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## Between Scylla and Charybdis: Improving the Cost Effectiveness of Public Pension Retirement Plans

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## Between Scylla and Charybdis: Improving the Cost Effectiveness of Public Pension Retirement Plans

### Abstract

Unless defined benefit pension plans are managed much better and more cost-effectively, they will be replaced by defined contribution plans. Benefit and contribution policies need to be carefully evaluated to make sure that a reasonable level of ongoing contributions, together with investment income, are adequate to fund the defined benefit plan without unpleasant surprises. Unless valuation and contribution conventions change to market-valued economically-based quantities, decision makers will lack the right information with which to make informed policy decisions.

### Disciplines

Economics

### Comments

The published version of this Working Paper may be found in the 2009 publication: *The Future of Public Employee Retirement Systems*.

# **The Future of Public Employee Retirement Systems**

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## Chapter 4

# **Between Scylla and Charybdis: Improving the Cost Effectiveness of Public Pension Retirement Plans**

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*M. Barton Waring*

Defined benefit (DB) pension plans are under a great deal of pressure today, and there is much pressure to replace them with defined contribution (DC) plans. Particularly in the public sector, pressure is on because DB plans are not viewed by many as cost-effective or financially sound. Unfortunately there is a kernel of truth in these concerns, but this chapter argues that the worst problems may be avoided with careful effort. Yet public plans cannot simply become more cost-effective by reducing staff, adopting index funds, or clamping down on travel expenses. There are more fundamental issues to address, issues at the very center of how benefits levels are set and financed. They are significant enough to make the difference between a plan that is long-term healthy, providing benefits for generations, and one that will sooner or later fall over of its own weight. Deferring discussion of the issue until later will simply make the problem worse and insure failure.

In what follows, we first discuss the consequences of the shift from DB to DC plans so as to demonstrate the need for reforms required to save DB plans. Next we review the major policy decisions faced by DB plan fiduciaries, showing what can be done to better manage these plans and improve their cost effectiveness and financial soundness. While much of the discussion applies to all types of DB plans, we devote special emphasis to public employee plans. Further, while we speak mainly of pensions in the United States, many of the same issues are crucial for plans from other countries.

### **Why not defined contribution?**

The pros and cons of DB versus DC are well known (Waring and Siegel 2007*a*, 2007*b*) and may be summarized with two key observations. First, because DC plans usually lack any method for purchasing an annuity (and

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where they do, they are exorbitantly priced), it takes roughly 50 percent more money at retirement for a DC plan to provide the same lifetime income security as would a DB plan. This is because DC participants each have to plan for their *maximum possible life spans*, while in a DB plan, they only have to fund to their *average life expectancy*. This makes a dramatic difference. Second, for most participants, the rate of savings in DC plans is far too low to provide any serious lifetime benefit at all. Median balances for those age 65 (or otherwise measured at about the time of retirement) are less than \$70,000 across a variety of surveys. Clearly this does not provide for a meaningful retirement income. Accordingly, the bottom line is that a DC plan requires a great deal *more* money to be set aside than a DB plan for a comparable lifetime retirement income, yet in practice, it collects much *less* money in contributions and earnings. There are also other problems with DC plans including high fees, too many withdrawals and loans, poorly chosen active management, and poorly designed personal investment policies.

While every effort should be made to make DC plans work more effectively, it is often difficult to boost contribution rates to reasonable levels, perhaps by making them mandatory or limiting early withdrawals. These and other needed reforms all present significant difficulties, although there are improvements that can be made at the margin. For these reasons, we propose that 'the worst DB plan is better than the best DC plan.' There may be a bit of hyperbole in this assertion, but the sad fact is that it is not much. Our view is that we must preserve and protect DB retirement plans wherever they still exist.

#### Key pension policies

There are four key pension policies which must be managed explicitly or implicitly by every DB pension plan fiduciary, oversight committee, or board. Between them, they completely shape the plan's cost effectiveness and financial soundness. These include accounting and reporting policy, benefit policy, contribution policy, and investment policy. We discuss each of these in turn to show their relative importance and their interconnections.

When seeking to manage the costs and risks of a plan, most attention is devoted to investment policy, with contribution policy perhaps also having its quick annual 'day in court.' Virtually no attention is paid to accounting and reporting policy, and very little to benefit policy. Nevertheless, these priorities are completely backwards. Furthermore, they have often been treated as if they were stand-alone policies, but they are heavily intertwined and not at all independent.

**60 M. Barton Waring****Accounting and reporting policy: the ugly stepchild**

Today's pension accounting and reporting policies are based on actuarial approaches that have little to do with financial and funding reality. This is especially true for US public employee DB plans, which have not had the benefit of some of the small reforms that have taken place on the corporate DB plan side. One explanation is that the actuarial methods underlying these policies were invented long ago, well before the development of modern portfolio theory and of the financial engineering knowledge that we have today. Though these policies are misguided in some key ways, they are strongly defended by a significant (although decreasing) portion of the actuarial community. And because they make the pension financing problem look rosier for the plan sponsor than it really is, trustees and other fiduciaries show a natural bias toward continuing with the old methods. As mentioned earlier, the four key policies are all interrelated, and today's archaic accounting and reporting policies permeate every other policy decision and make it impossible to properly manage the cost effectiveness of today's DB retirement plans. What follows discusses what would change if market-based accounting and reporting methods were adopted that would dramatically improve fiduciaries' ability to manage their plans.

**The Discount Rate.** The most important accounting and reporting problem for DB pensions is the discount rate and how it is set. It has been hotly debated in the US corporate DB plan environment and has now been brought closer to an adequate rate. But on the public employee plan side this topic is still ripe for discussion.

The discount rate is the most crucial accounting and reporting policy issue because it immediately and directly affects the stated size of a pension plan's liabilities, and thus the required level of annual contributions (and pension expense levels for private pension plans). The question is whether this discount rate should be based on expected returns on the asset portfolio, as actuaries have recommended in the past, or on some other market-based rate. Most financial economists contend that the discount rate should be the rate appropriate to a liability-matching portfolio of government bonds—that is, of a portfolio having the same market risks as the liability.

To explain why it is wrong to use the expected return on assets as the discount rate, we turn to a thought experiment. Let us assume the pension plan can be simplified to a single person and a single benefit payment, so that key ideas are not obscured by the apparent complexity introduced when looking at a plan covering thousands of people and responsible for years of monthly payments. Let us further assume that you are the sole trustee for a plan with this single employee, and further posit that this employee is retiring today. The retirement benefit is \$100,000, in a single

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payment to be made 10 years from today. Your tasks are to decide the right discount rate to use in evaluating the cost of this retirement plan, and to arrange a contribution that will provide security for the benefit.

We consider two approaches to setting the discount rate: the conventional asset return approach, and the risk-free government bond rate approach. The first, also termed the ‘expected asset return’ approach, traditionally used by actuaries, concludes that the present value of the liability and the cash contribution needed to fund it is \$46,320, assuming that the plan invests the money in a conventional pension plan asset mix (about 70% equity-like assets and the other 30% bonds) having an expected return of 8 percent per year. If this fund were to grow on average (arithmetic) at this rate of return, it would indeed provide the required \$100,000 at the end of 10 years.<sup>1</sup>

But such a portfolio has risk in it, so it cannot perfectly hedge the liability. The actual average return might very well be less than 8 percent per year. Accordingly, one cannot know with certainty whether the obligation will be fully funded or not at the end of the 10-year period. This investment policy has a risk level, expressed as a standard deviation of returns, of about 12 percent per year (this is a typical value for such a policy). But a risk level of 12 percent for one year is a whopping 38 percent over 10 years, lending huge uncertainty to the final portfolio value.<sup>2</sup> It means that the fund may earn far too much—or, more importantly, *far too little*. No one would be happy if instead of \$100,000, the fund contained only \$62,000 (that is, 38% too little) at the planned payout date, and this is only a one standard deviation downside event.

There is an important semantic issue involved in this discussion. The ‘expected’ return of 8 percent is not an expectation of the same sort as when one says, ‘Son, I *expect* you to be home at 11 o’clock tonight.’ In finance, the probability of the desired expectation happening doesn’t go up just because one wants it to, as is implied in our use of the word in ordinary conversation. Rather, it is a *statistical* expectation, the center point in a wide range of possible outcomes, more formally known as ‘realizations’ once they have occurred.

It is fair to quip that, at least with respect to ordinary use of our language, ‘the expected return is not to be expected!’ (Kritzman 2000: 65). One might do better than the expectation, but one might also do worse—but it is very unlikely that anyone will achieve exactly the level that was ‘expected.’ In summary, what risk means for investments is that the actual realized return will be different from the expected return, and the value we put on risk (the 12% and 38% numbers in this example) tell us by how much the realizations might ordinarily differ from the expectation.

A second approach to setting the discount rate is to imagine that one will invest \$64,390 in a hypothetical 10-year zero-coupon government bond

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at 4.5 percent, which would pay the required \$100,000 in 10 years with *certainty*. This approach to setting the discount rate does set a higher present value than the first example, and thus a higher immediate required contribution. But the obligation would be completely hedged and fully secure at all times during the 10-year period. Thus, 4.5 percent is the discount rate, rather than 8 percent as in the previous example, and it really does require a greater initial investment in order to assure the security of the benefit.

This second approach is the so-called ‘defeasing’ alternative, one which provides a perfect hedge for the required payment obligation. There is no market event that can happen, no interest rate change that can occur, that will alter the complete security of this benefit under this investment plan. Accordingly, financial economists and market players say that the right discount rate for a future cash flow is the expected return found in the financial markets for an asset, or portfolio of assets, with similar market-related risk characteristics as has the cash flow under analysis. By definition, if a perfect hedge is found in the market, it has the same market-related risks as the obligation being hedged. So we know that the expected return of the hedging asset is also the economically correct discount rate (and equivalently the expected return) of our liability. This makes intuitive sense even for non-economists, since the hypothetical matching portfolio would make the obligation completely safe, as demonstrated in our two examples. For this reason it is natural to think that the discount rate that gives us today’s present value for that future obligation in such a safe manner is the ‘right’ discount rate. And so it is.

Now, as a fiduciary, one could bow to pressure to reduce today’s apparent cost of funding this pension obligation and choose the first alternative. This constitutes an assertion that the present value of the liability is much smaller today and that a much smaller contribution is required to securely fund it. But where is the money going to come from if investment results are bad and the fund comes up short? If results are just one standard deviation below the expectation, the plan will be short by more than a third of the required \$100,000 at the end of 10 years. This shortfall probability should be taken into account, the probability (not the certainty) that an additional substantial future contribution will be required. Otherwise, the trustee must explain to the retiree that his or her obligation may depend on the future creditworthiness—or lack thereof—of the plan sponsor who is obligated to make up the difference. If this was more widely understood, employees would no doubt object—even public bodies can face taxpayer revolts or otherwise be unable to pay significant shortfalls.

Ultimately the plan might earn the full expected return, but it might not, and one could question whether hoping to ‘get lucky’ is the proper role of the fiduciary. Further, the expected return of the assets is not the

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right way to set a discount rate. In fact, economists say that the expected asset return has nothing whatsoever to do with the discount rate needed to establish benefit security for a liability of this type. The investment illustration, being hypothetical, illustrates a complete hedge which in turn demonstrates that the market-related risks are matched, which is the test for sourcing a discount rate. This would still be the discount rate for the example liability even if the fund's assets were actually invested in lottery tickets. Billions of dollars trade every day on the world's exchanges in full reliance on this latter method of setting discount rates for all types of assets and liabilities.

Despite the logic suggested by the financial approach, its strong theoretical underpinnings, and its nearly universal use in real-life Wall Street investment banking practice for valuing other streams of future cash flows, the traditional actuarial approach of relying on the expected return of the assets to establish the discount rate is still in common use in public plans. This is despite the fact that the 'Law of One Price' is one of the most fundamental ideas in economics, stating that any asset or any liability can have only one price.<sup>3</sup> Discount rates are simply ways to state future obligations in terms of today's prices. There cannot be multiple present values for pension liabilities. Instead, there is only one, based on the price of the hedging asset, which is—in the case of a liability that must be completely secured and that has no other market related characteristics—government bonds. Thus the discount rate is the expected return of those bonds.

**The Benefit of Changing to a Market Value Based Discount Rate Method.** Present values for pension liabilities based on the expected return of the asset portfolio are actually not 'present values' of a secured liability at all. They are something else entirely, and while they may be written with a dollar sign in front of them, they are not actually stated in dollars. In the past I have called these units something else, something significantly less valuable, in order to keep them separate mentally from dollars; let us term them 'Sasquatches.'<sup>4</sup> The question is, would you want your retirement fund to be funded in full by fungible dollars or by the same number of Sasquatches?

In our view, if we were to make this important accounting and reporting policy change, from Sasquatches to properly discounted 'dollars of present value,' it will beneficially inject itself into each of the other policies. The key issue is that the fiduciaries must expect that their statements of funded status, their statements of required contributions, and all other financial statements show the liabilities in properly measured dollars, not in Sasquatches, that is, using economically appropriate discount rates for calculating present values. It is often the case that the switch to a lower discount rate and the recognition of the true, but higher liability will be expensive and may cause some angst. But it is the only path to managing

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healthy pension plans at reasonable cost, since the liability is already as large as it is. Switching from a faulty measuring stick to a good one does not change the true size of the liability; instead, it only changes the portion of the liability to which we are admitting, and sound practice requires admitting the truth. Moving from recognizing only part of the liability (by using Sasquatches) to recognizing all of it (in true dollars of present value) can only help make the benefit more secure and the sponsoring organization more financially sound.

**Smoothing and Amortization.** Another aspect of pension accounting and reporting policy that tends to distort reality and one that interferes with the ability of pension fiduciaries to properly understand their plan's true financial status is the practice of smoothing. Because conventional practice does not always mark the discount rate to market on a regular basis, the pension liability as reported appears to be more stable than it actually is. Like any other bond-like stream of payouts, the liability fluctuates in value with every change of rates, going up in size with rate decreases and down in size with rate increases. It must be so, but some insist that the liability is stable, when of course it is not.<sup>5</sup>

Why is the failure to mark-to-market a problem? If the accounting and reporting procedures allowed pension fiduciaries responsible for a plan to see this natural fluctuation, their natural reaction might be to *hedge* those fluctuations, adopting investment policies that dampened the pension plan's surplus or deficit volatility. By contrast, if the volatility is not reported, then this important task will not get done. This is why nearly all US DB pension plans with liabilities that could be entirely hedged with a long duration bond hold only 25 or 30 percent of their assets in bonds (this small portion is in short duration Lehman Aggregate Index-benchmarked bonds). As a result, US pension plans could not be much more unhedged and exposed to interest rate risk if they tried intentionally. In the following text we show just how large this unhedged and mismatched surplus volatility is, but in round numbers, it is close to the same as the volatility of the 10-year bond.

The practice of amortizing newly awarded pension benefits also distorts the fiduciaries' perception of plans' true funding status. Perhaps there should be a mechanism for allowing a period of time to fully fund newly awarded benefits, but there should be no time lapse for recognizing a newly awarded benefit as part of the overall liability. Fiduciaries must see the full size of the liability if they are to have sufficient information to adopt responsible benefit, contribution, and investment policies. In the past, reported values for pension liability and for required contributions have been subject to a great deal of manipulation through management of the discount rate and amortization assumptions. Accordingly, few fiduciaries take the numbers generated by today's archaic methods perfectly seriously. But with market value-based economically-sound approaches to valuation,

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this can be remedied, so fiduciaries will have the information necessary to make hard-headed and clear-eyed decisions to protect and preserve their plans.

### **Benefit policy**

How big should benefits be? When a sponsor, through a retirement plan, promises a dollar of benefits to be paid at some point in the future, it will require a contribution by the sponsor at some point in time, either at its lower present value now or at its full future value later.<sup>6</sup> So the only way to control the cost effectiveness of a DB plan is to control benefit levels. Yet when the present value of those future benefits is stated in terms of Sasquatches rather than real dollars, and it is allowed to be interpreted by all interested parties as if it really were dollars, strange things can happen. Benefits tend to look less expensive than they actually are. In the example earlier, they appeared to be only about 72 percent as expensive in the first alternative as in the second, but this is an artificial example and is most likely an understatement. In actuality, the apparent cost can easily be only 50 percent of the true cost.

As a result, benefits are awarded more quickly and easily than they would be if the units of measure were in true dollars. This means that DB pension plans have grown more generous over time, and in many cases may outweigh the sponsor's ability to comfortably pay the true cost as it comes due, absent exceptionally strong investment returns. This may seem to be quite positive from the employee's perspective, at least at first blush. But it is not good for the employer, and if the error is sufficient, it can even endanger the plan sponsor as well as the health of the plan. It could even result in the DB plan's replacement by a DC plan. Both employers and employees will be better off over the long haul if they negotiate benefit levels and contribution rates based on economically-accurate benefit valuations and costs.

Cost-Of-Living Adjustments (COLAs) are another area where today's accounting and reporting practices permit manipulating the true size of the liability, as it is seldom clear to fiduciaries how significant granting a COLA actually is. By not formally adopting COLAs as a policy but going through the process of 'considering' a COLA grant each year, only the present values of COLAs already awarded must be counted in present value computations for the reported liability. Yet if there is a reasonable expectation that in future years COLAs will be awarded sufficient to cover (say) 50 percent of inflation for retirees, shouldn't that expectation be valued right now, so that the true financial impact of the desire to provide that level of COLA protection is apparent, even if stated separately? A policy of regularly giving out full COLA coverage might cost an additional 30 to

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50 percent of the no-COLA liability. These are expensive benefits, and they will require expensive contributions. All will be better-off if the true economic cost of the long-term plan for awarding COLAs were computed and reported along with the other liability valuation figures.

Another common threat to sound benefit policy and cost control arises when a plan's financials at the end of a year show it to be 'fully funded' according to the actuaries, and as a result, there is pressure to increase benefits. But since the liability is usually stated in Sasquatches and not in dollars, the plan isn't fully funded at all, so an increase in benefits will in actuality take a plan that is truthfully and economically in deficit and makes it even more so. New benefits cannot be justified on the grounds that the plan has excess assets when the excess is measured using traditional measures.

Controlling pension plan cost effectiveness is all about making sure that the benefit level is 'right'—no more, and no less than it should be, as a part of the total compensation package required to attract, retain, and motivate the kind of employees that the employer wants to have. Too small, and the quality of the work force may suffer; too large, and the finances of the sponsoring organization will suffer.

Under today's accounting and reporting practices, fiduciaries managing public employee pension plans do not have the right information for controlling the level of benefits. Managing what are in reality Sasquatches rather than dollars will not result in optimal benefit levels or optimal contribution calculations. It should be clear that all interested parties—labor, management, taxpayers, regulators, rating agencies—have the same interest in having good information. No one can properly evaluate the level of benefits, the appropriateness of that level, the adequacy of the planned funding, or the organization's ability to provide the required funding, if the liability is not measured in terms of proper, Law of One Price, dollars.

### **Contribution policy**

The true cost of a DB pension plan is best understood in terms of the present value of the benefits, that is, the liability. In practice, however, the cost is 'felt' year-by-year as a stream of cash contributions made by the employer to the fund. So for many advisors operating under the belief that the traditional approaches to valuing plans and calculating contributions are valid, controlling costs has meant to minimize the present value of the future contribution stream. We challenge this by noting that the present value of all future contributions (plus assets on hand) has to equal the present value of future benefits promised, the liability, or benefits will not be paid. It then follows that the present value of the future contribution

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stream cannot be minimized, or managed in any other way, once the benefit level is fixed.

This view contradicts widely held beliefs, but its accuracy is evident as soon as one starts using the tools of financial economics. In fact, the only thing that can be decided under the heading of contribution policy is the rate at which benefits are funded with cash contributions. This question is simply a matter of deciding how fast the contribution 'payments' are made and how soon the liability 'mortgage' is paid off. Contribution policy cannot make the pension more or less expensive. It is analogous to amortizing the mortgage on one's home: larger payments amortize it faster, and smaller payments amortize it more slowly (or if too small, the balance grows instead of shrinking). Pension contributions set with methods that provide too slow an amortization or accrual of benefits reduce benefit security, which is the primary concern of contribution policy and of market-based accounting.

The breakdown of the required contribution into its component or elemental parts is often not made fully clear to the pension board. There are usually several components to it. Among which the most common are the 'normal cost' or 'service cost,' an amount to be accrued, and contributed, for benefits deemed to have been earned this year. There are several 'methods' of determining the amount 'earned' through another year of service, so this number is often manipulated to reduce contributions. This is the 'base' contribution, the amount that would be paid in each year at a plan where all benefits were fully funded (under the terms of the method used, not necessarily by an economically sound method).

An amount representing a 'catch-up' contribution to pay for recently awarded benefits that are being amortized into the liability over time. These benefits should already have been acknowledged and stated with the valuation of the rest of the liability, since they have been granted, but this is not required and often it is not done. When they are not shown, constituencies will not know that the plan is in a hole and that it will require discipline and contributions to get out of it. If these values were reported, the fiduciaries and other constituents might be watching more closely to make sure that the amortization period is no longer than sensible. Another 'catch-up' payment to 'amortize' the plan's deficit, with the stated intention of getting the plan back to fully funded status over a multi-year period. This also is heavily manipulated in that sometimes the amortization period is set for as far out as 30 years. Given that it is based on a Sasquatch version of the liability, obviously this method will never bring a plan to true full funding status. Reasonable fiduciaries that understand this might well want to see a much shorter period of time for catching up.<sup>7</sup>

In practice, contribution policy tends to get a great deal of attention during that moment when it comes up for discussion each year, because

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no one likes to make (or ask for) large payments. So a good deal of effort often goes into finding creative methods of avoiding or minimizing this year's contribution, in a manner that wouldn't be contemplated under market-based accounting. The beneficiary, worrying about benefit security, ideally wants the contributions to be made relatively earlier rather than later, but from the sponsor's perspective, the temptation is to defer them as late as possible. Many fiduciaries have probably been led to believe that a contribution not made is a contribution avoided forever. But it is not; it is only deferred, and it will have to be made later, with interest! Sponsor cash might be preserved for the moment, to meet other demands, but the plan will still need it and benefit security will suffer for lack of it.

Again, market-value-based accounting and reporting policies would facilitate a much better understanding of contribution policy and its effect on benefit security and the funding status of the plan.

### **Investment policy**

Many pension plan trustees and officers seem to think that the way to improve the cost effectiveness of the DB plan is to make the investments perform better. Of course if that were feasible merely by forming the intention, it could be a great solution. But inevitably the attempt to generate better performance involves taking on more risks, and investment risks are real. Thus investing with a higher expected return target, in order 'to help pay for the plan,' may very likely end up making the plan cost a good deal more.

It is not rare for a pension board, pension trustees, labor representatives, and the public attendees, to turn in unison to the Chief Investment Officer (CIO) after hearing the disappointing funding level report from the actuary or administrator. In a grave voice, the board chairperson asks the question all of them are thinking, but in one more gracious form or another, the gist of the question is always: 'What are you going to do to get us out of this mess?' As if by some alchemy the CIO could skillfully make a single large (and correct!) bet that would bail out the plan, and as if the shortfall was the CIO's responsibility. In fact, the responsibility is much more that of the board than of the CIO. But to the extent that it accepts responsibility, the board may be thinking that the DB plan is not cost effective, is risky, that it cannot be controlled, and perhaps the organization should switch to a DC plan. None of those conclusions are in fact true, but they are understandable given that they are trying to run the plan with bad information. And there has been until recently little way for them to know that their information sources were less than fully accurate.

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Informed by good information, it would be clear that there are three ways, and only three ways, to get an underfunded plan back in balance. The first way is to make a large contribution or series of contributions sufficient to make up the balance. This is a contribution policy response, and it is completely effective. Yet the suggestion would be unwelcome, as cash contributions are always hard to find and painful to raise. The second way is to revisit benefit levels to ensure that more benefits are not being promised than are required to make an appropriate total compensation package of salary and benefits sufficient to attract, retain, and motivate the work force. This is a benefit policy response, and it can also be immediately effective in bringing a plan back into balance. This suggestion will likely also be unwelcome, and understandably so, particularly by the work force.

All this explains why all involved want the CIO to solve the problem with a few death-defying feats of investment transmutation: the other choices seem unpalatable. But the investment policy choice is the weakest possible means of bringing a plan back into balance, and brave efforts through a more aggressive and thus more risky policy may make the plan worse, not better-off. Nevertheless, many plans today are putting all their energy into just such investment policy solutions, using hedge funds, infrastructure funds, higher equity allocations, and other increases of risk. These may all be good things to do, helpful on the margin if carefully considered in terms of their added risk. Yet they are not going to solve any significant funding problems—not, at least, without the sponsor also just ‘getting lucky’! And there is increased risk of being very unlucky. It is not unfair to ask whether the focus on investment policy is not evidence that many plans are in denial of the true nature of the funding problem.

**Liability-relative Investing.** There is an ‘elephant in the room’ with respect to investment policy, ignored while sponsors work diligently to improve their strategy in every way except the one that will really do some good. Few if any sponsors have yet to adopt liability-relative investing—investing the assets and the liability together as a single portfolio, with the liability treated as an asset held short—as their primary mode of developing investment policy and strategy. The problem is being slowly addressed on the corporate DB plan side, but is woefully under-attended to by public employee DB plans. Yet the failure to do so (coupled with the continued use of traditional actuarial information) is the major reason, why the fiduciaries might perceive that the plan is too risky and out of control.

Surplus optimization, optimizing on the surplus, or on the portfolio consisting of assets minus the liabilities, is how liability-relative investing should be undertaken.<sup>8</sup> Waring (2008*b*) shows that it provides without doubt the single biggest opportunity to improve investment policy for virtually all DB plans: The ‘normal’ level of surplus volatility seen by today’s pension plans is around a 13 or 14 percent standard deviation. Experience

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in surplus risk analysis shows that about half of the surplus variance (the square of standard deviation) will be from interest rate volatility that could be avoided if the plan used surplus asset allocation to develop its strategic asset allocation policy. If it did, it would be holding a portfolio that is fully duration-matched to the liability, cancelling out the funding ratio volatility that comes from interest rate movements (the sponsor would also be holding the portfolio of risky assets [equity etc.] that it wants).

To use a numerical example, let us assume that the fully hedged, liability-matched 'standard deviation of the surplus' would be 10 percent, for a given plan with a given exposure to equities and other risky assets. This gives a surplus variance (standard deviation squared) of 100. If that same plan were like most plans today and were not liability-hedged, experience says that there would be an additional contribution of about 100 in variance. This gives a total variance of 200. So the standard deviation of surplus for the unhedged plan is then the square root of 200, or 14 percent—again, consistent with experience for today's typical, asset-oriented investment policies in DB plans. Note that half of this plan's variance risk is avoidable if it just held a liability-matching asset portfolio. Avoiding this risk through surplus optimization is the most important single action a sponsor can take to improve its investment policy, and to reduce the appearance that the plan is out of control or unreasonably risky.

This can be readily done, by holding first the 'liability-matching asset portfolio' mentioned earlier, normally using swaps and other derivatives to hedge out the liability risks (Waring 2004*a*). (The liability risks consist mostly of real interest rate risk and inflation risk.) Then it is time to decide how much of a 'risky asset portfolio' the plan wants to hold in the hope of good returns that will help pay for the plan (Waring 2004*b*, 2008*a*, and 2008*b*). Today's typical risky asset exposures are quite aggressive, with 70 + percent of the portfolio dedicated to equities and other risky assets. This seems quite high, particularly once the problem is properly reframed in surplus context. It is perhaps acceptable for financially strong and growing organizations with relatively small plans. But the risk represented by this level of aggressiveness is real, and could seriously damage the funded status of the plan. Since bad markets tend to go with financial stress in all organizations, it is likely that when 'risk happens' the organization will be too strapped to be able to make up the loss with a large contribution, and at that point the plan is going to remain underfunded and will face a risk of failure.

Sadly, few public plan sponsors have adopted surplus approaches to date. Falling interest rates and falling equity markets are the two worst things for pension plan financial health, and both are happening simultaneously at present. They both happened earlier in the decade as well. This is causing a dramatic increase in plan deficits, worse for plans that entered this

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period of market turmoil already underfunded. Had these plans adopted a liability-matching asset portfolio a couple of years ago, the falling interest rates would not have hurt them. Had they reduced the level of their equity exposures, the market's losses would not have hit them so hard. (We note that hedge funds have not solved this problem!)

To sum up, the truly effective means for controlling funding levels are by making big special contributions or by rationalizing the benefit program. Understandably, neither one of these is very attractive, but ultimately they may be necessary at many plans. Any such efforts must be informed by good, economically sound valuation information in order for both sides to give credibility to the need. Much lower in the hierarchy of effectiveness, some carefully chosen amount of asset risk can be used to try to help pay for the plan as an appropriate investment policy decision, but fiduciaries should be careful lest they expose the plan to even larger risks than they would truly be comfortable experiencing. Ultimately there is absolutely no good reason not to move toward holding a full liability-matching asset portfolio, which will halve the risk (measured as variance) faced by typical plans. Regardless, investment policy will seldom have the power required to make an underfunded plan become fully funded.

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According to our view, the vast majority of public plans are underfunded. Yet fiduciaries and other stakeholders have not insisted on reforming accounting and reporting policy, even though it would dramatically improve their ability to truly understand their plan's financial posture. The main explanation is that they fear negative legislative reaction. It is possible that lawmakers will simply terminate the plan if told that the true value of the benefits that have been promised is much higher than had been previously acknowledged. On the other hand, if boards do nothing, the underfunding problem will progressively get worse until plans fall over of their own weight. This is just as serious and is also a real concern, even if it is not as immediate. DB boards must wend their way between these competing dangers. They cannot avoid future risk by avoiding the immediate risk while denying the fact that the traditional actuarial approach is badly failing them.

There is no easy way out of this dilemma for public DB plans. The strong levers for fixing the fact that a plan is underfunded are to put more money into it and/or to re-evaluate benefit levels, both very effective but unattractive alternatives. A strategy designed and followed to accomplish just these tasks, facing up to these difficulties, has several elements. First is a move to improved accounting and reporting policy. A fiduciary could

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announce a move to reduce the discount rate by 0.5 percent every year for six years or until he gets to a market discount rate, whichever comes first. The book liability valuation will then come up to fair market value in annual doses, rather than all at once. The actuary can be asked to begin reporting to the board immediately, on a non-book basis, the true value of the liability today, so that constituents know what they are dealing with. The board must acknowledge that good decisions cannot be made without good information, and so market-based information is needed about the value of the liabilities and about the market value impact of every decision, including contribution policy and investment policy. And the actuaries must be required to buy into these goals and sign on to serve them without reservation.

A second advance would focus on contribution policy. Here the actuary would be asked to provide information on the contribution level required to bring the plan to fully funded status on a market value basis within 10 years, with all current benefit levels considered (i.e., without amortization of recent new benefits). This information will be invaluable to the fiduciaries in understanding both the actual contribution policy decision in this year and in subsequent years. It is needed to define how much the legislature must be asked to contribute, and to evaluate whether these amounts are within the realm of the possible.

A third advance pertains to benefit policy. If the contributions required to be on a path to full funding on a market basis within a 10-year time frame are too onerous to be legislatively feasible, it would probably be wise for labor and management to undertake a joint effort to revise the benefits to a level that can be afforded over the long term. While this is difficult, especially for labor, it is worth remembering that 'the worst DB plan is better than the best DC plan.' It is important to preemptively take on this task and put a meaningful and hard-nosed plan in place, before the legislature takes stronger action.

A fourth element would be to adopt sensible investment policy. One could immediately move to adopt a surplus asset allocation approach to developing investment policy, including holding a liability-matching asset portfolio which will consist mostly of interest rate derivatives with long durations. This will dramatically reduce the risk to the plan's market valued or true surplus, starting immediately. In addition, the board will have to give some careful thought to how much risky asset exposure, with the attendant risk of loss, the fund can bear. Bad years are becoming more 'normal,' so while the investments will help pay for the benefits, the more aggressive the investment policy, the more likely that it will make the plan more expensive.

Ultimately the questions that all must grapple with are how large benefit levels can be and still be affordable over the long term, and who will pay

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for these benefits (assuming some combination of employer and employee contributions, as is relatively common among public employee DB plans)? These questions can only be addressed accurately with good, economically sensible, market-value-based information.

### Conclusion

Our aging populations need support during their retirement years, and they are growing too large to be supported on a pay-as-you-go basis by the shrinking working-age population. This means that retirement plans must be financially sound without requiring generation-shifting contributions where today's workers have to make up for yesterday's workers' failure to save. To be financially sound, these plans have to be pre-funded and cost effective. Their periodic cost needs to make sense in the context of the total compensation—salary, medical care, pensions, and other benefits—required to attract, retain, and motivate employees.

All this suggests that plan sponsors must learn what the plan costs and liabilities are, with real and valid numbers. Today we lack such numbers, so the first order of business is to grapple with accounting and reporting policies, putting them on a market basis so that we do have real numbers to manage. With that done, boards will make better benefit policy decisions and contribution policy decisions. In turn, this better information will motivate better investment policies and strategies, in a liability-relative framework. Saving DB plans means making them financially sound. This is an urgent matter, but is in the best interests of all constituents.

### Notes

- <sup>1</sup> Given the expected variability or standard deviation of 12 percent, the fund will have to grow at a somewhat higher arithmetic average rate of about 8.7 percent, in order to achieve the geometric average (or compound rate) of 8 percent over the time horizon.
- <sup>2</sup> The 38 percent figure is just the standard approximation, assuming a normal distribution, of the 10-year standard deviation, i.e. 12 percent times the square root of 10 years. More correctly we would use the lognormal approximation, but we would lose in intuition what we gained in accuracy. Note further that 38 percent is just one standard deviation (over a 10-year holding period): It is quite possible—there is about a one in six likelihood—for results to be more than one standard deviation below the expectation, even much more.
- <sup>3</sup> More precisely, the Law of One Price (or the no-arbitrage condition) requires a market that is efficient. In practice, if a market approaches efficiency, there should be little difference in prices for identical goods in the identical place.

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- <sup>4</sup> Actuarial ‘expected rate of return’-based discount rates have been lower than the Treasury bond rate for 20-odd years, but during the inflationary period of the 1970s and early 1980s, there were periods when the reverse was true. In that unusual situation, Sasquatches were actually more valuable than dollars. Before this period, fewer equities were held in pension portfolios, and the difference between the expected return on the assets and the proper discount rate was not typically very large, so it did not create a problem. The problem started when the portfolio diverged aggressively from its liability benchmark.
- <sup>5</sup> People who insist that the liability is stable may be relying on the observation that the future values (benefit promises) are quite stable. The present value, however, is not and cannot be stable because present values fluctuate with interest rate (discount rate) changes.
- <sup>6</sup> To eliminate credit risk, regulations in the United States and other places require certain plans to be fully funded, a status that is assumed to be intended in this discussion even where there is no explicit regulation (as for US public employee DB plans).
- <sup>7</sup> For a comparison, under the Pension Protection Act, US corporate plans now must plan on getting to full funding within seven years on a valuation basis that is much closer to market value than that used by public DB plans.
- <sup>8</sup> If the plan is in deficit, the surplus thus defined is a negative number. It is easier to talk about the (positive or negative) surplus than to switch back and forth between surplus and deficit, depending on the sign of the number.

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