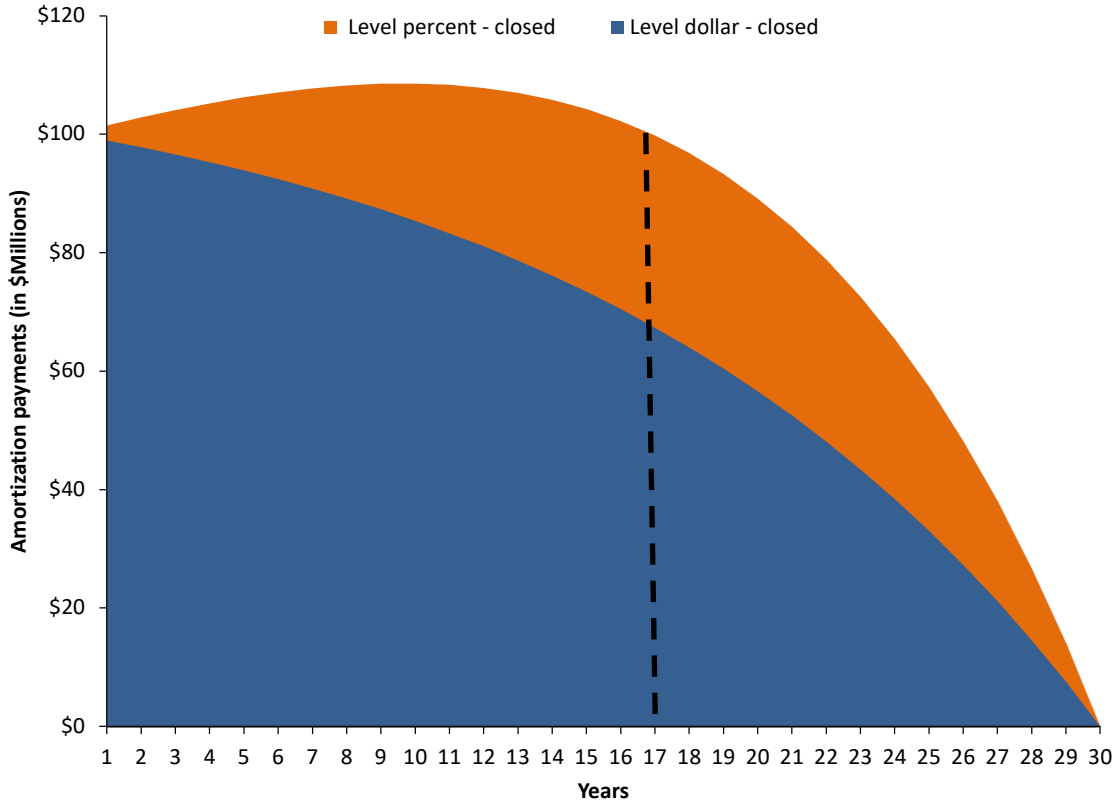
FIGURE 8: UAL BALANCE BY AMORTIZATION PERIOD USING THE LEVEL-PERCENT METHOD



Source: Authors' calculation using hypothetical plan scenario

Figure 9 shows the progress of UAL balance elimination for the two amortization methods with the same 30-year amortization period. As is evident in the visualization, the level-dollar UAL balance steadily declines starting with the initial year, while the level-percent balance rises in the first 10 years due to negative amortization. It thus takes 17 years for the level-percent UAL balance to fall back to the initial $100 million level. This means the entire original unfunded liability amount is more likely to be shifted to a different generation of taxpayers who no longer receive services from the average employee to whom the debt is owed. While the level-dollar method in this case also pushes amortization costs to future taxpayers, it does so to a much lesser extent.

FIGURE 9: UAL BALANCE BY AMORTIZATION METHOD BASED ON THE CLOSED AMORTIZATION SCHEDULE

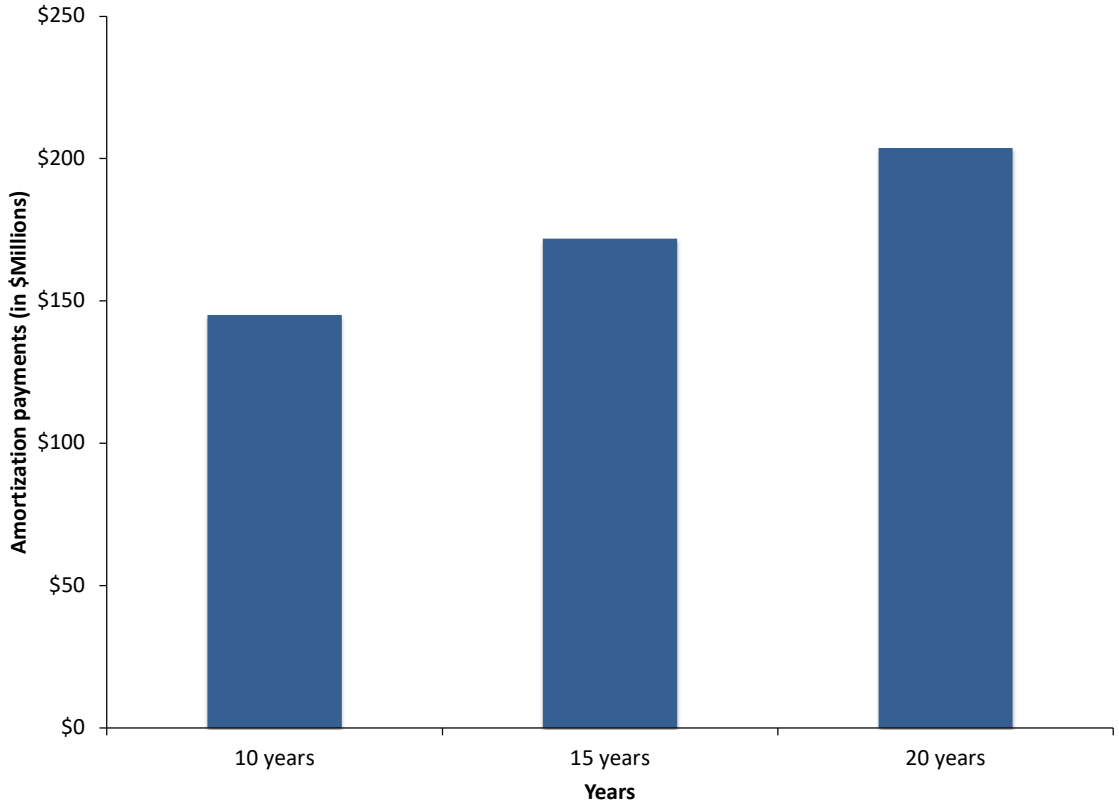


Source: Authors' calculation using hypothetical plan scenario

The choice of the amortization period, given that it is within the average remaining lifetime of plan members, again largely depends on the time preference and risk appetite for the pension board governing the plan. Longer amortization periods allow more budget flexibility in the short run and reduce contribution volatility but lead to higher costs in the

long run.[5] Shorter amortization periods result in lower total payment amounts (Figure 10) but impose higher costs in the short run (Figure 11).

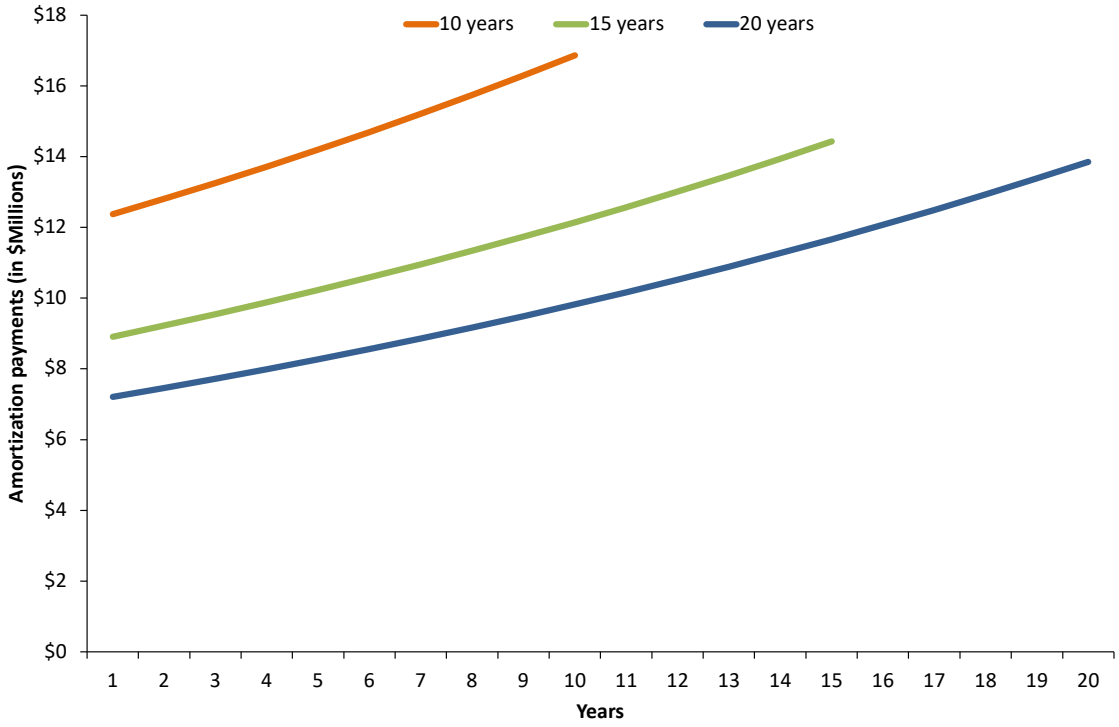
FIGURE 10: TOTAL PAYMENT AMOUNT BY AMORTIZATION PERIOD, LEVEL-PERCENT METHOD



Source: Authors' calculation using hypothetical plan scenario

[5] Another consideration is that a shorter amortization period allows the pension plan to better recover from significant near-term negative experience, such as an economic recession. This is because higher contributions in the near- and mid-term increase the funded status more quickly, allowing the plan to better ensure benefit promises for its members should a negative event happens.

FIGURE 11: YEARLY AMOUNT BY AMORTIZATION PERIOD, LEVEL-PERCENT METHOD



Source: Authors' calculation using hypothetical plan scenario

PART 5

HOW ACTUARIAL ASSUMPTIONS AFFECT AMORTIZATION PLANS

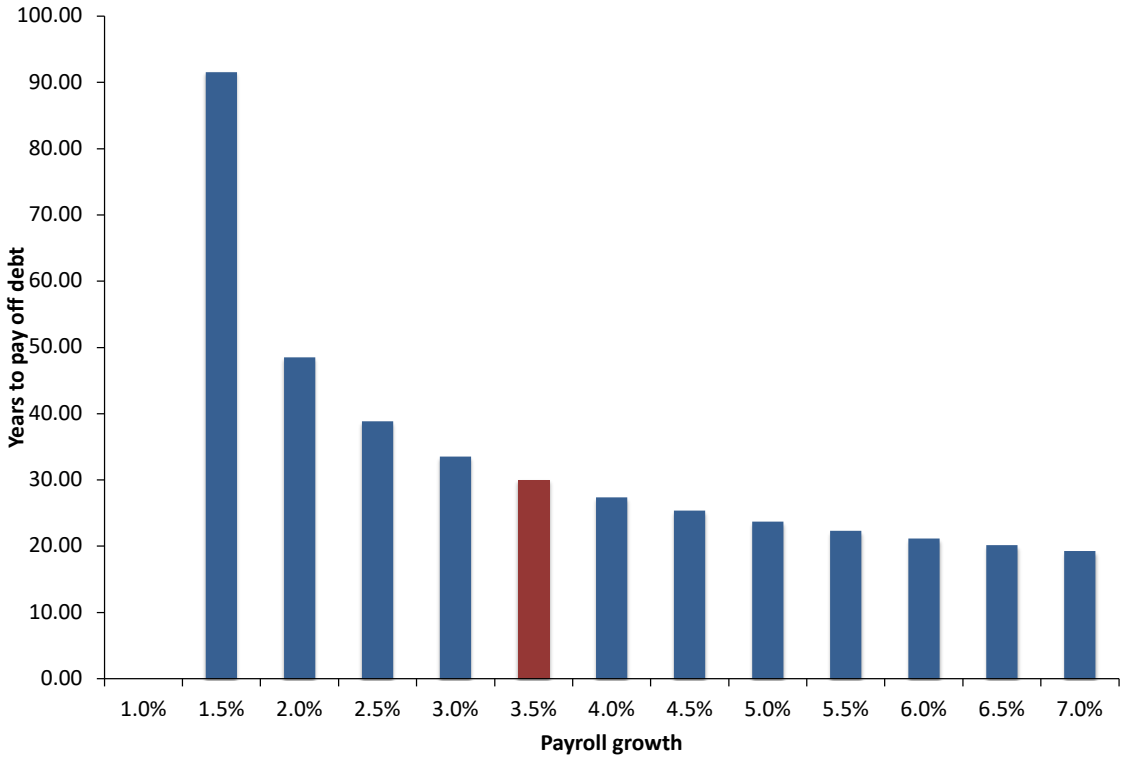
All the calculations and analyses in previous sections rely on the premise that the relevant actuarial assumptions will be realized, in particular the payroll growth rate and discount rate. But reality often deviates from those assumptions.

5.1 PAYROLL GROWTH RATE AND LEVEL-PERCENT AMORTIZATION

To determine the amortization payment as a fixed percentage of payroll, one must estimate the payroll growth rate, which reflects future increases in total covered payroll attributable to inflation and expectations in employment growth. If the payroll grows at the assumed rate, the amortization payment will grow at the right rate to exactly pay off the unfunded liability at the end of the amortization period. If the payroll grows more slowly than expected, it will take a longer time to pay off the debt.

Figure 12 illustrates the relationship between the growth rate of payroll and the time needed to pay off a pension debt using the closed 30-year level-percent method. The amortization schedule assumes a payroll growth rate of 3.5% and a discount rate of 7%.

FIGURE 12: PAYROLL GROWTH AND TIME TO PAY OFF DEBT



Source: Authors' calculation using hypothetical plan scenario

The graph shows that if payroll grows at the 3.5% rate, it will take exactly 30 years to pay off the debt, as assumed by the original plan. If the payroll grows faster than expected, it will take fewer years to pay off the debt. Conversely, a lower than 3.5% growth rate will result in more years required to fully amortize the debt. For instance, if the actual growth rate is 2.5%, it will take almost 40 years to pay off the debt. Notably, if the payroll growth rate drops to 1% or below, the debt will never be paid off with the original amortization plan.

The level-dollar method, however, does not rely on a payroll growth rate estimate and thus is not affected by changes in payroll growth.

5.2 DISCOUNT RATE AND UNFUNDED LIABILITIES

While the amortization of pension debt is often compared to the amortization of a home mortgage, the two are not exactly the same. For a home mortgage, when all annual payments are made, the loan is completely paid off, and the homeowner has no further

financial obligations to the lender. This is not necessarily true for a pension plan's unfunded liability.

> *While the amortization of pension debt is often compared to the amortization of a home mortgage, the two are not exactly the same.*

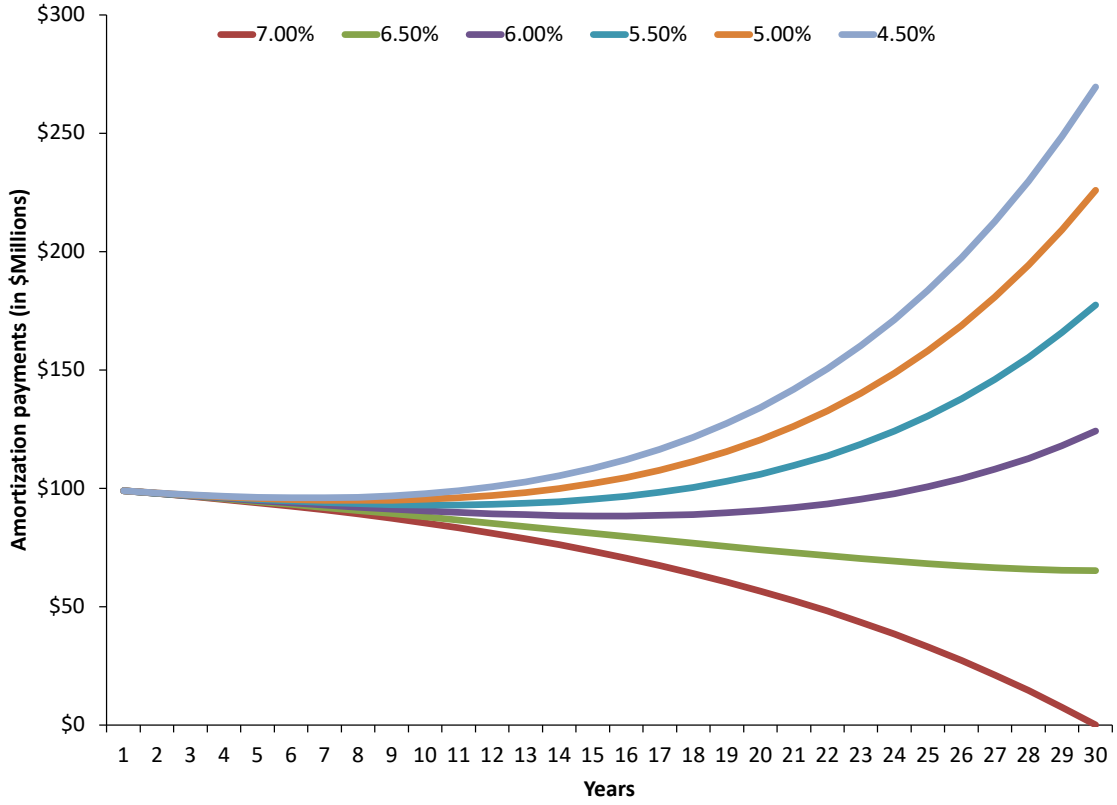
To see why this is the case, consider a hypothetical $100 million 30-year mortgage and an unfunded liability of the same amount. Assume that the unfunded liability is amortized under the closed level-dollar method over 30 years. The discount rate used for both amortizations is 7%. As a result, the annual payment for both the amortization schedules is $8,058,640. The difference between the two plans is that while the $100 million mortgage is a current debt that can be paid off any time during the 30 years, the $100 million unfunded liability is the present value of a *future* debt representing future pension benefits. The unfunded liability, therefore, is really paid off only when all the annual payments are made *and* the actual investment returns match the discount rate assumption, which is 7% in this case.

From the financial point of view, this difference should not matter since a future debt is equivalent to a current debt whose value equals the future debt's present value. However, the problem is that if the discount rate is too high (not reflecting the risk attached to pension obligations), it may understate the true present value of the future obligations. In other words, the 7% discount rate assumes a lot more risk than warranted by the near risk-free nature of the public pension debt.[6] Hence, there is a sizable chance that actual investment returns will deviate from the assumed discount rate. This means making all the required amortization payments will not guarantee that the underlying unfunded liability is truly paid off.

Figure 13 illustrates how actual investment returns affect the progress of the unfunded liability balance, using the above amortization example.

[6] Truong Bui, Anthony Randazzo, "Why Discount Rates Should Reflect Liabilities: Best Practices for Setting Public Sector Pension Fund Discount Rates," Reason Foundation Policy Brief 130 (2015). Reason Foundation. http://bit.ly/29Tn2FD

FIGURE 13: UNFUNDED LIABILITY VARIES WITH INVESTMENT RETURNS



Source: Authors' calculation using hypothetical plan scenario

When the actual rate of return matches the assumed 7%, the debt balance reaches zero at the end of year 30. However, when the actual rate of return drops to 6.5%, the debt balance is only reduced to $65 million. In the extreme case where the actual rate of return is only 4.5%, the unfunded balance rises to $270 million at the end of year 30.[7] The discount rate, therefore, plays a critical role in the amortization of pension debt. Setting the right discount rate, which properly reflects the riskiness of pension obligations, reduces the chance that the annual payments will not earn enough returns to eventually pay off the debt.

[7] The calculations only count the effects of investment returns on the particular $100 million unfunded liability layer. The investment returns' effects on the whole plan's assets are not included.

PART 6

THE GOLD STANDARD FOR AMORTIZATION POLICY: BEST PRACTICES RECOMMENDATIONS

When adopting a particular amortization policy for a public pension, policymakers must consider a number of factors and tradeoffs. Time preference and budgetary constraints may prove influential forces in selecting from among the amortization method choices. However, from the perspective of plan solvency and intergenerational equity, there are best practices that a pension plan can follow in adopting the best possible amortization policy.

(1) **The level-dollar method is better than the level-percent method.** Using level-dollar avoids actuarial assumption sensitivity, the potential for negative amortization, and requires the lower total contributions over time compared to level-percent.
(2) **Closed amortization schedules are better than open schedules.** Using a closed schedule ensures the unfunded liability will actually be paid off. The open amortization approach violates the basic principles of intergenerational equity because the unfunded liability is never paid off.
(3) **The length of an amortization schedule should not exceed the average remaining service years of the plan.** This practice adheres the closest to the intergenerational

equity principle. Today's taxpayers, not future ones, should fund the pension benefits of today's government employees. A good rule of thumb is to adopt schedules that are 15 years or less.

(4) The shorter the amortization schedule, the better. Shorter amortization periods may mean a higher level of contribution rate volatility, but they save costs in the long run and allow the pension plan to better recover from a significant near-term negative experience.

(5) Discount rates should appropriately reflect the risk of the plan's liabilities. If the discount rate is too high, the recognized value of liabilities will be too low; thus, the value of unfunded liabilities that are amortized will be too low, and the plan will risk not having enough assets to pay promised pensions.

Plans that choose to adopt alternative policies to this gold standard can still make choices that aim for long-term solvency. Specifically:

(6) If using the level-percent method, adopt a closed design with a schedule of 15 years or less. Amortization schedules should always be closed, and the shorter the schedule, the better the policy.

(7) To avoid contribution rate volatility, use a layering method. Seeking to avoid spikes in amortization payments is an understandable budgetary goal, but it is best pursued by layering closed amortization schedules, rather than by using an open schedule.

PART 7

CONCLUSION

Stretching out unfunded liability amortization schedules and back-loading amortization payments have contributed to the chronic underfunding of public sector pension plans. In addition to putting a fiscal burden on the plan itself, it creates uncertainty over the plan's expenses to make for UAL going forward.

As illustrated by our hypothetical examples, a combination of overly long amortization periods (25-30 years) and the level-percent of payroll method often produce large negative amortization. This amortization policy, therefore, pushes a substantial portion of the unfunded liability into the future (i.e., it back-loads amortization payments), violating intergenerational equity and increasing funding risks. On the other hand, a reasonably short amortization timeline (15 years), together with using the level-dollar method, ensures that existing UAL is paid off without overburdening the plan with debt created by negative amortization.

This brief examines in depth the best practices of implementing an amortization policy that prioritizes paying out debt on a manageable timeline. Amortization policy is at the core of the successful elimination of pension debt. To put pension plans back on the solvency track, fund managers should use best practices for amortization policy, such as closed, layered amortization policy, level-dollar amortization, and a short amortization schedule.

ABOUT THE AUTHORS

Truong Bui is a managing director of the Pension Integrity Project.

Bui primarily works on the pension team's data and quantitative work and has contributed to numerous policy studies and data visualizations.

Prior to joining Reason, Bui was a financial analyst for Thien Viet Securities, a local investment bank in Vietnam, where he specialized in business valuation and investment memo preparation.

Bui graduated from RMIT University Vietnam with a bachelor's degree in commerce and received a Masters of Business Administration, with an emphasis in finance, from the Drucker School of Management at Claremont Graduate University.

Jen Sidorova is a policy analyst with the Pension Integrity Project.

At Reason, Sidorova has contributed to in-depth analysis of the Mississippi PERS, Montana PERS, Montana TRS, and North Carolina TSERS pension systems, among others.

Sidorova's work has been published in the *The Washington Times, Orange County Register, The Atlanta Journal-Constitution*, NJ.com, MarketWatch, *The Clarion-Ledger, Union-Sun & Journal*, Real Clear Policy, Townhall, and Yahoo! Money.

Her work has been featured by Equable, *Carolina Journal*, The Foundation for Economic Education, and Georgia Public Policy Foundation.

Sidorova recently presented a panel paper at the APPAM 42nd Annual Fall Research Conference along with University of Texas, Dallas Associate Professor Evgenia Gorina and her Reason colleagues Anil Niraula and Marc Joffe.

Sidorova holds Master of Arts degrees in economics and political science from Stony Brook University.

Anthony Randazzo is an executive director at Equable, a nonprofit facilitating retirement plan sustainability and income security throughout the country. Randazzo works with stakeholders around the country to build collaborative approaches to complex political and financial problems. He was formerly managing director of the Pension Integrity Project and director of economic research at Reason Foundation. Randazzo graduated from New York University with a multidisciplinary M.A. in behavioral political economy.