

# The Case for New Pension Accounting Standards

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About the cover: Like the road signs in the picture, the pension accounting rules used across the country do not always give the best guidance to their managers, and to the public. This report describes some of the ways in which the current rules provide a sometimes misleading picture of the health of a pension fund, and suggestions about how to reform the rules to provide better guidance going forward.

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## Executive Summary

That there is a crisis in public employee pension systems around the country is common knowledge. Whether it is actually true is a different thing. What is not widely known is the extent to which the crisis, such as it is, has been exacerbated by the accounting rules pension systems use. These rules provide a sometimes misleading picture of the health of a pension system and a poor guide to decisions by policy makers. They also create a degree of moral hazard for stakeholders, whereby the consequences of important decisions are not felt for years, possibly decades, after the decisions are made. It is possible to develop different rules that will address some of these shortcomings.

This report presents a critique of the existing accounting rules for public pension funds as formulated in the various statements of the Governmental Accounting Standards Board (GASB), and some suggestions about different directions that might help policy makers make better decisions about the pension plans they manage. Section 2 of this report presents the basics of the critique, including the following:

- The GASB treatment of a pension liability as equivalent to a debt is questioned. A debt, for example, is owed to someone, but there is no one who can book the unfunded liability of a pension plan as an asset. It is not plan members, since they are owed the money regardless of the funding status, but if not them, who?
- Several ways the current accounting rules mask risk and provide unjustified precision, allowing plan managers to be comforted when no such comfort is warranted—or alarmed when they should relax, a risk that appears of equal significance to those who closely follow the issue. For example, under common conditions, a system that is making its investment targets risks losing money nonetheless, something that is not at all apparent from the calculations prescribed by the GASB rules. This is particularly relevant in the case of a closed plan.
- The GASB rules are philosophically at odds with the nature of a pension system as a mutual aid compact among plan members. It is not easy to disentangle the contribution of individuals from such an arrangement, and attempting to be rigorous about it threatens to undermine the system.
- The economic impact of pension fund accounting rules has likely been much more significant than widely assumed. There are over \$4 trillion in state and local pension assets, the vast bulk of which were accumulated between 1980 and 2010. At the end of that period, federal GDP was about \$19 trillion, but it took 400 years to grow so large. In other words, there have likely been years in the recent past when the bulk of the nation's economic growth was poured into purchasing sterile financial assets rather than into investments that would create economic growth.

Section 3 develops a few alternatives for how one might begin to think about changes to the pension accounting framework to address these critiques. Potential reforms of the accounting rules are presented:

- Reform of costing to include a standard cost along with the normal cost
- Use of depletion date calculations instead of a funding ratio for planning purposes

These rules provide a sometimes misleading picture of the health of a pension system and a poor guide to decisions by policy makers.



- Risk weighting of pension fund assets to indicate the level of risk in a portfolio and
- Creation of standards for valuation of the local economy, since ultimately that is what secures a public pension system.

Elements of the various alternatives are synthesized in Section 4 to make a recommendation for how the accounting rules might be changed along with some other policy suggestions for both pension plan managers and for consideration by GASB. These are summarized in the following table.

	<b>GASB Approach</b>	<b>Recommended Approach</b>
<b>1</b>	Calculate a net pension liability by subtracting the assets on hand from the estimate of total liability.	Do not combine low-accuracy numbers (liability) with high-accuracy numbers (assets) and expect to get anything but a very rough estimate, unsuitable as a basis for making important decisions
Explanation: These are numbers known to a very different degree of accuracy. Combining them results in a low-accuracy estimate, typically one that is very large. The calculation is a useful exercise for any system, but differences cannot be precise, so important decisions must not depend on that precision as they currently do.		
<b>2</b>	Present the net pension liability in the statement of net position for the employer.	Do not include pension liability in the statement of net position.
Explanation: As we see in case after case (Detroit, Stockton, Connecticut, etc), including this vast but very uncertain number in the net position increases pressure on policy makers and guarantees it is used inappropriately to make policy decisions. It is not a debt known with anywhere near the precision of accounts payable, for example, and combining the two merely creates inaccurate financial statements.		
<b>3</b>	Future contributions cannot be counted against current liabilities.	Some future contributions can be counted against some current liabilities.
Explanation: Accounting clarity is the primary justification for this proscription. But a public pension system is an ongoing, permanent, enterprise. Employees who support their predecessors will have successors to support them in turn. Introduction of a standard cost is an alternative way to provide the necessary clarity while responsibly allowing future payments to pay for the future retirement benefits of current employees.		
<b>4</b>	The promise of future payments effectively has no value.	An employer's promise to pay into the system in the future has value, just like any other government obligation and is an asset to the system.
Explanation: The lack of value of the government's promise to pay in the future is a logical consequence of the proscription against future contributions counting against current liabilities. Without that proscription, the obligation may be valued like any government bond and counted as an asset to the pension fund.		
<b>5</b>	Limitations on discount rate used to calculate liabilities.	Revert to requirement to divulge discount rate in use when liability estimates are made.
Explanation: Decreasing the importance of the total liability calculation likewise makes the chosen discount rate less important. Estimates of future liabilities must be made responsibly, but the discount rate limitations effectively increase the size of the liability, increasing the pressure to adopt risky funding policies.		

6	Normal costs attempt to allocate 100% of the cost of a single individual's pension to that specific individual.	Normal costs cover a fraction of a single individual's pension expense, while a standard cost covers the remaining expense of keeping the system running.
Explanation: Normal costs are estimates, prone to errors. By introducing a standard cost to cover part of the expense of maintaining the system, the accounting can accommodate the collective nature of a pension system and provide estimates of the system cost with greater confidence.		
7	All assets are counted as equal in value if their market values are equivalent.	Asset values should be weighted in inverse proportion to their risk.
Explanation: It is almost tautologically true that a fund with a risky capital structure is likely to be unable to cover its liabilities even if the current value of the assets equals the value of the liabilities. This is precisely what it means to have a risky capital structure. Funds should be evaluated with risk at the forefront, not tucked inside an estimated rate of return.		
8	Funding ratio is the key indicator of pension health.	Suggest a depletion date estimate using risk-weighted assets as a key indicator.
Explanation: If the employer's pension liability is an asset of the fund and if the costs are a combination of normal and standard, the net pension liability is no longer a good estimator of system health. A depletion date estimate that uses risk-weighted assets would be a good indication of system resilience, while also honoring the collective nature of a pension system.		
9	No acknowledgment of economic strength of plan sponsor in the health of a plan.	Economic strength of plan sponsor is very important to understanding whether a system is in crisis or not.
Explanation: The true security behind a public pension plan is the economic health and strength of the economy supporting the plan sponsor. And yet, there are few places where that strength or weakness is reflected in the rules used to evaluate a plan.		

Ultimately the goal of these recommendations is the same as the goal of the GASB rule-making committees: to preserve the valuable institution of the pension plan, and to make clear how best to manage these plans so as to keep them strong and solvent for this and future generations of public employees and citizens.



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Are all pension fund managers irresponsible or is there some deeper cause behind the condition of public pension funds in the US?

## 1: What is the problem?

Are public pension systems underfunded or are public pension systems under attack? It is common to find reports about this state or that city whose pension system is in dire straits. The list is a long one and includes Illinois, Kentucky, New Jersey, Detroit, Chicago, Los Angeles, New York, and innumerable others. The Pew Charitable Trusts recently reported that state pension funds have \$2.6 trillion on hand to pay \$4 trillion of future liabilities (Pew Charitable Trusts, 2018). It is all alarming, and after all, \$1.4 trillion, the difference between those two numbers, is a significant amount of money. But there is another perspective. That is, it is difficult to think of another category of government expense that is two-thirds prefunded for the next 50 years. Pew does not report in similarly breathless prose about even larger shortfalls in prefunding education expenses or maintenance costs for capital assets. Of course, it is not the norm to prefund either of those expenses, while it is the norm to prefund pension expenses. But may one be forgiven for wondering why these are treated so differently?

This inquiry is motivated by an observation and a couple of questions. The observation: It is clearly feasible for a pension system to operate indefinitely at low funding ratios, under the right demographic conditions. This is demonstrable both in theory and in practice. The theory, as outlined in Sgouros (2017), is simply that if one neither advances nor retreats in funding level during a given year, who is to say it cannot be done again the next year? The practice can be shown by several examples, the most obvious of which is the US Social Security system, which operated at a level far lower than full funding for three generations, and was only prevented from continuing by the impending retirement of the postwar baby boom generation. Countless other public pension systems have functioned successfully at low funding ratios for a long time—some for even longer than Social Security—though not without enduring seemingly incessant scolding about their circumstances. These successes notwithstanding, managers of other public pension systems apparently cannot be allowed to content themselves with operating this way under the combination of accounting rules, bond rating agency precedent, state law, and the flurry of pension activists that prevail in 2018 America. Why not?

Why are the rules the way they are? What is the justification for such things as declaring the full amount of a pension debt on the balance sheet of a government while declaring it as an asset nowhere at all? If no one can claim the asset, to whom is this money owed? How can it be that a public debt has no value in this context, in stark contrast to all other contexts?

One more observation: To the extent there is a public pension funding crisis, it seems to affect both the responsible and the irresponsible governments alike. Its effects are as close to universal as any such crisis could be. Obviously there are bad decisions made in government. And yet the universality of the pension pressure leads one to wonder whether it is possible that all municipal managers are irresponsible, or whether there is perhaps some deeper contributory cause behind the crisis?

The suggestion to be explored in this report is that the accounting rules themselves must not be ignored as a potential contributory cause of the apparently



poor condition of pension funding in the United States. When things go awry for some pension plan, it is often not because the rules are ignored but because they are followed. There are, of course, many causes for a fund's condition, and it would be foolish to think the rules are the primary cause of underfunded pensions. We argue only that the rules themselves encourage poor decision making by providing a frequently misleading guide to action. Following the rules closely means hiding some risks and exaggerating others, attending to unimportant details while ignoring important assets, and basing momentous decisions about the distant future on layers of guesses while delaying the consequences of poor decisions until the decision makers are long gone. We will look at each of these.

In addition to providing often misleading guides to action, the rules also create financial and political pressure on policy makers to act, often with ruinous results. The rules are ultimately rooted in how we think about pensions, and relate back to the formulae originally developed to manage them. To propose meaningful improvements to the current rules will require close consideration of them and their difficulties.

## 1.1 Looking at accounting rules

For a pension fund, the accounting rules defined and promulgated by the Governmental Accounting Standards Board (GASB) provide measures used to assess the conditions of a fund: the actuarial liability and assets, the funding ratio, and the rest of the associated measurements. Those measures are then used to make judgments about the appropriate course of action for the fund managers. Because the GASB rules are widely used, these measurements can be used to compare one fund with another, and to compare a fund with itself at some earlier, or future, time.

But this is not where the use of the rules ends. Accounting rules are also used to evaluate what degree of action is necessary, to answer the question, Is this an emergency or not? Beyond the simple questions of whether to adjust the rate of return or how to amortize a loss, the rules are also used to make more momentous decisions, such as whether to close a fund, to shift employees to a savings plan such as a 401(k), or to issue a pension obligation bond. Accounting rules are used to evaluate the risk of various alternatives for action, and thus it is useful to inquire whether the rules provide an adequate basis for judgments about risk.

The reality of any complex enterprise can be challenging to describe in detail. Money flows in, money flows out, and something happens in between. Accounting rules represent a choice about how to portray that reality, but they must not be mistaken for reality itself. If the rules overemphasize or underemphasize some feature in a potentially harmful fashion, it is entirely justified to examine those rules before acting. Indeed, the accounting profession has a long history of doing exactly that, both formally and informally. For example, in 2009 and 2010, the nation's bank regulators chose to quietly modify, and perhaps even ignore, the existing valuation rules for bank assets rather than force all of the nation's biggest banks into receivership. Their wager was that the collapse of asset value was a temporary phenomenon and that to take hasty action would be more destructive than to do otherwise (Scannell, 2009).<sup>1</sup>

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**When elite institutions were threatened by the accounting rules, the rules were changed to accommodate them.**

More formally, the accounting rules for charitable trusts have undergone substantial evolution over the past 40 years, as the “prudent investor” standard supplanted the “prudent man” standard of value maintenance. It was once the case that a bequest to some trust came with a legal obligation to maintain the value of that bequest at the amount donated. A loss on some investment essentially became a liability to the trust. This was often explicitly stated in some trust instrument (Cary & Bright, 1969), and the Uniform Management of Institutional Funds Act (UMIFA) codified this respect for the “historic dollar value” in the early 1970s. Starting in 2006, the new Uniform Prudent Management of Institutional Funds Act (UPMIFA) eliminated the concept of the historic dollar value, among other changes, and Connecticut, California, and New Jersey—homes to Yale, Stanford, and Princeton, owners of massive endowments subject to these rules—had already adopted this new standard before the 2007–2008 financial crisis. Massachusetts, the home of Harvard and MIT, whose endowments saw dramatic losses, quickly adopted the new rules. As with the banks, when elite institutions were threatened by the accounting rules, the rules, and the accompanying legal framework, were changed to accommodate them (Conti-Brown, 2011).

In addition to these changes, in recent years the accounting profession has debated how to deal with off-balance-sheet transactions (Burgess et al., 2016), how to meaningfully evaluate risk on corporate balance sheets (e.g., Harris et al., 2013; Fouque & Langsam, 2013), and the meaning and value of corporate stock options (Poitras, 2007; Bodie et al., 2003). Indeed, the GASB pension accounting rules in place now were adopted after considerable debate and not a little controversy (Allen & Petacchi, 2018). In other words, there is nothing improper, or even terribly unusual, about questioning accounting rules.

## 1.2 Road map

This report proceeds as follows: Section 2 will present a critique of the current accounting standards for public pensions promulgated by GASB. The aim is not merely to complain about the onerous nature of the rules, but to show how the rules themselves provide a poor guide to action, by having policy makers either rely on inaccurate indicators, overlook risk, or ignore what ought to be important considerations.

It is not enough merely to complain if there is no alternative, so the diagnosis of the various problems with the accounting rules is followed by a series of suggestions for improvement in Section 3. These include changes in the method used to assess the cost of a system and different indicators to track the financial strength of a system than are currently suggested by the GASB rules. The last part of this section looks at accounting rules for other types of financial institutions, to see if there are lessons to learn from them.

Elements of the various alternatives are synthesized in Section 4 to make a recommendation for how the accounting rules might be changed, along with some other policy recommendations, both for pension plan managers and for consideration by GASB. An example is worked out using a small California city for illustration. We do not work out the formulae in detail but merely outline how a system could work better than the present one, and leave some policy details to

future discussions and research. The goal is to provide direction and substance to discussions of reshaping the rules.

Finally, it must be added that though this report consists of a detailed critique of GASB rules, the goal of these recommendations is ultimately exactly the same as the goal of the GASB rule-making committees: to preserve the valuable institution of the pension plan—the classic variety that provides adequate retirement benefits by sharing risk among its members—and to make clear how best to manage these plans for the current and future generations of public employees and citizens.

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<sup>1</sup> One can debate whether they were correct, or whether they did it as well as Paul Volcker when he did the same thing in the 1980s after the third-world debt crisis of those years (Lira, 2010), but this is what happened and how the parties involved explained it to themselves at the time. See also Bair (2012).

There are reasons to be critical of the GASB rules for public pensions that have nothing to do with funding policy.

## 2. Critique of accounting standards

Though there are many finance officers and city council members across the country who have complaints to make about Governmental Accounting Standards Board (GASB) rules, most of these complaints have to do with the issue of funding levels and assumed rates of return. The rules are said to be onerous, but the reply comes that they are that way on purpose, to show the true cost of pension benefits and to encourage responsible funding policy. The goal of this report is to show that there are reasons to be critical of the GASB rules for public pensions that have nothing to do with funding policy. The inconsistencies that many perceive about the way pensions are managed have at their root some curious choices about how pensions are accounted for.

The important issues are the curious and inconsistent nature of the pension “debt,” the lack of error analysis in the development of normal costs, and the various ways in which the rules mask important risks. Some thought should also be spared for the various ways in which the rules appear to create unnecessary political risk through ill-chosen terminology or rules that favor a particular funding policy.

A brief history: Even up until the 1970s and 1980s, many public pension plans were funded in a pay-as-you-go fashion. As more plans moved to an actuarial model, financing their benefits with pension funds, there was a wide variety of rules followed. GASB established common standards for practice with its Statements 25 and 27 in 1994, which prescribed not only reporting requirements for pension funds but also aspects of funding policy, such as the number of years of an amortization or how the annual premium is calculated (Clark et al., 2003; Sgouros, 2017). The most recent rendition of the GASB accounting rules for pensions, issued in 2012 in Statements 67 and 68, attempts to separate the accounting rules from funding policy. The idea is that the rules are all about portrayal of a pension fund's circumstances and its debt, and that the policy for actually funding the debt is beyond the purview of those rules.

The goal is laudable, but unfortunately, the separation between the two is not nearly so clean. For example, it is not a neutral choice to require, as GASB 68 does, that a pension debt be presented in the statement of net position for the plan sponsor, in the same category of debt as accounts payable and bond debt. This is done knowing full well that these debts are often quite large compared with other components of a government's indebtedness, and accounting for the debt in this fashion will create political pressure to pay it off. The rule that insists it appear there is thus not neutral in regard to funding policy.

A similar calculus is in place for the rules about the assumed rate of return. A plan with a potential future funding shortfall will be required to use a lower rate of return, thus increasing its estimated liability, often substantially. Such requirements are also not neutral in terms of funding policy. They are designed to push plan sponsors into compliance with the standard policy: to amortize the outstanding unfunded liability as soon as possible and to use as low an assumed rate of return as possible.

Why is the lack of neutrality a problem? A plan with more money in it is obviously more secure than a plan with less, and a plan using a lower discount rate is more secure, too. But these are not solely technical questions. Plans are subject

to political risk as well as other risks. If, in order to achieve some funding goal, one risks a plan's very existence, one has not made anyone's retirement more secure. What is more, overfunding is a waste of important public funds. Every dollar in a pension fund that is not necessary to fund pensions represents a waste—funds taken from other important public goods, such as schools, environmental protection, and infrastructure.

The technicians may know best how to make a system more secure, but they cannot arrogate policy choices to themselves, nor should they use the rules in a coercive fashion. There is nothing coercive about requiring honesty, but the pension accounting rules are not uncontroversial in these aspects. As we will see, a pension debt is not like other debts in important ways, and other aspects of fund management are not beyond debate, either. Most plan calculations are, after all, merely predictions about an unknowable future. We can certainly learn from experience while still acknowledging that it is coercive to insist on a specific answer to questions such as these.

What is more, the rules themselves are not the only means of coercion. Many states have adopted statutes and even constitutional provisions providing strict boundaries on the range of funding policies that may be adopted by plan managers in state and local governments (Brainard & Brown, 2017). Even factors as basic as the assumed rate of return are set by the legislature in many states (Brainard & Brown, 2018). The result is that plan managers in many systems have no control over the levers of policy that are envisioned to be at their discretion by the authors of the GASB rules.

## 2.1 Pension debt

Consider, for a moment, the liability accumulated by the sponsor of a partially funded pension plan. This is said to be a debt of the plan sponsor, and GASB 68 requires that the debt be included in the statement of net position. It is, however, a curious kind of debt, and not merely because its size is highly contingent on dozens of assumptions about the future. To begin with, though it appears as a liability for the plan sponsor, it does not appear on the plan balance sheet as an asset. Indeed, it appears as an asset nowhere at all, a debt somehow owed to no one.

An obvious suggestion is that the debt is owed to the plan members themselves, and so it would appear on their balance sheet, should one draw up such a thing. But a fully funded plan owes that money just the same as a partially funded plan, so this is not the answer. In fact, consideration of the plan members raises the further question of the debt's schedule. The typically recommended amortization period for a pension liability would have a debt paid off decades before the final dollar of the debt was actually due to retirees. What kind of debt must be paid off so long before it is due?

One might go a step further to say that long-term pension debt, unlike other debts, has *never* been a trigger of those recent municipal bankruptcies, even though it has frequently borne the public blame. Debt not due for decades cannot be the cause of a cash-flow problem in the present, even if it is a cause for concern (Turbeville, 2013; Sgouros, 2011). In more than one recent case, a municipal bankruptcy was arguably more the result of panic induced by the accounting rules

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than the pension debt itself, as the size of the debt persuaded policy makers to take big risks that might not have seemed necessary under different rules. Both Detroit and Stockton, California, appear to have fallen in this way (Walsh, 2012; Bhatti, 2015).

The answer to this puzzle is not complex: a pension debt is an accounting artifice. The liability itself hovers in nature somewhere between accrued but unpaid wages and long-term debt, not exactly like either one, but in some features similar to both. Considering it to be more like debt than wages is an invention whose function is to encourage a specific funding policy. Whether that function was envisioned by whoever it was who first made the comparison between pension liability and long-term debt is not material; this is how it functions in the debate over pensions now.

### **Promise to pay counts for nothing**

The peculiar asymmetry of a pension debt—a liability to the plan sponsor but an asset to nobody—has an adverse effect on the accounting. A government's promise to pay something in the future has value in every conceivable context, except this one. Like the holder of a long-term bond, a short-term note, even a purchase order, a pension fund is in possession of an implicit promise to pay from the plan sponsor. But unlike the holder of that bond, note, or purchase order, the promise owned by the plan is deemed to have no value at all in the plan accounting.

This might just be an amusing conundrum, but it has material consequences. Because a large part of the stream of premium payments from the plan sponsor and members has no value in the accounting, it is ignored in assessments of plan health while much attention is paid to the rate of return on investments. A plan is generally regarded as a financial enterprise, an investment fund that happens to include some dull, albeit steady, premium income. However, a plan could equally well be described as a mutual aid society, augmented by some erratic investment income. This is a question of emphasis that has material consequences.

One sees this most clearly in decisions to close a pension plan. From the analysis of the balance sheet alone, there would seem to be no risk in closing a plan, but from consideration of the practical consequences, one might draw the opposite conclusion. Closing a plan removes much of the dull and steady source of income, which after all does not even appear on the balance sheet, forcing reliance on the much more erratic source of income. Unsurprisingly, this does not always work out well, and closed plans frequently become a drain on the finances of the sponsor that imagined it was saving money and getting rid of risk (Collie et al., 2015; NRTA, 2017).

One can see similar results in a partial closure, whereby employees might have some of their retirement investments moved to 401(k)-style savings plans. Such changes inevitably mean a drastically reduced rate of contribution to the pension plan. Indeed, that is usually the point, as it was in Rhode Island in 2011. There, the transition to a blended plan reduced the unfunded liability, mainly by slashing benefits, but it also redirected the bulk of the premiums into individual savings accounts. Now with a substantially greater reliance on investment results, the plan has struggled to advance its funding ratio, even in good years.<sup>1</sup> This is a



surprising result only if one imagines that the premium income is not a vital part of supporting a pension fund.

A decision to create an early retirement incentive as a way to cut government payroll is a similar story. An employee's retirement does not change a plan's liability much if at all, but a loss of current employees to pay premiums can be a serious shock to a pension system. However, the loss shows only in cash flow reports, not on the statements of net position, at least in the near term. If the debt of the plan sponsor corresponded to some asset of the plan, its value would rise and fall with policy decisions by the plan sponsor, allowing a more sophisticated understanding of the effects of decisions such as these.

### Strength of economy counts for nothing

Another consequence of the pension debt asymmetry has to do with the financial and economic strength of the plan sponsor. There are standard methods available for rating the security of a bond. A financially strong state is seen to be more likely to pay back a debt, as is the government of any economically strong area. These kinds of assessments can provide a good relative measure of the risk embodied by a given government debt instrument. Unfortunately, without an asset to rate, it is not possible to do the same for a pension liability. There is nowhere for a pension debt to take into account the tax capacity of the government or any other measure of its economic strength.

As an example, consider Kentucky and Illinois. As of this writing, both states were in similar straits by the pension fund numbers, with the Illinois funding ratio around 47% (Public Pension Division, 2017) and that of Kentucky somewhat worse, at about 34% (Kentucky Retirement Systems, 2017, looking only at the top five funds). One of these states, however, has a much stronger economy overall, and is thus far more likely to be able to pay off that pension debt and make good on its promise to its employees. The funding ratio alone tells none of that story, nor does any other part of the accounting.

If the pension debt were an asset in the way that any other debt is, it would be possible to rate it and discount it according to the ability of the state to pay. The result would be a better picture of how dire the situation is, for either state. Furthermore, if the strength of the underlying economy were acknowledged as an asset to a plan, it would be reasonable to suggest that using pension funds to invest in local economic development would be a worthwhile investment.

In the management of public pension funds in 2018, yield is king, but the security and liquidity of standard investment forms are deemed vital as well. The result is complicated proscriptions on investment of public funds that generally preclude using pension dollars for productive investment in the local economy. Instead, such funds are largely dedicated to sterile corporate stocks and treasury bonds, along with a smattering of corporate and municipal bonds. Recent moves to add variety to these portfolios have largely been concentrated on private equity, hedge funds, and real estate trusts (Listokin, et al., 2014) that also generally have little to do with the local economy. A few funds have begun to invest small amounts in infrastructure (generally in the range of 2%–3% of assets), but these investments are not generally local and are usually limited to those that have a

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Matching costs to revenue prevents expenses from spiraling out of control.

significant, dollar-denominated return (Cooper & Craig, 2013). Since the accounting rules do not count the strength of the local economy as an asset of the fund, investments that might make economic sense are not feasible if they do not also have an identifiable return.

## 2.2 Normal cost

The fundamental principle behind accrual accounting is to allocate the cost of some enterprise to the revenue it produces over some period of time. In the case of a government, the goal is to allocate the cost of running the government to the taxes and other revenue that support it. If the costs are less than the revenue collected, then the government will run a surplus; if not, there will be a deficit. If the costs of one year are allocated to a different year, then one can have no confidence that the taxes collected will be adequate. In other words, matching costs to revenue prevents expenses from spiraling out of control. This is particularly important for expenses like a pension, in which the actual expenditure of dollars may be years or decades in the future.

In actual practice, determining the costs for some enterprise can be quite complicated. Consider a manufacturer of magic shields and the price of vibranium; do you use the actual cost of vibranium in shields, when it might vary through the course of a year, or the average cost over that whole year? You could use a standard cost for that, or an actual cost. And once you determine a number for the cost of the materials, what about the overhead? Since you cannot know the actual or average cost until well after the fact, perhaps you would use a predetermined “normal” cost, predicted from past experience, for budgeting purposes (Libby et al., 2016). Within these categories, there are a variety of ways to make these estimates, with differing treatment of overhead expenses and material costs, all to answer what seems like a simple question: how much did this magic shield cost to make?

Pension fund analysis uses a normal cost, derived from past experience, to estimate pension liabilities. There are a variety of ways to derive this cost. One might, for example, choose to estimate liabilities on the basis of aggregate measures or by individual. One might choose different ways to amortize the cost over a member’s career or over some standard period. Though there are several possible methods, GASB standards now sanction only the “individual entry age” (IEA) method for normal costs. This method allocates the value of an individual’s pension on the basis of a level percentage of payroll between the time employment starts (the “entry age”) and the anticipated retirement date. The cost is thereby amortized over a member’s career with that employer, as a percentage of his or her salary.

A pension fund is more than a mere investment plan; it is a mutual aid pact among the plan members. The plan members pool their risk, receive the benefit from the pooling, and assume the risk that any individual member will pay into the system for a benefit he or she might not receive. Normal costing attempts to address this issue by using probability estimates—the likelihood a member will survive until retirement, the mortality rates after retirement, the likely rates of investment return, and so on—and continuing to fine-tune those estimates over time (Winklevoss, 1993, Chapter 6 contains a discussion on the topic).

There are two important problems with using the normal cost as the basis for estimating a pension plan's liability. One is a question of accuracy, the other a question of philosophy. We examine them in turn.

### Normal cost is an inaccurate way to measure total liability

While in manufacturing one might use a normal cost for prospective budgeting and an actual cost or an average cost for retrospective analyses, in pension funding, the actual expenses are virtually never added up, at least in part because even a decade after the service year, most of the costs incurred in an accounting sense remain far in the future. Even if we imagine ourselves transported to that distant time, it would not be possible to “true” the normal costs, even if one can refine components of it. Before enough time has passed to develop a complete picture of the prediction results, benefit structures and mortality rates will have changed, making refinements of those decades-old predictions useless. As a result, the reliance on the normal cost is complete. But to say that the best possible measure of actual money spent is a calculation made with probabilities is a peculiar stance to take.

Inside its calculation, and the calculation of its components, the normal cost contains multiple estimates of probabilities: for equity investment returns, for interest rates, for survival to retirement age, for the length of a career, for survival to ripe old age, and more. In a given year, if the budgeted normal costs do not match the actual costs, the system winds up with a larger unfunded liability than it had when the year began, and people will implicitly say the cost calculations were incorrect, because they referred to the unfunded liability as the record of past years when the full cost was not paid. Obviously, in some cases this is literally true, as many governments have failed to make their recommended contributions. In many others, however, it is a false conclusion; failing to contribute enough to keep the unfunded liability from growing is not evidence that the probabilities used to calculate the normal costs were incorrect. A fair die rolls a three one time in six; the economics are favorable for a series of bets on three if it pays off more than six dollars for each dollar bet. If a given roll produces a two, that does not imply that the probability was estimated incorrectly; it merely means that one has lost a perfectly defensible bet. It is the same case with the probabilities of retirements, mortality, promotions, and so on.

Furthermore, beyond the philosophical issue of what exactly a probability means, there are assumptions inherent in the standard estimates of the normal cost that deserve examination: that the probabilities are knowable and static; that the deviations between the probability and experience are small and cancel out in the limit of large numbers; and that a given system has enough trials over a given time period to be a decent approximation of the limit, so the deviations can cancel out. All of these are assumptions, glossed over in the standard texts, but that nonetheless deserve consideration.

First and foremost, we do not live in a Platonic world of unchanging categories and objects. On the contrary, our world is dynamic, constantly changing. Predictions about longevity or investment returns are inherently uncertain. Even predictions about benefit structures—something that is knowable at least

To say that the best possible measure of actual money spent is a calculation made with probabilities is a peculiar stance to take.

It is not merely that the dice are being rolled, but that the numbers on the dice change in unpredictable ways.

in a theoretical sense—will undoubtedly be wrong as negotiations between employers and employees ebb and flow over the decades. In other words, not only are predictions of normal cost necessarily wrong by virtue of their nature as probabilities, but they are also wrong because of the changing nature of the factors being addressed. It is not merely that the dice are being rolled, but that the numbers on the dice change in unpredictable ways.

Second, it is not obviously true that the deviations either are small or cancel out in the limit. It is possible to calculate a normal cost using aggregate instead of individual values for benefits and mortalities. If the deviations in the IEA method were small and linear in nature, one would expect the aggregate method to produce cost estimates related to the sum of the individual calculations. This is not the case, and the aggregate method is not generally in use any more because of the volatility in contribution rates it produces. (It is disallowed by the IRS for private plans.) This is hardly surprising, since the normal cost would seem to predict that any plan member will receive a share of the accumulated assets roughly equivalent share to that of any other member. In practice, of course, some members will receive pension benefits for one year or not at all, and others for 40 years or even more. These are large deviations, and one cannot assume that errors in the predictions made about these benefits will simply cancel each other out in the limit of large numbers of pension plan members.<sup>2</sup>

In other words, even beyond considerations of the choice of estimation method, one should not expect calculations such as the IEA to be precise, nor should one assume that one approaches precision through ongoing iterations of experience studies to fine-tune the various probabilities. Precision in these estimates can be improved, but not to an arbitrary degree. The reason to share risk among plan members is that sometimes things work out and sometimes they do not. The accounting must accommodate not only the uncertainty but also the course corrections along the way.

To recap:

- Normal costing is an approach to estimating the cost of the inputs to some enterprise, but it is not the only one in wide use in the accounting for many different kinds of enterprises.
- Unlike those for manufacturing, pension cost estimates are very seldom measured retrospectively due to the long time scales involved, leaving the reliance on normal costs complete.
- Normal costs depend on predictions of longevity, benefit structures, and investment returns, none of which can be known a priori with any degree of confidence.
- The math behind normal costs implicitly assumes that the deviations from the mean will cancel out in the limit of large numbers. But these deviations are potentially quite large, and statistical theory does not imply that they will necessarily cancel out, even in the limit.

Current practice is to use a sum of normal costs to generate an estimate of future liabilities for some pension plan. This is a valid approach, but the resulting number is only an estimate and cannot be assumed to have any more than an approximate relation to the eventual expenses, even if all the assumptions turn out to be correct.

Given the scale of the debts involved, the results can involve potential errors that dwarf other elements of the balance sheet. Illinois faces an unfunded pension obligation of \$137.7 billion. A 10% error in the estimate would result in a change half the size of the total state net position of \$24.9 billion excluding that debt (Mendoza, 2017, p.19). Given the uncertainties in the probabilities with which the normal cost is assembled, one can expect the potential error in the liability estimate to be much larger than this. By the estimates in Appendix A the 95% confidence interval might be a range of over  $\pm 33\%$ , or \$45 billion, in either direction.

If assets known to reasonable precision are exactly equivalent to liabilities known only very crudely, there is a 50% chance of shortfall and a 50% chance of overfunding. Anyone who deals with probabilities knows this. The surprise is how large the errors can be. The rules do not build in a sensible pad to this kind of risk; they simply ignore it. Obviously plan managers could aim for 120% funding levels, but this would be widely regarded as absurd and would represent a significant probability of being a colossal waste of money.

### Normal cost undermines the concept of mutual aid

In addition, there is a philosophical problem with the way we account for the cost of a pension system. It is worth repeating that a true pension system is not just an investment vehicle; it is a mutual aid pact among its members. Putting it somewhat crudely, part of what funds the long and happy retirement of its members is that not all its members will enjoy a long and happy retirement. Mortality is a big bet we all take. The only thing that is certain in an uncertain world is that safety can be found in large numbers.

When a pension actuary calculates the “normal cost” for a plan member, the year’s increment in the expense incurred on behalf of a specific employee, he or she attributes a cost to an individual and thereby undercuts the collective nature of the pension plan. It is a useful abstraction for certain tasks, but it is not the heart of the enterprise, and to make that mistake is to commit a category error that leads to malign consequences, such as proposals to substitute a 401(k)-style savings plan for a pension. A pension plan depends on the large numbers of people who participate in it, and any attempts to parcel out this person’s contribution from that one’s will inevitably confuse matters, to the detriment of members.

In truth, no member of a pension plan will ever receive the exact value of the normal cost he or she contributed, except occasionally by coincidence. Some will receive nothing, and some will receive many times what they put in, and this is by design. Members taught to think in terms of their “investment” in a plan will readily equate those payments to contributions to a personal 401(k)-style savings plan, perhaps not understanding the world of difference between the two. This is especially the case when the savings plan is misleadingly labeled a “defined-contribution” pension, a neologism from the 1970s designed to confuse pension plan members (Sgouros, 2017).

Beyond the philosophical implications, one might consider the practical reality of the different revenue streams that accrue to a pension plan. Again, one can think of a plan as being supported by the irregular and occasionally spectacular

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investment returns, plus the solid and dependable, but generally boring, premium income for the active members. By valuing the future premiums at zero in a balance sheet, the rules emphasize consideration of the erratic revenue source over the boring source. But any sensible investment professional knows to diversify one's income sources; it is the diversity of the income that makes investment risks sensible, or even feasible. Dispensing with the boring and dependable income while continuing to take the same investment risks is a recipe for trouble, as many closed pension plans have discovered.

## 2.3 Masking risk

Among the most important shortcomings of the accounting rules embodied by GASB 67 and 68 is the many ways in which they hide risk from decision makers. For example, because the rules do not account at all for future premiums from new members, any risk to those premiums is effectively invisible. Closing a plan is risky because it cuts off that premium income, but who could tell from a fund annual report? The spurious precision of liability estimates that conceals the risk of shortfall or overfunding is another example. One sees similar issues in the use of present value, in the way pension debt is presented on a balance sheet, and in the failure to address the composition of a plan's assets.

Issues of risk are incorporated into the accounting rules of banks and insurance companies. Banks, for example, are required to hold reserves against liquidity risk, capital against market risk, and loss allowances against credit risk. Insurance companies hold an excess of assets against actuarial risk, and capital against interest rate risk. These are all quantities, specified by the relevant accounting rules, that appear on the balance sheets of these institutions.

Obviously, only foolish plan managers ignore the comparable risks, but the pension accounting rules do not accommodate them in any meaningful way. A plan manager can aim for a more aggressive funding target or a lower interest rate to insulate a plan against risk, but may invite ridicule from people who will wonder why a fund needs more money than necessary, or why expected returns are set foolishly low.<sup>3</sup> Following the letter of the rules, pension plans are merely supposed to align imprecise measurements of huge quantities and hope for the best. That plan managers know how to adjust the parameters to compensate for risk is different in important ways from having the rules address risk directly. Financial reformers speak in alarming terms about the "off-balance-sheet" risks taken by banks. For pension funds, all the risks are off the balance sheet except the risk of a funding shortfall. Given the imprecision of the liability estimates, even that one is cloudy.

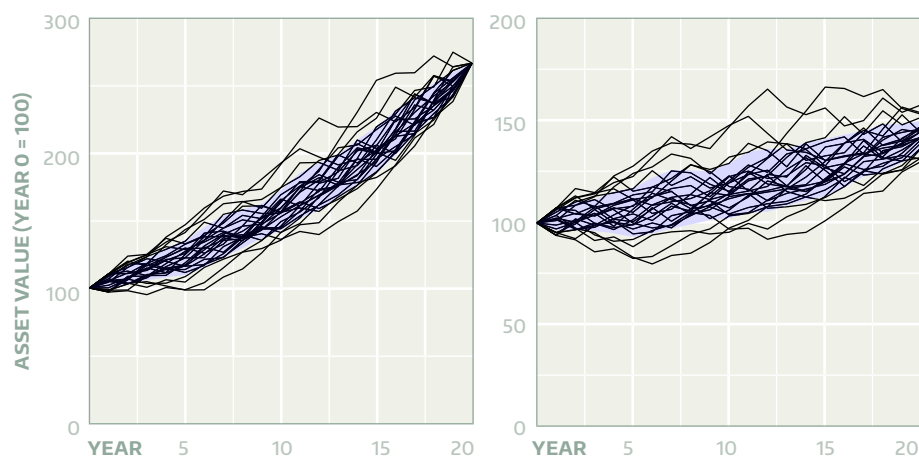
## Present value hides risk

Present value is a vitally important concept in financial accounting, but it has some shortcomings. One important issue is that it elides the urgency of a debt. A debt due tomorrow can have the same present value as a debt due in a decade. One is obviously more worrisome than the other, but present value is silent on the difference. For a pension plan, this can create political risk, which we will examine below.



There are also important ways in which present value can mask risk. Figure 1 shows the investment results for 25 trials, where the average return over 20 years is precisely the same for each trial. Indeed, each trial used the same set of investment returns, put in 25 different orderings. The left diagram shows simple growth, and one can see that the present value is 100 for assets worth 265 in 20 years, no matter the variation in the returns along the way. All 25 trials end up in exactly the same place, but there is considerable variation along the way, so investments at an intermediate stage will show dramatically different results. The right diagram shows exactly the same investment results, but with an amount withdrawn each year regardless of the asset level. The fixed amount exacerbates the fluctuations, leaving even the final investment results quite variable, despite the consistency in terms of present value. All of the lines in the graphs are of plans that are *successfully achieving the same investment goal*, and yet there is considerable variation in the outcomes. A decision about risk made in terms of present value will incorporate none of this variation.<sup>4</sup>

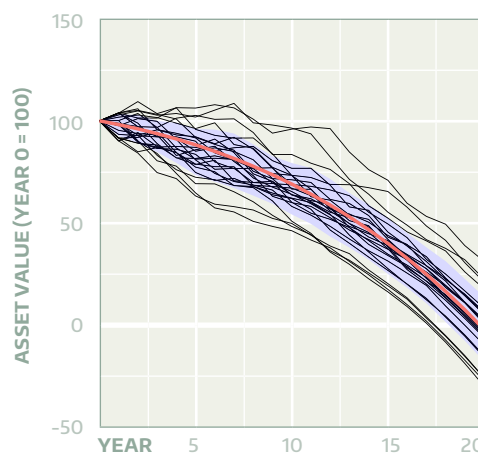
All of the lines in the graphs are of plans that are successfully achieving the same investment goal, and yet there is considerable variation.



**FIGURE 1:** Present value under volatility. The figures represent asset growth over 20 years, where the average return is a normally distributed set with a mean of .05, and standard deviation of .05. Each line represents a different trial, using the same set of 20 numbers, but in a different order. The right figure uses the same investment returns but has approximately 60% of the average gains deducted each year. The blue shows the range of investment results within one standard deviation of the mean each year. Note that only 3 of the 20 years show actual investment losses.

This hidden risk becomes more important as the amount withdrawn from the plan increases. One sees this most clearly in discussions around closing a fully funded pension plan. By definition, a fully funded plan has enough assets to pay off all its liabilities, so a policy maker without a commitment to supporting employee retirements as an end in itself might choose to close it and appear to eliminate all sorts of risks and dire warnings. In reality, closing a plan substantially increases its exposure to market risk by removing the steady stream of premium income that had previously provided a certain level of market risk mitigation. A closed plan faces considerable market risk, even if the plan succeeds in making its stated investment goals.<sup>5</sup> Figure 2 shows a closed plan paying down its liabilities over 20 years. Only 12 of the 25 trials actually make it to the depletion date with a positive

balance, even though the investment goals have been met and, according to the present value, the assets and liabilities work out perfectly. (The red line shows the ideal trajectory.) The worst-performing 4 trials end with negative balances equal to a quarter of the starting asset balance, so the risk can be quite substantial.



**FIGURE 2:** Closing a plan under volatility. The figures represents a plan using precisely the same investment returns as in Figure 1, but withdrawing a larger net amount each year, as if the plan were to be closed. Using present value calculations, the ending balance should be zero, but 13 of the 25 trials show negative final balances. The red line shows the asset level as predicted using present value calculations.

A pension obligation bond is a simple, common-sense policy that is actually fraught with risk, masked perfectly by the presentation of two very different debts in exactly the same way.

### Debt equivalence

Because of the GASB rules, a pension liability appears as a debt on the balance sheet of the plan sponsor, along with other debt. If one debt is as good as another, it makes sense to consider substituting a debt with a lower interest rate for one with a higher rate, and this is what a pension obligation bond (POB) does. It's a simple, common-sense policy that is actually fraught with risk, masked perfectly by the presentation of two very different debts in exactly the same way.

Issuing such a bond is actually a very risky form of investing on the margin, where timing is usually the only difference between success and failure (Munnell et al., 2014). The debts may be numerically equivalent, but they are not at all the same thing, and a government has far less control over the management of a bonded debt than it does on the pension debt. The Government Finance Officers Association (GFOA) maintains a list of "best practices" that has an admirably clear entry on the subject: "[GFOA] recommends that state and local governments do not issue POBs" (GFOA, 2015).

Along with the obvious, that the return earned on the borrowed funds might not exceed the assumed rate of return, the GFOA points out other risks. POB structures often incorporate guarantees and other provisions embedded in the fine print. They often delay the repayment of principal, leading both to a deceptively low payment schedule and to a high probability of rolling over when the term is up. At least as important, the ratings agencies may not consider pension liability in the same way they do bonded debt.

What's worse, the fixed costs of borrowing seem smaller when the bet is large, encouraging governments to go big when they decide to issue a POB.

The City of Detroit sold \$1.44 billion in POBs in 2005—and lost \$2.8 billion as a result (Farmer, 2013). Stockton, California, sold \$125 million in POBs in 2007, and went into bankruptcy when the gamble collapsed. The fund was left worse off than before the bond was issued, *and* the city owed the bond capital to its bondholders (Walsh, 2012).

A government that has taken out a large POB to finance its unfunded liability is in a much riskier situation than a government that merely has a large unfunded liability. It does not seem unreasonable that the balance sheets of two such governments should make the difference clear. Otherwise, what is the balance sheet good for?

## Asset equivalence

The GASB rules mask risk by failing to distinguish between two very different kinds of debt. In parallel fashion, they do the same by failing to distinguish among different kinds of assets, making no distinction between assets in different risk categories. This is especially indefensible since several of the changes in GASB 67 and 68—acknowledgment of the entire pension liability on the plan sponsor balance sheet, restrictions on the rate of return—were clearly intended to increase the pressure on plan managers. This is a recipe for trouble: a plan could be entirely invested in commodity futures or lottery tickets, and it would be irrelevant to the accounting.<sup>6</sup>

As a result, for the pension manager's purpose, yield is all, and this has led to funds taking very risky positions, in hedge funds, real estate, and private equity, among others (see, e.g. Pew Charitable Trusts, 2017). Unfortunately, yield is not all, and maximizing return at the expense of other concerns, such as security, volatility, or liquidity, is usually a poor investment strategy. Nonetheless, concerns such as these are not addressed by the accounting and are thus ceded to the control of local laws and regulations on public investments or to the fund managers themselves.<sup>7</sup>

Astute plan managers well recognize these risks, but acknowledge them by stepping outside the GASB framework to acquire information that the accounting rules do not encompass, through such means as ad hoc asset-liability matching studies. Such studies are not part of the standard reports and as a result outside observers will find it difficult to distinguish between the astute managers and the others.

The situation could not be more different in other realms of finance. In both the banking and insurance industries, important measurements of financial capital depend strongly on the composition of the investment portfolio. In the banking industry, the Basel capitalization rules dictate that certain forms of investment be discounted by as much as 100% when it comes to assessing the strength of a bank's capital position (Sgouros, 2014, p.27). Similar rules apply to insurance companies, some of whose assets have long been ignored when calculating the total asset position (NAIC, 1998). More recently, measures of "value at risk" (VAR) have helped to guide evaluation of a portfolio among regulators (for better and worse: Lopez, 1997; Nocera, 2009; McLean & Nocera, 2010). These rules have been developed over the years through extensive adverse experience—bank runs, insurance scandals, fraud, panics, and so on. One might complain that the pension industry has not experienced such crises, though another might reply that we are having one now.

**A plan could be entirely invested in commodity futures or lottery tickets, and it would be irrelevant to the accounting.**

By the time a poor decision causes real financial pressure, the mayor who made it may be retired, dead, or a senator.

## 2.4 Political risk

The GASB accounting rules are inextricably a part of the political context of our time. To the extent they encourage or discourage certain kinds of management decisions, these incentives must be evaluated while understanding the context in which those decisions will be made. Under these conditions, it is vital to appreciate what one might think of as “semantic cargo” in words such as *unfunded* and *adequate* and in numbers such as a funding ratio or an expected rate of return. These are not merely unlabeled knobs technicians can turn to tune performance. Using these terms, technicians can appear to mean more than they intend, and political consequences result as the terms become tools with which activists and editorial writers apply pressure to elected officials and other policy makers. The activists and editorial writers are generally not accountants or actuaries. Their weight in these affairs is their expertise in persuasion and moving votes, and unfortunately not in their familiarity with the finer points of setting the assumed rate of return or the amortization period.

Careless use of language is not the only way in which the rules create unnecessary political risk. There are several other ways in which the structure of the rules encourages poor decisions by pension plan policy makers, including delaying the consequences of poor decisions, risking overfunding, and creating competition for public dollars.

### Moral hazard of long time lags

One way in which risk is, if not masked, then soft-pedaled has to do with the delay between a policy change and its consequences. A benefit increase, a skipped payment, an early retirement incentive can each put a pension system into a much riskier position, if not simply a bad one. Unfortunately, in many cases the new circumstances will not become clear for many years after the decision that triggered them as the pension fund’s financial position decays under the new conditions.

As an example, consider a mayor who settles a potential strike by offering generous new pension benefits with no salary change. Suppose the changes increase future retirees’ pensions by 20%. The result will be a substantial increase in the future liability of the system and a decrease in the funding ratio. Using very rough estimates, for a plan that is 70% funded, this would be a drop to approximately 58%, if we imagine the increase is uniformly applied. This is a pension plan in dramatically worse shape as a result, but it is trivial to construct scenarios in which the city’s annual payments are affected in only a minimal fashion. If the city’s payments to the plan before the change had been a 50-50 split between premiums and amortization of the liability, the new ratio will come out to about 55-45. The sponsor’s annual payments will go up less than 10%, but the changes will not even begin until the year after the first full year of the new conditions, when the actuaries make their report about the funding status. There are any number of simple ways to structure the new benefits so the change will take years longer than that to phase in. In other words, the cash flow of the city will hardly have been affected, but the net position of the fund has been profoundly damaged. By the time this decision causes real financial pressure, the mayor who made it may be retired, dead, or a senator.

An early retirement proposal works in a similar fashion, and these have been popular with executives who wish to cut employee head count. Suffering a burst of retirees at the same time payroll is cut will dramatically increase the pension liability, especially if the inducement to retire involves stretching (or even ignoring) some actuarial assumptions, also not unusual. Unfortunately, these same actions that damage a pension plan may improve the cash flow of the plan sponsor, by reducing payroll expenses.

Furthermore, even if the will existed at that point to hold the decision makers responsible, a pension plan is a complex system with many moving parts. As time progresses after some specific decision, a host of other confounding factors will have some degree of influence and their cumulative effect over that period will tend to relieve him or her from bearing all the responsibility. The mayor above, a county executive who shorted the pension fund payments or a governor who offered a generous early retirement incentive may enjoy bad investment returns or a change in the rate of return in the meantime to share the blame for premium increases.

Bad decisions are seldom without consequence, and decisions like these might force premium increases, or raise the cost of borrowing down the road, for example.<sup>8</sup> Reduction of the dollars flowing into a pension system harms its health, without a doubt. But in many such cases, the effect on the current budget of the sponsoring government is close to zero. In fact, to the extent that a skipped payment or a new police department contract relieves financial pressure on the city, the effects can be positive—in the short term. A good accounting system is supposed to provide an accurate picture of an organization's financial health and a useful guide to action. In this case, the accounting system guides its users to destructive and inappropriate action.

It is also worth considering the practical reality of who exactly makes financial decisions and on what basis. Municipal finance officers convened for this report repeatedly stressed the observation that annual expenses are what drive city council members to make decisions about policy. In one session, many agreed that a government's statement of net position was regarded as a far more abstract description of the state of affairs than the change in the fund balance over the course of the year. A pension change that dramatically worsens the pension balance sheet but touches the annual expenses only lightly will thus have only a small effect on policy. One can complain that these people are making bad policy, but one might equally well complain that rain is wet. There is a substantial and growing literature on decision-making, and the consensus of experts is that it is better to accommodate policy to the realities of how humans make decisions rather than simply to complain that they do it badly (e.g., Thaler and Sunstein, 2008).

The immediacy of consequences is among the positive features of a pay-as-you-go pension system. In such a system, benefit changes would have an immediate effect on a budget. They would be predictable enough that they could be included with great certainty in a prospective budget, for consideration before they went into effect. This is significantly different than is done today, and though a pay-as-you-go system has other well-known shortcomings, it might alone justify reconsideration or modification of the accounting rules.

**Reduction of the dollars flowing into a pension system harms its health, but in many such cases, the immediate effect on the current budget of the sponsoring government is close to zero.**

It is almost a law of nature that a fully funded pension system does not stay fully funded.

## Overfunding is a political risk

Despite the parlous state of pension funds, overfunding is worth consideration, not least because 100% funding is the goal, and overfunding is only one good investment year beyond that. The idea is that a fully funded system can rely on investments and requires only minimal premium income, reducing the burden on the plan sponsor and its employees. Of course, this virtually never happens, because it is almost a law of nature that a fully funded pension system does not stay fully funded. History has repeatedly demonstrated that such a system becomes a target for benefit increases, premium cuts, or both. Under a regime of full funding, neither option costs money in the short term—again, because of the lag between policy changes and their effects—and the result is an inevitable erosion in the plan’s funding status.

CalSTRS, the giant pension fund for California teachers, was fully funded in 1998. Its investment returns plummeted when the tech bubble popped in 2000–2001, but not before the state cut its payments into the system *and* increased some classes of benefits (LAO Staff, 2013). As of 2017, the system has a \$97 billion unfunded liability and a 64% funding ratio (CalSTRS, 2017).

CalSTRS was hardly alone. The Chicago Teachers’ Pension Fund’s fully funded status in 1995 was used to justify a 10-year payment “holiday,” dramatically reducing fund revenue. Even by 1999, the system was still fully funded. But the holiday also brought increased benefits and management expenses, and those only exacerbated the two colossal incidents of financial market turmoil since then. As of 2017, the plan is 50.2% funded (Chicago Teachers’ Pension Fund, 2018; Dabrowski et al., 2015). The same pattern is reflected in national averages. Census Bureau data shows that 1997 was a high-water mark for employer contributions to public plans, many of whom cut contributions in the warm glow of full funding, but had to restore them by 2003 (Peng, 2009, p.22).

The risk of a fully funded, or overfunded, pension plan is not only the political risk of increased benefits and reduced contributions, but also the risk that policy makers will perceive an opportunity to close the plan entirely. According to the definitions used to analyze a pension plan and the accounting frameworks in place, this is a rational choice for a fully funded plan. There may be a political cost to such a decision, but the accounting says there would be no financial cost. In reality, closing a plan substantially increases the risk to the taxpayers, as we have seen above. Experience shows that few such decisions have turned out to be good ones.<sup>9</sup>

To the extent that the GASB rules insist that a plan’s current assets meet its current liabilities, they are essentially aping the comparable requirements for a private sponsor of a pension plan. Such a requirement insures against the liquidation of the plan sponsor, since in that event, the plan would have adequate assets to pay its obligations (though of course the accuracy of liability estimates is a serious issue, as described above). However, a public entity such as a state, county, or city faces no risk of liquidation. In other words, the rules insure a public plan against a risk it does not face while the funding target exposes the same plan to risks it faces every day. The divergence between the insured risks and the risks actually faced is not merely ironic; it is a recipe for failure. The insured risks never materialize while the others always do, given enough time. In this case, failure



means further increases in the cost of employee pensions, further ire directed at teachers, police officers, and other public employees, and more stress on the tottering finances of state and local governments.

### Crowding out investment is an economic risk

Public pension plans have not always been funded on an actuarial basis. Until the 1980s, many states and municipalities still operated pay-as-you-go plans, whereby pension benefits are paid out of the current budget (Peng, 2009)<sup>10</sup>. Since then, however, the buildup of pension funds has been tremendous. Since the 1950s, state and local pension assets have gone from an almost negligible proportion to almost a fifth of GDP in 2013, as shown in Figure 3. The nation's GDP took almost 400 years to grow to its current size, while state and local pension funds have built to their level of investments largely over the 30 years between 1980 and 2010. Over a period when the pension funds were increasing, as much as \$60–\$70 billion per year, GDP growth was in the neighborhood of only three or four times as large, sometimes substantially less. Savings like this should be an engine of growth, but that is only when the savings can be invested productively, and this is not generally the case for pension funds.

A substantial fraction of GDP growth over the last few decades has been soaked up by pension funds that have largely used this money for unproductive investments in financial paper.



Figure 3: Growth of pension assets since the 1960s. Since the 1950s, state and local pension assets have gone from an almost negligible proportion to almost a fifth of GDP in 2013 (Mason, Jayadev, and Page-Hoongrajok, 2017).

In other words, a substantial fraction of GDP growth over the last few decades has been soaked up by pension funds that have largely used this money for unproductive investments in financial paper. During the recent recession and after, pressure on state and municipal balance sheets was widely believed to have played a role in the slow pace of recovery (e.g., Morath & Leubsdorf, 2016). A similar pressure has been in place for a generation, depressing economic growth and creating a tremendous drag on the entire nation's economy.

Dramatically increasing the level of prefunding pension expenses has not been without substantial cost, but it has benefited one class of citizen: investors. About 64% of state and local pension assets are in corporate equities Federal Reserve Bank (2016). The total market capitalization of the entire S&P 500 is about

\$23 trillion, which implies (using the Pew Charitable Trusts estimate of \$2.6 trillion in state pension funds nationwide) that public pension fund investments make up well over 10% of the stock market. The same accumulation of pension assets that has been a drag on the nation's economy has created a tremendous demand for investment paper, creating upward pressure on the price of corporate stock and other investments.

One might say that it only goes to show that our nation cannot afford such expensive pension benefits, but the flip side might be true, too: our nation cannot afford such expensive strategies for funding those benefits. Because the GASB rules opt for security over efficiency in several places, and elide several issues of accuracy, one cannot make the first claim with confidence that it is stronger on its merits than the second.

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<sup>1</sup> The funding ratio stood at 59% immediately after the changes, at June 30, 2011. As of June 30, 2018, it stood at 52.9%, according to Employees' Retirement System of Rhode Island annual reports. (ERSRI, various dates)

<sup>2</sup> See Section 1 in Appendix A for more on this.

<sup>3</sup> The giant Canadian pension funds, such as the Ontario Teacher's Pension Plan, have adopted this strategy. They are certainly secure, but the security is possible perhaps only because no one has yet come up with a good measure of the opportunity cost of such large accumulations.

<sup>4</sup> See Appendix A, for a further discussion of the math behind present value in the face of volatility.

<sup>5</sup> Liquidity considerations usually make it impossible to maintain a high rate of return over the duration of a plan's closure, but Figure 2 ignores that source of risk. One could thus consider it a best-case scenario that half the outcomes lose money.

<sup>6</sup> The value of an asset is obviously affected by its risk, but whether the price adequately conveys all the risk of a given asset is a subject of debate among economists. Other financial regulators, in banking and insurance, have clearly voted no on the question.

<sup>7</sup> The effect is made somewhat worse by GASB's move away from actuarial valuation to marking asset values to market. Volatile investments need not be risky if one can wait out the fluctuations, so doing away with asset value smoothing can increase risk. There are better smoothing techniques, see Section 3.2.

<sup>8</sup> This last is of less concern than many might think, since many cities have what are essentially junk bond ratings. For these cities, the ratings risk only barely rises to the level of a material concern, and its consequences are only potential, not certain. In other words, the cities most likely to skimp on their pension contributions are also the least likely to be harmed by the consequences.

<sup>9</sup> The city of Woonsocket, Rhode Island, issued a \$90 million POB to close a pension plan in 2002. A dozen years later, as reported in its 2013 financial report (Woonsocket, 2013), after some poor investment years, the plan had assets of only \$48 million, a remaining unfunded liability of \$34 million, only a single employee still paying into the system (\$5,000 each year, compared with \$8 million in expenses), and the city had a \$90 million bond debt to repay.

<sup>10</sup> In fact, there are still some out there, including, for example, one that serves older judges in Rhode Island, whose pensions are paid directly from the court budget (Hoyle, 2014, p.21). The Indiana State Teachers' Retirement Fund is funded in a similar fashion, pay-as-you-go for employees hired before 1995, and actuarially funded for those hired since then (Peng, 2009, p.103).

### 3. Possible solutions

Most discussions of our nation's pension funding circumstances focus on how to get plan sponsors to make good decisions about funding policy under the current rules. The rules themselves are rarely questioned—except when a change in rules is perceived to add pressure to a government to make changes in funding policy. Placing the entire pension liability on the sponsor's statement of net assets is an example of such a change, as is limiting the actuarial methods of valuing a plan's liabilities or limiting the discount rate used to calculate the present value of those liabilities. These changes, however, merely increase the pressure on a government; they do not change the directions in which the rules push. If the Governmental Accounting Standards Board (GASB) rules of the 1990s urge governments to move to full funding as soon as possible, or to take on more risk to achieve that goal, the changes of GASB 67 and 68 merely push them harder to do the exact same things. These are not comforting trends, and it seems worth considering suggestions about how the rules could be modified to guide better decisions not just by plan managers but by the policy makers above them.

Pension plans are not the only large financial institutions with specialized accounting rules. Other financial corporations, such as banks and insurance companies, also have their own accounting rules, and there are several valid comparisons one might make between them. Both a pension plan and a life insurer accept premiums in the present for benefits to be paid in the distant future. Both a pension plan and a bank invest on behalf of their customers. All three of them face considerable uncertainty in their businesses, with several varieties of risk.

Of course, there are significant differences in their businesses, too. Pensions have a very long term, with a larger degree of predictability than banks and insurers, but the liabilities tend to be comparatively quite large. Even a modest pension, paid over a period of decades, represents a very large sum compared with most bank accounts and insurance policies. The three entities also differ in their treatment of assets versus liabilities. For banks and insurers, the difference between these two is the capital of the enterprise. Pension plans, in contrast, do not have “capital” as distinct from liabilities and assets, and there is no requirement that the books show a balance. Pension plans simply calculate a “fiduciary net position” and compare that with the liability estimate. In this way, a pension plan can seem a somewhat transitory enterprise, more like a revenue bond, whose value is extinguished when its revenue ends, than a permanent institution like a bank. In fact, a fully funded pension system can—at least in theory—be closed at any time, supposedly requiring no further contributions though in practice this is seldom the case, as we saw above.

But perhaps the most important distinction to make is between private financial institutions and a public pension plan, and this is found in the constraints on the business. A dollar invested in an insurance company's capital is a dollar devoted to insurance. A public dollar, in contrast, has a multitude of claims on it. Just as with any government expense, efficiency is vital. Overfunding an insurance company, or having too much capital in a bank, generally just means a lower profit for the investors. Waste of a dollar on a pension means a dollar not spent on education, roads, or public safety, not to mention the desires of the person who paid the

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them, instead.

dollar in tax. As with any other government expense, it is important to meet public obligations at the lowest feasible public cost.

Here, one can take advantage of another aspect of a public pension plan, its permanence. Unlike a private sponsor, a government will never risk of liquidation. A GASB report called “Why Governmental Accounting and Financial Reporting Is—And Should Be—Different,” defended the difference between governmental accounting standards and those appropriate for the private sector. Early on, the authors pointed out that the lack of a threat of liquidation is among the primary differences:

“[M]ost governments do not operate in a competitive marketplace, face virtually no threat of liquidation, and do not have equity owners” (GASB, 2013).

Rather than chafe at the reasons why a permanent government is different from a necessarily contingent private enterprise, one might resolve to take advantage of them, instead, to do things that would not be practical or safe otherwise. Many pension plans already do this in some aspects of their investment policy, since they can afford to invest for the very long term. But this is hardly all that is possible. It is the permanence of a government that allows it to invest in free public education, knowing that it will be around to enjoy the benefit of an educated populace, years hence. A public pension plan can do the same and take advantage of that permanence to offer a substantial benefit at a lower cost than a private entity could. There is nothing wrong with doing so. On the contrary, what would be wrong would be to ignore the advantages offered by a government's permanence and as a result spend much more than is necessary on the provision of public goods such as pensions.

### 3.1 Better costing

As we saw above, costing is not an exact science. Costing for pension plans has borrowed useful features from accounting for manufacturing or trade, but has ignored some others worth consideration. As we have seen, the current method of estimating cost is a source of spurious and frequently misleading precision. The important costing problem is not how to move closer to perfection, since that is not likely to be possible in an ever-changing world, but how to accommodate the inevitable errors while still keeping a pension plan on a sound financial footing.

In manufacturing, one applies a normal cost or a standard cost in the budget phase, but when one wants to do a retrospective analysis, one can use actual costs. For a pension system, one is never really in a position to use the actual costs of individual employees. The stage of correcting variances is presumed to be related to refining the normal cost calculations, as is occasionally done with experience studies for a typical pension system. Unfortunately, the nature of the probabilistic reasoning behind the pension mathematics and the inconstancy of the target values does not permit one to assume that refinements of these calculations bring one any closer to some “true” value. In other words, pension calculations need a principled way to accommodate error, not simply to assume that it is part of the unfunded liability. This can be accomplished with a blended cost approach.

To begin with, we acknowledge that the normal cost is an estimate by

discounting it. This is comparable to the way that WWII-era navigators in the South Pacific used to aim their planes a few degrees to one side or the other of a distant island, so they would be confident which way to turn when they ran their course and did not see the destination. In their case, turning the wrong way meant running out of gas and crashing into the ocean. The stakes are perhaps lower in this case, but one would prefer to underestimate costs and pay up later than to put in more money than necessary, because that money is necessarily taken from the provision of other important public goods.

To this discounted normal cost we add a standard cost to maintain the target. The target is just a planning value, one or more numbers that provide information about the relative health of the fund from one year to another. This planning value might be a funding ratio, but it might instead be a depletion date or an artificial depletion date derived from risk-weighted assets, options we will consider below. That is, the standard cost is derived by estimating the difference between the sum of the discounted normal costs for each employee and the dollar amount necessary to maintain or advance the target planning value in that year. It is attributed to no particular employee, in the same way that the costs of maintaining a personnel department, resurfacing an employee parking lot, or maintaining a break kitchen represent costs attributable to employees as a group, but not to any individual.

Because this blended cost contains a component of the normal cost, it will satisfy the goal behind matching revenue and expenses. Recall that part of the point of such matching is to prevent costs from spiraling out of control. While this method acknowledges that such matching will never be precise, it retains the matching to keep control of the costs. The prevention function of matching costs is equally well fulfilled by limiting a fixed percentage of the costs as it is by limiting the whole cost. That is, if 40% of the costs do not spiral out of control, 100% will not, either, though they will obviously be larger.

Control of the standard cost component will obviously still be an issue, but this is true of the status quo today, too, where closed amortization periods can lead to undesirable volatility as the end of the amortization period approaches. Layered amortizations are widely used as a way to control this volatility, and similar strategies can be adopted to smooth a standard cost. One important advantage of a standard cost is that it will tend to cause policy changes to have a more immediate impact on the cost of a system, addressing the moral hazard issues outlined in Section 2.4.

Under the status quo, when a persistent shortfall develops, we say that the normal costs were wrong and that the current unfunded liability should have been allocated to those previous years but was not. With a system of blended costs, we say that all normal costs are estimates and are thus inherently wrong. The standard costs are there to adjust them and maintain the financial strength of the system, but they are in no way attributable to previous years, except in the case in which an expected payment was simply not made. A system with unfavorable demographics, or negative cash flow, will see an increase in the necessary standard costs, which will provide immediate feedback to managers and policy makers.

It is certainly true that this method may not give a precise number for the cost to an employer of an individual employee, but the truth is that the current system

**A standard cost can be derived by estimating the difference between the sum of the discounted normal costs for each employee and the dollar amount necessary to maintain or advance the target planning value.**

A promise to pay the ongoing standard costs is a promise that has value, just like any revenue bond, and it could be included in a balance sheet.

does not do that either, though it claims otherwise. Obviously an exact accounting of costs is nice to have, but the collective nature of a pension system, the long time frame, and the nature of the probabilities used to approximate a cost prevent doing it accurately. This is not, however, a reason to mourn. Many accounting rules represent a compromise between idealized accounting and practical reality. Petty cash accounts, for example, are such a compromise, as are error accounts used to speed up the reconciliation of accounts. The world is simply not as orderly as many accountants want it to be. Rather than force the world to conform to an imaginary order, it is better to have the rules accommodate the world.

Such a change to costing would entail two significant changes to the status quo. It would appear to countenance the idea of never having adequate assets on hand to meet all the future liabilities, and it would create a situation in which some costs of current retirees are shared by current employees.

### Assets must equal liabilities

As we have noted, it is already a peculiarity of pension fund accounting that the fundamental accounting equation appears not to be honored. A public pension plan simply presents its assets and liabilities according to the GASB rules, and they need not add up or net out. A plan with net actuarial assets smaller than its liabilities and no plan to amortize the difference would appear to be in trouble, but it has an important asset that is not counted: the promise to have employees in the future and to support the pension system on their behalf.

Such a promise to pay the ongoing standard costs is a promise that has value, just like any revenue bond, and it could be included in a balance sheet. There is a methodology for valuing such a bond that takes into account the financial strength of the government making the promise, the likely interest rate, and the various kinds of risk such a series of payments might tolerate. A bond with a rolling 30-year horizon might be an appropriate vehicle to include as an asset in a pension fund in this scenario. A framework that honors the accounting equation can then be erected.

A framework constructed in this fashion will not only acknowledge the reality of a plan sponsor's commitment but, by including an asset scaled according to a government's ability to pay, it can also provide a clearer indication of when to worry that a plan's liabilities are too large.

Of course, such an asset is only a promise to pay, but most of the assets in any bank are also merely promises. Indeed, an insurer invested in long-term bonds is in an identical situation. Promises have value in many contexts, and pensions need not remain an exception.

### Intergenerational equity

If standard costs cover a part of the current expenses of a pension system, it is inevitable that there will be some mixing of responsibilities among generations of employees. Some portion of the standard costs will come from active members to pay retirees. Some may think of that as a violation of some vaguely defined standard of "intergenerational equity." This is the idea that having one generation subsidize another violates some sort of fairness.

However, it is clear that this definition of equity is not an absolute good. If it were valued above all other considerations, then all elementary educational expenses would be financed through debt. Why, after all, should parents pay for the education of their children, when intergenerational equity would demand that children simply borrow to pay for themselves? And why should it be legitimate that we allow health insurers to have the young and healthy subsidize the old and sick? Even senior discounts at national parks would seem to be a violation of this sacred principle. It is obvious, in other words, that this is a standard that is barely even acknowledged, let alone honored, in any other sphere of public policy.

In truth, however, there is no violation of fairness proposed at all to let a standard cost cover some of a pension fund's expense. That is, one can easily interpret "equity" to mean an equitable sharing of a burden between two groups of people, not that the burdens must be borne separately. If younger workers bear part of the cost of their predecessors' retirement, but are supported in turn by their successors when they retire, many people would construe this arrangement as "fair." In truth, it would be a tortured reading of the Golden Rule that would claim otherwise.

Indeed, it is exactly this version of equity that has us pay for the education of our children, and later asks them to join us in the health insurance risk pool. Sharing risks and sharing expenses are the way to build a healthy society. Keeping risks and expenses confined to tiny age classes would be a very peculiar role for a government to play in any context, including pensions.

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### 3.2 Better planning values

The pension accounting rules have important political consequences that often make achievement of the policy goals difficult. The important pension measurements have semantic cargo that renders them difficult to use as mere planning values. When a fund is labeled as "unfunded," and not having the assets it needs, a possibly momentary funding shortfall that is perhaps meaningless in the long run can become a crisis. Inserting the issue into the political realm usually results in discussions of benefit cuts or whether the system should be done away with.

Perhaps a more promising approach would be to move away from the idea of the funding ratio completely. A funding ratio is just a planning value, a target to hit to ensure that the engine is running smoothly. It happens to be stated in terms of assets and liabilities, but if it had no units, it would work as well. Another planning value could substitute, if it encompassed the necessary information to evaluate a system's health.

The Social Security system—which is, after all, a regular pension plan—does not use a funding ratio as a planning value. Instead, it acknowledged from the beginning that the contributions of active members would be used to subsidize the pensions of its retirees. As a consequence, it uses a very different accounting model, which includes the use of a depletion date as a planning value. The depletion date measures how far in the future the system is projected to run out of funds. If, at the end of a year, the depletion date is no closer than it was at the beginning of the year, the system is stable. If the depletion date is closer, then there is trouble. This is perfectly comparable to using the change in the funding ratio to monitor the health of a pension plan.



Depletion date  
accounting paints  
a picture of a system  
that is closer to the  
mutual aid pact that  
a pension plan truly  
represents.

In a sense, the difference between the accounting for Social Security and the GASB-approved methods for a pension plan is comparable to the difference between cash and accrual accounting for a business. There are obvious technical differences, but the point is that these are fairly arbitrary choices of how to portray the reality of the enterprise. There is no *right* way to do it, though there are obviously advantages and disadvantages to each.

One obvious disadvantage to depletion-date accounting is the way that expenses and income are *not* lined up. This means that modeling income and expenses is required to make predictions about the future and to control costs. This is hardly a significant obstacle, however, for two reasons. The first is capacity. The mathematics of pensions (including Social Security) was developed in the earliest part of the 20th century, long before computers existed. The calculations are largely conducted in present value because that is what made them feasible at the time. Much more than that is feasible today. Despite the complexity of pension systems, the necessary calculations for modeling even a very large system are substantially less taxing than most computer games, so the capacity to do so is available to virtually anyone.

The second reason is that present value is itself not a perfect measure. As we saw above, present value obscures the urgency of a debt, an important consideration for policy changes. Present value also uses a discount rate, which contains a guess about the shape of the investment future. As we saw above, if you imagine the next 20 years of investment returns as a set of 20 numbers, two different sets that give the same present value for liabilities can give very different investment results, depending on both the variance (volatility) and the order of the numbers. For low volatility and very small levels of payments being withdrawn from the store of assets, this is an approximation that works well, but not otherwise.

A depletion-date strategy would require a certain degree of smoothing in the market valuations, to make possible useful comparisons of the planning value from one year to the next. The traditional actuarial valuation, with a simple five-year running average, may not be the best approach. In an attempt to iron out random, and meaningless, variation, such smoothing frequently obscures important trends, and this was part of the reason that GASB 67 and 68 deprecated the use of actuarial valuations. However, there are statistical techniques, such as the Kalman filter or the particle filter, that do a better job of distinguishing trends from random noise, and investigation of the application of these tools to problems of valuation and risk in finance has been active in recent years (e.g., Wells, 2013; Mirantes, 2012). Techniques such as these can be adopted to provide valuation estimates that do not obscure financial market trends with a material impact on long-term asset value.

One obvious disadvantage of this approach is that depletion-date accounting does not do away with the rhetorical issues surrounding the funding ratio. Needless panic induced about when a system will run out of money is likely no improvement over needless panic induced about not having enough assets to pay the liabilities. It does, however, paint a picture of a system that is closer to the mutual aid pact that a pension plan truly represents. Pension plans were not originally designed to be an elaborate savings plan, with funds accruing to a member's own advantage.

A pension was meant as an ongoing enterprise whereby members of all ages help those who are no longer able to work, in exchange for receiving such help in their turn (Clark, Craig, and Wilson, 2003; Costa, 1998). Accounting that reflects that purpose will serve better than accounting that forces a system to be something it is not, despite the unwanted cargo the term carries.

### 3.3 Better valuation of assets

If one is to regard a pension system as an ongoing enterprise rather than a store of individually saved funds, how best to evaluate its strength? And how best to manage its weaknesses? These are questions that appear in several other financial regulatory contexts, and perhaps one can borrow from those. Banks, for example, never have enough cash on hand to pay all their liabilities and so must keep reserves available and liquid, but not too much. Insurers must compensate for the errors in their long-term predictions, but again, not too much. The goal of regulators in those arenas is to ensure that the bank or insurance company has a plan and the financial strength to meet its future needs, something slightly—but crucially—different from merely ensuring that it has precisely the assets to meet its liabilities. Risk is one important consideration. After all, a fund with a risky capital structure has, by definition, an excellent chance of being unable to cover its liabilities, even if the value of the assets is predicted to equal that of the liabilities in the distant future.

Banks and insurance companies, of course, have less control over when their obligations present themselves than does a pension fund which has a much higher level of predictability. Nonetheless, the comparisons seem apt, and Ai et al. (2015) have described a very similar idea that compares a pension fund with a life insurance company in order to develop an improved understanding of the investment risk and longevity risk faced by the system.

Part of the methodology associated with both banks and insurance companies involves evaluating the composition of the assets on which they base their security. For banks, this involves risk-weighting their capital, discounting the most risky investments, and coming up with a measurement of how much of their capital is really secure. Bank accounting rules also demand different categories of capital to shore up against different kinds of risk. Insurance companies tend to be more conservative investors than banks, but even they have rules about the composition of risk in their portfolios. Insurers in the United States are regulated at the state level, so requirements vary from one state to another, but limitations on asset categories and investment quality are common. The National Association of Insurance Commissioners (NAIC) maintains a Securities Valuation Office to rate investments, and many states' regulations reference those values.<sup>1</sup>

The GASB accounting rules for public pension plans really have no similar requirements for public pension plans beyond encouraging the adoption of an investment policy that “reduces risk through the prudent diversification of the portfolio across a broad selection of distinct asset classes.”<sup>2</sup> Among pension fund managers, it is not uncommon to undertake an asset-liability matching exercise or to do stress testing of the system under different investment and longevity scenarios, to measure possible impacts on liquidity and assets overall. Indeed, it

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Ultimately, what stands behind the promise of a public pension is the financial strength of the sponsoring government, not the accumulated store of pension fund assets.

would be foolish to manage a large portfolio without doing such examinations from time to time. But these are not a part of the regulatory accounting structure, even if they are a routine part of a fund manager's toolbox.

Combining a weighting of fund assets according to their risk or volatility with depletion date accounting would provide an estimate in years of something comparable to a worst-case scenario. As we saw, use of a depletion date as a planning value has some important advantages over a funding ratio. Combining risk weighting with a depletion date might have the effect of lightening the semantic cargo carried by the date.

### Standards for valuation of local economy

Ultimately, what stands behind the promise of a public pension is the financial strength of the sponsoring government, not the accumulated store of pension fund assets. And what stands behind that government is the volume of economic activity on which that government has a claim. An expansive view of a pension fund's assets should include that strength in its accounting. As we saw above, both Illinois and Kentucky operate pension funds currently at fairly low levels of funding, and both of them show unfunded liabilities greater than their annual budgets. But one of them has a far larger and more diverse economy, and so is a smaller risk overall.

Though these considerations are a commonplace of bond investing, they are invisible to the accounting for a pension fund. This is justifiable only because of the odd treatment of the pension liability. The debt appears as nobody's asset, and so the relative strength of the debtors makes no difference.

Including in a pension fund's assets the value of the sponsor's promise to pay premiums in the future would provide a way to include a measure of the strength of the economy behind a pension system. One could rely on the traditional apparatus of bond ratings, which might be only a small effect.<sup>3</sup> Alternatively, one could use the risk-weighting step and develop discounts using economic information such as the rate of growth of tax receipts or the tax effort.

<sup>1</sup> See, for example, model legislation at <https://www.naic.org/store/free/MDL-283.pdf> that limits "medium-grade" investments to 20% of a reserve portfolio. The NAIC model act catalog is available at [https://www.naic.org/prod\\_serv\\_model\\_laws.htm](https://www.naic.org/prod_serv_model_laws.htm). The models are widely used as a basis for state insurance legislation, but the resulting laws vary substantially.

<sup>2</sup> Text from sample financial statements (GASB, 2012, p.72, illustration 3). GASB 40 also spells out disclosure requirements to address investment risk, but this is hardly the same thing as limits on the portfolio's risk composition.

<sup>3</sup> For example, imagine an AAA-rated city whose promise over certain years and parameters is worth 15% of the assets in a pension fund. Having the city's bond rating fall to A would potentially lower the value to 14.2% of the assets, which is only a small effect for a large change.

## 4. Conclusion

Many of the recommendations here could be amalgamated into a new methodology to evaluate a pension system's health and to assess the value of possible changes in policy. These would include the following:

- Blended costing, combining a discounted normal cost for each employee with a standard cost that embodies the result of the inevitable imprecision.
- An artificial bond created to be an asset of the pension fund, a formal representation of a legal commitment to pay a set fraction of the standard costs into the future.
- Use of a risk-weighted asset inventory—including the artificial bond—as input to the planning value. Each category of asset is discounted according to its risk, with cash discounted not at all, and the bond discounted according to a measure of local economic strength.
- A planning value with as little semantic cargo as possible. At this point, because the investments have been discounted and the bond included, a depletion date is somewhat abstract and could just be expressed as a number. Potentially one could do the same with a funding ratio, but there are the philosophical reasons outlined above to prefer the depletion date.
- A variety of secondary indicators, related to the growth of benefits and the changes in cash flow to the system, and perhaps liquidity and risk measures. A set of regulatory ratios, as bankers use, could become important and help to provide needed detail beyond the changes in the main planning value.

Many of the recommendations here could be amalgamated into a new methodology to evaluate a pension system's health and to assess the value of possible changes in policy.

### 4.1 An example

To see what these changes might look like in practice, we can apply the concepts to an example. There are, of course, a wide range of policy choices that remain to be made within a framework like this: How many years does the artificial bond cover? What is the right mix of normal and standard costs? What is the best way to weight the risk of investments? There are many more, but it is nonetheless instructive to see how such a framework might be applied.

Carlsbad, California, is a small city near San Diego that operates a "miscellaneous" pension system to cover municipal employees, managed by the state's big pool, CalPERS. As of 2016, the system had assets with a market value of about \$241 million and \$344 million in accrued normal cost liability, leaving it with an unfunded liability of about \$104 million and a funding ratio of approximately 70%. A recent burst of benefit costs seemed to indicate potential trouble ahead, but otherwise the system seems stable, with the city making its payments and the system paying its benefits. Currently, the annual benefit cost is about \$16 million. The normal costs for the pension are calculated to be just a tiny bit under 20% of payroll, and the employee share is about a third of that. In 2016, the payroll was \$36 million, making the following anticipated contributions to the plan for fiscal year 2018:

\$7.2 million	Normal cost contribution
\$6.8 million	Amortization of the unfunded liability
<hr/>	
\$14.0 million	Total

The city would thus pay almost \$3 million less per year, but still enough to keep the system healthier at the end of the year than it was at the beginning.

Anticipating a 5% growth in payroll over the next 20 years, the present value of the promise to pay 70% of the normal costs would be worth approximately \$97 million, using a 5.5% discount rate, more or less what that city's taxable bonds would get. This is roughly the unfunded liability, implying that 70% is perhaps an appropriate choice of funding target, were one to use the GASB method of accounting. But we can advance this exercise further to see what depletion-date accounting would look like with risk-weighted assets.

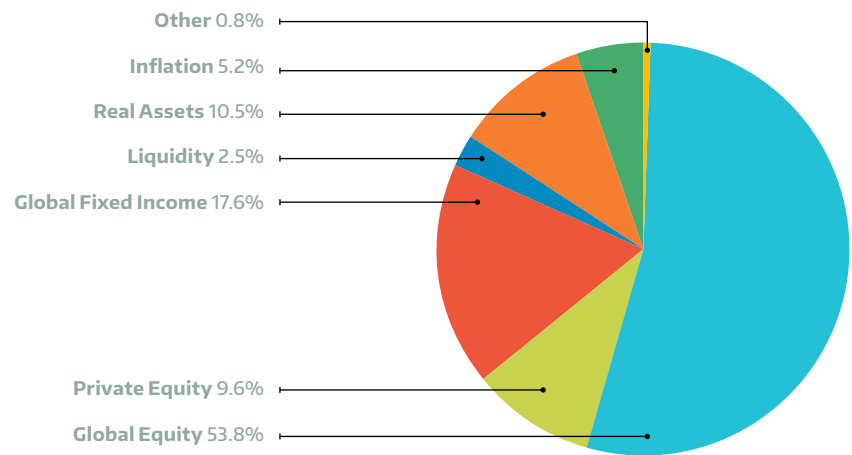


FIGURE 4: Asset composition, city of Carlsbad, California. From the fiscal year 2018 annual report. Carlsbad is part of the giant CalPERS fund, so these allocations are not truly at the discretion of city managers. "Inflation" refers to a portfolio of inflation-sensitive assets.

The composition of the plan assets is shown in Figure 4. Somewhat arbitrarily choosing the risk weightings, we discounted the global equities and the inflation-sensitive assets by 20%, the real estate by 40%, and the private equity by 50%, and derived a figure of \$288 million for the risk-weighted assets, including the artificial bond representing the future contributions. Assuming a 5.5% growth rate for benefits and a 7.5% rate of return, the depletion date appears to be approximately 82 quarters in the future. This is, of course, not strictly a prediction, due to the risk weighting.

It is, however, a number we can compare with similar calculations in the following years. Assuming the investment targets are met during the ensuing year, if no other contribution is made, the depletion date will move closer by slightly less than 4 quarters. The addition of about \$6 million in standard costs will move the following year's depletion date result back to slightly more than 82 quarters, leaving the system in a better financial position than it was at the beginning of the year. The contributions to the system would thus appear roughly like this:

\$5.0 million	70% of normal cost contribution
\$6.0 million	Standard cost to maintain system
<hr/>	
\$11.0 million	Total

The city would thus pay almost \$3 million less per year, but still enough to keep the system healthier at the end of the year than it was at the beginning.

Will anything be different under such a regime? Obviously the fiscal pressure on governments may be slightly reduced in many cases, but in many other ways there will be no differences. The same checks will still go out to retirees, and payments into the funds will still be made by employers and employees. Once again, accounting is not reality, just a portrayal of reality. But that portrayal will also change the incentives for different policy options, and it is possible that some money will be saved as a result.

## 4.2 Interpretations of history

One way to read the history of the last 30 years is that in the early 1990s, GASB acted to standardize accounting rules and thereby uncovered what appeared to be a slow-boiling public pension funding crisis, and then in 2012, it acted to stiffen the rules because merely standardizing them was not adequate to stem the tide of mismanagement. But another way to read the same history is that in the early 1990s, with the best of intentions, GASB created a system of rules that provide poor guidance to management of public pension funds. Having failed to stem the crisis, GASB doubled down on the rules in 2012, and thereby made the problem worse. The recent history of public pension management can thus be seen as a demonstration of the downside risk in increasing the pressure on government decision makers when the guidelines at hand are misleading or inaccurate.

History is complex, with multitudes of actors and motivations, and any interpretation of this sort is necessarily a subjective enterprise. One need not accept the entirety of either narrative, but one should be aware that complete rejection of one of them tends to imply acceptance of another. Those who say there is nothing wrong with the current rules, only with their application, must be prepared to explain why so few governments seem to apply them as designed.

The alternate narrative provided here claims that to an extent larger than is widely appreciated, the apparent pension funding crisis, such as it is, has been caused either by semantic content poorly chosen or misunderstandings of that content, or perhaps a bit of both. This is hardly to allocate all the blame for underfunded pensions to the accounting rules, only to say that they play a part not only in creating the problems, but in making the solutions difficult. The good news is that a semantic problem can have a semantic solution. We can ameliorate a great deal of angst and preserve the valuable institution of the old-age pension with a little bit of rethinking instead of a massive restructuring.

Ultimately the goal of these recommendations is the same as the goal of the GASB rule-making committees: to preserve the valuable institution of the pension plan, to make clear how best to manage these plans, and to keep them strong and solvent, for this and future generations of public employees and citizens.

## 4.3 Comparison with GASB rules

The table on page 4 offers a summary of the important issues with the GASB rules and recommendations of how to address them.

The good news is that a semantic problem can have a semantic solution. We can ameliorate a great deal of angst and preserve the valuable institution of the old-age pension with a little bit of rethinking instead of a massive restructuring.

## A. Math

This section contains a more substantive presentation of mathematical results referenced in the text.

### A.1 Accuracy of liability calculations

Each year, in order to calculate the future liability of a pension system, actuaries estimate the increment added that year to actuarial liability for each employee, the “normal cost” of the system. The formula for the normal cost is given by the following equation, shown in the notation used in Winklevoss (1993, equation 6.1)

$$(NC)_x = b_x {}_{R-x}p_x^{(T)} v^{R-x} \ddot{a}_R \quad (1)$$

where:

$(NC)_x$	The normal costs (retirement benefits only) of a participant age $x$ who expects to retire at age $R$
$b_x$	The benefits accrued in the year the member is age $x$
${}_{R-x}p_x^{(T)}$	The probability that the participant age $x$ will survive death, termination, or disability until age $R$ . The $(T)$ is for “termination.”
$v^{R-x}$	The interest rate discount for the years between $x$ and $R$
$\ddot{a}_R$	The present value of a \$1 per year life annuity at retirement age $R$ .

The present value of the total liability for a pension system is calculated with this sum, added up over all years to date, and over all  $N$  employees, so it looks like

$$L_{total} = \sum_{i=1}^N B_i {}_{R-H}p_x^{(T)} v^{R-H} \ddot{a}_R \quad (2)$$

This is essentially the same as equation 1 with the benefits earned in a given year replaced by the total benefit costs earned by an employee during his or her entire career to date.

Within each of the four terms of this equation are a number of estimates and probabilities, some of which are listed here:

${}_{R-H}p_x^{(T)}$	Includes the probability of survival to retirement age and the probability of leaving the job before then (voluntarily or involuntarily)
$v^{R-H}$	An estimate of the average rate of return for the years between the hire date ( $H$ ) and the retirement date ( $R$ )
$\ddot{a}_R$	Includes an estimate of the rate of return at the retirement date, and also mortality estimates for the retirees. This is a present value, so it also includes an estimate of the rate of return between the present and $R$ .
$B_i$	The accumulated benefits for an employee would not seem to be an estimate, but this number must accommodate the potential for benefit changes and salary increases. Strategies vary among systems for accommodation of the probability of promotion or some other job change over an employee's career that would materially affect the benefits accrued, but one strategy is to adjust this number.



The job of actuaries is to apply these mortalities to the population under consideration to come up with an estimate for  $L_{total}$ .

The probabilities in question are mostly independent. Though death and disability rates might not be completely independent, the probability of changing jobs is independent of interest rates at the time, and post-retirement mortality rates are independent of interest rates decades in the future. This means that the product in equation 2, can be regarded as a product of a half-dozen or so probabilities and some constants. Basic probability theory suggests that the confidence interval for such a product is greater than the product of the intervals for each of the terms. Thus, if each probability estimate has a 95% confidence interval that spans values 1% above and below the expected mean, the product of these probabilities has a confidence interval of greater than  $\pm 6\%$ .

For some of these values, such a small confidence interval is highly unlikely. A 1% error for the interest rates on which  $\ddot{a}$  depends is the difference between a 5% interest rate 20 years from now and 5.05%. A 1% error rate for the probability of a worker's leaving the job before retirement is the difference between having 100 people out of 1000 leave before retirement and 101. Predictions within these bounds would be regarded as extraordinarily accurate.

In general, one can assume most predictions of the distant future are substantially less accurate than that. For example, actuarial mortality tables are generally thought to be accurate to within a 95% confidence interval of  $\pm 10\%$ .<sup>1</sup> Were one to assume that the 95% confidence levels for all the probabilities involved in the liability estimate were as good as  $\pm 5\%$ , the corresponding confidence levels for the result would be in the range of plus or minus a third. In other words, an estimate of a billion-dollar liability might mean \$660 million, and it might mean \$1.34 billion.

It is a commonplace of statistical reasoning—and a basic tenet of pension accounting—to assume that in the limit of large numbers, errors in sums such as equation 2 will cancel each other out. Some estimates will be a little high and some a little low, but if the deviations are symmetric, they will cancel out, more or less. This is the central limit theorem, one of the foundation stones of modern statistics. The central limit theorem is not a universal statement, however, but has conditions attached, essentially that the terms in the sum be independent and identically distributed.

One cannot make such an assumption, however, because the  $v^{R-H}$  term is the same for all participants.<sup>2</sup> In fact, one can go even further with many pension systems because, except for the largest systems, any sum involving mortalities may not be regarded as normally distributed, because the underlying values are not identically distributed. After all, the probability of changing jobs for teachers may not be identical to the rate for maintenance workers, and once you separate out all the categories, the numbers may not be large enough in any category for the approximation to be adequate, except for the largest systems.

One can predict reliably that when betting a dollar on successive flips of a fair coin, the winnings will average \$.50 per bet. The prediction of winnings will be accurate because each flip is independent of the previous one, and because we can count on a coin to act similarly from one flip to the next. Neither condition is

true for a sum over pension system members. The assumption that a probability is an adequate estimator in the aggregate is thus an empirical claim contingent on evidence about the shape of the various distributions, not a fundamental fact of statistics. Given that the long time scales make confirming those distributions challenging or even impossible, one must regard such sums as very rough estimates, not precise measurements.

One might suggest that annual estimates of the liability might vary symmetrically, and thus be high as often as low. This cannot be the case either, since measurements in successive years are hardly independent, being largely of the same people. This is also the case for estimates of the employer-specific components of the survival-to-retirement term,  $R-HP_s^{(T)}$ , such as the probability of leaving a job. Over a few years, turnover will lead to a more or less renewed population, but the process takes time. Statisticians talk about the *mixing time* for a system to reach equilibrium, when you can count on a stable probability distribution from one sample to the next (Levin et al., 2009). There is not a systematic way to estimate the mixing time for a system as complex as most pension plans, but one can reasonably expect the mixing time to relate to the inverse of the annual turnover rate. For example, for a system that saw 10% of its employees replaced from one year to the next, mixing time would be measured in decades.

As an aside, note also that after any shock to the system, it will require a period comparable to the mixing time to settle to equilibrium again. Few systems are without shocks every few years: early retirement incentives, layoffs, opening a new department, a change in teacher qualification standards, successful equal employment opportunity lawsuits, or a change in employee recruitment strategy can all change the probability distribution of the population. An example from the news: As of 2019, US government science agencies, such as the EPA and NASA, are seeing massive employee turnover, due to the January government shutdown and political interference in their work (Billow, 2019). This means the probability estimates the Federal Employee Retirement System is using for current employees are no longer correct *and* that replacement employees will be unlikely to reproduce the demographic details of the departing population.

## A.2 Sensitivity of present value

Two time series with precisely the same average rate of return can have very different investment results if a fixed amount is withdrawn from the assets each year. This is relevant to the discussion around Figure 1 on page 21 which demonstrates the point by using the same set of returns, under several different orderings.

Consider a sequence of  $N$  years' worth of liabilities,  $\mathbf{L} = [L_1, L_2, L_3, \dots, L_N]$ . Assuming a rate of return  $r$ , the present value of these future liabilities,  $L_{PV}$  at the beginning of the series, is given by the equation

$$L_{PV} = \sum_{i=1}^N \frac{L_i}{(1+r)^{i-1}}.$$

If you assume a store of financial assets,  $A_0$ , available to pay off those liabilities

before the first year begins, you can calculate the assets remaining at the end of each year with the following equation:

$$A_i = (A_{i-1} - L_i)(1 + r). \quad (3)$$

Under these conditions, if  $A_0$  is equal to the present value of all those liabilities, the remaining assets in year  $N$ ,  $A_N$ , will equal zero.

Note that if the withdrawal from the supply of assets can be expressed as a fraction of the assets in equation 3 above, then the equation becomes much simpler:  $A_i = fA_{i-1}(1+r)$  for some  $0 < f < 1$ . This becomes the same arithmetic as simply using a lower discount rate with no withdrawals.

The set  $\mathbf{L}$  of predicted liabilities will typically differ from the actual liabilities. The assumed rate of return,  $r_{\text{avg}}$ , is also only a guess about what might happen. Assume for a moment that all the predictions of liability are correct, and also assume that  $r_{\text{avg}}$  is the average return for a series of actual values  $[r_1, r_2, r_3, \dots, r_N]$ , each of which differs from  $r_{\text{avg}}$ . Calculating the value of the assets at the end of year 1 gives

$$\begin{aligned} A_1 &= (A_0 - L_1)(1 + r_1) \\ &= A_0(1 + r_1) - L_1(1 + r_1). \end{aligned}$$

Substituting into the expression for year 2, we obtain the following

$$\begin{aligned} A_2 &= (A_1 - L_2)(1 + r_2) \\ &= A_0(1 + r_1)(1 + r_2) - L_1(1 + r_1)(1 + r_2) - L_2(1 + r_2). \end{aligned}$$

We can generalize recalling that  $(1+r_1)(1+r_2)(1+r_3)\dots(1+r_N) = (1+r_{\text{avg}})^N$  by the definition of an average return, and create an expression for the assets left after the end of year  $N$ :

$$A_N = (1 + r)^N \left( A_0 - L_1 - \frac{L_2}{1 + r_1} - \frac{L_3}{(1 + r_1)(1 + r_2)} - \dots \right).$$

The value  $A_N$  thus depends on the order of the  $r_i$ . To see this, consider swapping  $r_1$  and  $r_2$ . The term  $L_2/(1+r_1)$  will change value, but all the other terms in equation 1 will remain the same. For any pair of  $r_i$  and  $r_j$  with  $i < j$ , swapping them will change the terms that contain only  $r_i$  and leave intact the terms containing both. There are no terms that contain only  $r_j$  without  $r_i$ , so two different orderings of the same set of investment returns can give significantly different results, even though the sets of returns have the same average value and variance. Stated in English, the observation is relatively mundane: investment losses and gains affect only money that is not already spent.

Recall that the predictions of the liabilities and average rate of return were assumed to be *correct*. Yet in the presence of a regular withdrawal from the system, volatility in investment returns can create risk that the results will not be as predicted. This is risk hidden by reliance on present value.

<sup>1</sup> See, for example, the discussion on page 18 of SOA (2014).

<sup>2</sup> In an analysis of equity-linked life insurance plans, Feng and Shimizu (2016) pointed out that the central limit theorem does not apply to a virtually identical sum, for precisely the same reason.

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