

THE PENSION
FORUM

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Table of Contents	PAGE
Pension Deficits: An Unnecessary Evil <i>by Lawrence N. Bader</i>	1
Comments on “Pension Deficits: An Unnecessary Evil” <i>by Eric Klieber</i>	10
A Critique of “Pension Deficits: An Unnecessary Evil” <i>by Dmitry Mindlin</i>	11
Author’s Response to Mr. Klieber’s and Mr. Mindlin’s Comments <i>by Lawrence N. Bader</i>	14
Fixing the Pension Plan Funding Rules <i>by Edward E. Burrows</i>	19
Reaffirming Pension Actuarial Science <i>by Dmitry Mindlin</i>	30
A Critique of “Reaffirming Pension Actuarial Science” <i>by Lawrence N. Bader</i>	43
Comments on “Reaffirming Pension Actuarial Science” <i>by Tony Day</i>	47
Comments on “Reaffirming Pension Actuarial Science” <i>by Robert McCrory</i>	49
Author’s Response to Mr. Bader’s Comments <i>by Dmitry Mindlin</i>	50
Author’s Response to Mr. Day’s Comments <i>by Dmitry Mindlin</i>	58
Author’s Response to Mr. McCrory’s Comments <i>by Dmitry Mindlin</i>	62

Pension Deficits: An Unnecessary Evil

by Lawrence N. Bader, F.S.A.

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Falling equity markets and interest rates have devastated pension plans worldwide during the past several years. The S&P 500 Index companies enjoyed a collective pension surplus of \$250 billion in 1999. Even after the 2003 market rally, they face a deficit of \$168 billion in 2003 (Bianco, Deng, and Suri 2004). These circumstances spotlight the weakness of current funding and investment practices for corporate defined benefit pension plans. This article presents a case for securing all accrued benefits through *full funding*.¹

“Full funding” is commonly understood to mean that assets are sufficient to cover liabilities measured at an arbitrary discount rate, with no consideration of how the assets are invested. Here, I use “full funding” to signify a much stronger funding condition, one in which an immunizing bond portfolio secures all benefits to which employees would be entitled upon service termination. The combination of sufficient assets and an immunization strategy eliminates dependence on the creditworthiness of the pension sponsor. Furthermore, the sponsor commits not to undermine that security by changes in investment or funding policy, by plan amendments that are not immediately funded, or by plan mergers or spin-offs.

I discuss pension funding initially in the absence of governmental guarantees because most countries lack guarantees and because this approach yields insights that are useful in evaluating guarantee programs.

Preregulatory Environment

The setting for this discussion is a transparent financial system in which plan sponsors, investors, creditors, and employees fully understand the value and risk of pension plans. In this transparent system,

- capital providers understand that a dollar owed to a pensioner and a dollar owed to a creditor have the same (tax-adjusted) effects on corporate value and
- employees understand the risks of both underfunding and asset/liability mismatches. They correctly value their pensions and are able to make rational trade-offs between pensions and salary.

These assumptions are heroic. But we cannot base an optimal pension system on the behavior of stakeholders who view pension plans only through a veil of ignorance.

The simple preregulatory environment has no taxes, no regulation, and no governmental guarantee of pension promises. Later in the discussion, I introduce these factors.

A Simple Pension Promise. Suppose an employee’s compensation for a year includes a salary and a promise of a \$20,000 lump sum payable in 25 years. The lump sum is vested and payable whether or not the employee is alive at the due date.² This pension promise is economically equivalent to the employer’s issuing its own nontransferable bond to the employee as part of his pay package.

¹ This article draws substantially on the thinking of Sharpe (1976), Black (1980), and Tepper (1981).

² I assume full vesting throughout this article. Unvested benefits—a small percentage of the liability of most plans—raise several issues beyond the scope of the discussion. Also, the article considers only hedgeable, bondlike accrued pensions, not economically uncertain projected pensions. Projected pensions are not a true corporate liability (Bader 2003b).

Suppose this nontransferable bond is fully collateralized by a portfolio of matching risk-free bonds. In this case, the employer's bond itself is risk free and would be valued at riskless rates by the market and the employee. But suppose the collateral is too small or too risky and there is a danger that the company might default. In this case, the employee discounts the bond for its default risk.

Nondiversifiable Risk. If the plan sponsor issued such a bond publicly, investors would treat it like any other similarly risky bond in their diversified portfolios. But for employees, the risk of the employer's bond is different from that of other companies' bonds. The employer bond adds to the large employer-specific risk that the employees already bear through their employment, and the employees cannot diversify or hedge this risk in any practical manner.³

If a company were to sell its own risky bonds to its own employees, therefore, the company would be selling to unwilling buyers. Unlike the investors who determine market prices, employees cannot diversify the company-specific risk to which they are already overexposed, so they would not pay the full market price. Nor would it be rational for them to give up enough salary to cover the full market value of the risky pension.

A company might still, despite this inefficiency, wish to provide pension plans. Such plans might help manage retirement patterns and assure retirees a decent standard of living. Also, society encourages pension plans through tax subsidies, which can close the gap between company cost and employee valuation of their pensions. But can companies improve the value of pensions to employees without commensurate cost?

Full Funding of Accrued Benefits. Companies can accomplish such an improvement by securing pension promises through full funding. As noted, any employer-specific risk in a pension fund makes the pension inefficient because its cost to the employer is greater than its value to employees. Full funding eliminates the risk that can arise from pension assets that are either too small or too risky.

If the risk is from pension assets that are too small, the company should borrow in the capital markets from willing lenders to "refinance" its inefficient "debt" to its employees. The company is better off borrowing from investors who can diversify than from employees who cannot.

If the risk arises from aggressive investing, the company can shift to an immunizing bond portfolio. Exchanging one class of marketable assets for another creates no first-order change in shareholder value, but the company gains by raising the value that employees attach to their pensions and, therefore, the salary that they will sacrifice for those pensions.

Tax Arbitrage. Companies can also gain from full funding by saving taxes for their shareholders. Like a number of other countries, the United States taxes bonds at a higher rate than equities and gives favorable tax treatment to pension funding. Under these conditions, Black (1980) and Tepper (1981) showed that it is tax efficient to fully fund pension plans, invest the pension fund in bonds, and shift equity risk to the shareholders' own portfolios or elsewhere in the company.

The arguments about employee risk and tax arbitrage do not demean equity investment. They merely redirect the equity investment away from pension plans so that it will not subject-

³ Although a short position in the company's debt offers a theoretical (and very approximate) hedge for the pension promise, such a strategy would be costly or impossible for rank-and-file employees and would be frowned on or forbidden for management-level employees.

shareholders to unnecessary taxes and employees to nondiversifiable dependence on their employers' creditworthiness.

A Note on Immunization. The argument so far is that eliminating market risk is more valuable to employees than costly to sponsors. This argument weakens, however, for the final increment of risk reduction—that is, replacing the highest-quality corporate bond portfolio with U.S. Treasuries. In this replacement, sponsors pay for the state income tax exemptions and high liquidity of Treasuries. These qualities are unimportant to pension funds and may make reducing pension risk to “absolute zero” overly expensive.

Unfortunately, no riskless securities exist that do not have these costly—but in this context, useless—properties. Therefore, this potential final improvement in pension security may not justify the cost of squeezing out the last bit of default risk.

The shortcomings of Treasury immunization do not, however, make corporate bonds the correct measurement standard. Only government bonds offer a risk-free, objective, and hedgeable standard.⁴ But in practical situations, an imperfect immunization—one that relies on bonds that are very high quality but not riskless—may offer the optimal balance of cost and security. The sponsor of an imperfectly immunized plan should maintain sufficient assets to meet a Treasury-based standard at all times by slight overfunding in anticipation of possible losses.

Funding under a Guarantee System

Now consider how Pension Benefit Guaranty Corporation guarantees change the desirability of

funding.⁵ The PBGC is financed by premiums paid by plan sponsors to insure each other's pension plans. Thus, we may refer to the PBGC as the “OPSGC”—the “other plan sponsors' (OPS) guaranty corporation”—to remind us that the cost of one sponsor's pension plan failure is borne by other plan sponsors, not by some outside party. The law provides no taxpayer money, so economically, the other plan sponsors are the guarantors and the PBGC is only an administrator and collection agency.

The PBGC guarantees most, although not all, corporate defined-benefit pensions. These guarantees undercut the major advantage of funding in the unregulated system described previously. A PBGC-guaranteed pension is secure with or without company funding, and employees with such guaranteed pensions have no company-specific risk to worry about.

By fully funding a pension on which it might have defaulted and forced the PBGC to pay, the company transfers value to the PBGC without benefit to its own employees. In the absence of legal funding requirements, each sponsor's narrow interest is thus to fund as little as possible. At the same time, each sponsor wants all other plans to be well funded so that it will not have to pay for their failures. In game theory terms, this situation is a “prisoner's dilemma.”

As the guarantee system shifts risk from employees to the OPS, legislation becomes necessary to prevent each sponsor's pursuit of selfinterest from producing the worst result for all sponsors. A compulsory guarantee system, if combined with permissive funding and investment standards, can enable weak companies to drag down and prey upon strong ones. So, beneath the veneer of an

⁴ I have argued elsewhere (Bader 2003b) that the valuation of corporate plan sponsors' pension obligations, like the valuation of their debt, should reflect credit risk (after factoring in the security provided by any pension assets). The current article, however, addresses optimal funding policy, which should aspire to eliminate, rather than reflect, risk.

⁵ Although I refer to the PBGC specifically, this analysis also applies to other governmental guarantee systems, such as those in Ontario (Canada), Germany, and the proposed U.K. Pension Protection Fund.

insurance operation, the PBGC serves primarily to extract capital from successful companies to pay the obligations of unsuccessful ones.

For example, suppose a failing company cannot pay competitive salaries. It may be able to solve that problem by promising outsized pensions and funding them inadequately. The guarantees give the full value of the pensions to the employees, and the company gets to use in its business the money that should go toward employee compensation. In this sense, the OPS involuntarily provides a loan guarantee to the failing company and the company gets full value for its pension promise from its employees, value that it could not get from its employees or from the capital markets for a similar promise without the guarantee.

Two broad legislative solutions are available:

1. The government can require full funding, thereby preventing plan sponsors from taking risks that are borne by others.
2. The government can charge each plan sponsor a premium that accurately reflects the risks that the sponsor imposes on the system.⁶

The second solution is appealing because of the freedom it gives sponsors to manage their plans. But charging true risk-based premiums would put the PBGC in a uniquely difficult position among the government regulators of financial intermediaries. Think how closely we regulate banks, insurance companies, and brokerage firms. These financial intermediaries must have assets that cover their liabilities and maintain a reasonable match in risks between assets and liabilities. If similar standards were applied to pension plans, the PBGC could limit its regulatory focus to the

plans themselves. But suppose pension plans were not held to the standards governing other financial intermediaries, so they remained dependent on their sponsors' financial health. Then, the PBGC would have to extend its regulatory reach to evaluating and monitoring the operations of every sponsor of an underfunded plan. This role would be daunting for a government agency whose mission is simply to insure pensions.

A final and critical problem with permissive funding and investment rules is that the risks borne by the PBGC are not diversified. The vast majority of sponsors are taking the same risk—betting on equities instead of hedging their pension liabilities with bonds. A severe and prolonged decline in stock prices can thus trigger an assessment spiral among plan sponsors and, eventually, a taxpayer bailout of the PBGC.

So, mandatory full funding, not risk-based premiums, is the only practical prevention for the diseases that can afflict a guarantee system.⁷ A workable, equitable, and financially sound guarantee system would have the following characteristics:

- The guarantee agency would function mainly as a monitor and enforcer rather than as a claims-paying insurer.
- The failures that it covered would be rare misfortunes rather than inevitable outcomes of widespread risky practices.
- Pension plans would be fully funded with respect to the benefits that would be due upon plan termination.
- Plans would remain fully funded at all times, without the need for extended periods or full market cycles to correct deficiencies.
- Plans would not take on new liabilities without sufficient assets to cover them.

⁶ See Bodie and Merton (1992). Currently, PBGC premiums are modestly risk related; they include a charge of 0.9 percent of the unfunded liability. The premiums are not equitably risk based because they do not reflect the investment policy or strength of the sponsor.

⁷ Bodie (1996) discussed this problem in similar terms, but he suggested another possible solution: replacing the PBGC with private-sector guarantees that rely on the risk management products developed since the PBGC was founded.

Questions and Objections

I have argued here that nonguaranteed pensions should be voluntarily fully funded in a transparent but unregulated pension system and that a sound government guarantee system must mandate full funding. In this section, I consider some questions and objections concerning full funding.

1. *I suggested that companies with underfunded plans should borrow money to fund their deficits. But companies may object that debt is a limited resource. Alternative uses for borrowed funds must compete with each other, and companies should have far better uses for debt than buying bonds for their pension funds.*

Borrowing to fund a pension deficit does not use scarce capital; it simply refinances or restructures liabilities. Pension deficits affect corporate value in the same way that debt does. By borrowing and funding, the company replaces inefficient and expensive pension debt with conventional debt. The restructuring leaves its net liabilities unchanged and its borrowing capacity undiminished.

A company eager to borrow for an attractive capital investment would gain, not lose, by first refinancing inefficient or expensive debt. The debt may be an old loan that can be replaced at a lower interest rate, or it may be a pension deficit—which is highly inefficient, not only because of the employee or PBGC risk, but also because the company is deferring the tax deduction available for paying off the pension debt and forgoing the use of the pension tax shelter on the earnings of that payoff.

Either type of refinancing reduces the company's after-tax debt cost and *strengthens* its financial position. So, these types of borrowing do not compete with borrowing to fund capital investment.

The downside of borrowing to fund a pension deficit is that it increases the likelihood that the

pension will be paid and raises the liability value—effects that are similar to those from voluntarily collateralizing a risky debenture. If the pensions are not guaranteed, the employees are bearing the risk and the cost of eliminating the risk has to be recovered from the employees through salary concessions (or from tax savings). If the pensions are guaranteed by the PBGC—that is, other plan sponsors—the cost of that risk should properly be borne by the company, either by full funding (preferably) or through full risk-based premiums.

2. *Doesn't funding pension plans harm the economy by depriving plan sponsors of capital they could use in their businesses?*

Companies would, of course, like to divert to other business uses the portion of their compensation costs that should go into their pension plans. Troubled plan sponsors are especially fond of this argument, which would save them the bother of competing for capital in the public markets. But of course, money contributed to a pension fund does not go down a rat hole; pension fund investments recirculate it into the capital markets to efficient users of capital.

ERISA's intent is to limit plan sponsors' ability to use their pension funds in their businesses. Permissive funding standards, however, create a massive loophole. ERISA generally restricts defined-benefit plans to investing no more than 10 percent of the plan assets in the sponsor's securities. But that restriction applies only to the assets actually invested; it ignores the implicit employer bond that covers the shortfall of those assets relative to full funding. By ignoring this employer bond, ERISA enables sponsors to turn hundreds of billions of dollars of pension capital to their own uses.

3. *If full funding is so attractive, why doesn't everybody do it voluntarily?*

Part of the answer to this question lies in the guarantees provided by the PBGC, which largely eliminate the employee pension risk that provides the main incentive for full funding. The broader reason that we do not see full funding, however, is that pension finance is not currently transparent. Even for nonguaranteed pensions, employees seem to be generally unaware of their pension risk. Not only employees but capital providers also commonly fail to understand pension finance. When pension funds invest in equities, current accounting rules permit the sponsors to anticipate the risk premiums in their reported earnings and to conceal the risk by smoothing out the effect of market fluctuations. Financial economists commonly assume that investors look through the reported earnings to the underlying economic reality. Companies, however, do not appear to share that assumption about investor sophistication, and recent empirical research supports the company view with regard to pension accounting (Coronado and Sharpe 2003). Thus, companies have been able to deal with pension risk through sponsor-friendly accounting rules rather than genuine asset/liability management.

4. *Why not fund pension liabilities with equities or other risky assets that have higher expected returns than bonds?*

By funding with risky assets (risky beyond the modest level suggested in the section “A Note on Immunization”), a company fails to eliminate the plan’s dependence on the company’s credit. That company-specific risk is inefficiently borne either by employees (for nonguaranteed pensions) or by the PBGC.

Furthermore, investing the pension fund in risky assets leaves the plan leveraged rather than defeased. In the transparent financial world toward which we are moving, pension risk would raise the company’s cost of capital. By absorbing some of the company’s risk-taking capacity, pension fund equity risk would come at the expense

of other risks that the company could take without introducing inefficiencies into employee compensation and tax management.

Corporate investing in marketed equities delivers no value to shareholders: The shareholders can make those investments for themselves. But those pension fund equity investments may crowd out the investments in the core business that can uniquely deliver value to shareholders.

In addition, funding with equities gives up the tax gain available with bonds (Tepper).

5. *Isn’t funding with immunizing bonds more expensive than funding with equity investment?*

Yes, under the standard actuarial or accounting model. No, in terms of shareholder value. Although the expected contributions over the life of immunized plans are higher, there is a compensatory drop in the company’s risk, so shareholder value is unaffected. The only “loss” to the company comes from the transfer of value to employees or the PBGC by better collateralization of the pensions (see the answer to Question 1), and the company can recover any value transferred to employees through salary concessions that recognize the greater pension value. Overall, shareholders gain from substituting bonds for stock in the pension plan because of tax efficiencies and other secondorder effects (Bader 2003a).

6. *Full funding would generate considerable demand for high-quality, long-duration bonds. This demand would disrupt the U.S. capital markets and cause the interest rates on such bonds to drop to levels that pension sponsors would find unattractive. In most countries, the inadequate supply of such bonds would make large-scale immunization impossible.*

Since 1980, the sleep of pension plan sponsors has been untroubled by the Tepper–Black

critique of their errors. To worry that sponsors will all awaken one morning in a headlong rush to implement the Tepper–Black advice seems rather alarmist.

In free markets, new demand for long-duration bonds should, over time, call forth an adequate supply. As companies immunize their long-duration pension liabilities, they will acquire capacity to issue long-term debt without net damage to their balance sheets. (They will simply be substituting one long-term liability for another.) And if long-term market debt carries low interest rates, companies will choose to issue such debt in preference to using other capital sources, such as private credit, short-term debt, or equity financing.

7. *Even granting that secure pensions serve the company's or the PBGC's interests, why fund beyond the amount needed to purchase annuities?*

The actual purchase of an annuity contract would provide adequate security. But simply funding to a level that is believed to be adequate for an annuity purchase would not.

The private annuity market for pension plan terminations is small, and its pricing is opaque. Pension plans cannot hedge their funding levels on an annuity purchase basis, so they cannot assure that adequacy today means adequacy tomorrow. Also, insurance companies combine their gross interest rate with conservative demographic assumptions and loadings for profit and expenses. Therefore, annuity purchase rates are unlikely to be significantly (if at all) below liabilities that combine Treasury rates with the demographic assumptions used for funding the plans.

8. *Why would companies establish defined-benefit plans with such funding strictures? Defined contribution plans can give employees similar benefits (through investment in a Treasury portfolio) and other options they might prefer (such as equity investments).*

In the United States, this is a trillion-dollar question, to which the answer is not at all clear: Can the virtues of defined-benefit plans outweigh the clarity, relative administrative simplicity, and employee choice offered by defined-contribution plans?

A defined-benefit plan cannot provide the same benefits as a defined-contribution plan more cheaply if the risks to the shareholders are correctly reflected. But neither is it a more expensive vehicle. It is simply a different vehicle—one in which the company may provide value to the employee by absorbing certain demographic risks.⁸ It is also a more efficient human resource tool. Unlike defined-contribution plans, defined-benefit plans can provide guaranteed income amounts targeted to achieve various human resource objectives, such as encouraging early, normal, or late retirement. The target levels can be met through good times and bad, so human resource planners need not worry that a market plunge will discourage retirements just when the company most desires voluntary departures. Defined-benefit plans also lend themselves more readily than defined-contribution plans to “window programs” that might be needed to cope with temporary conditions.

Employees who want equity exposure can obtain it with assets other than their pensions. (Companies might assist with supplemental defined-contribution plans.) For employees who have no other financial assets, it may be just as

⁸ Defined-benefit plans have the apparent advantage of paying lifetime pensions, which free employees from the danger of outliving their retirement plans. This advantage is diluted, however, because these plans also commonly offer lump-sum options, which are heavily used. Also, defined contributions can, and often do, offer annuity purchase options.

well that their savings take the form of fixed and secure pensions.

Transition

Transition from the current permissiveness to a full funding standard even over an extended time would be painful to some major businesses and their employees. An important first step, however, would be to stop the bleeding—by preventing plan sponsors from taking on new unfunded liabilities. Specifically, a plan should be permitted to accrue additional benefits, by plan amendment or by continuing accrual of credits under existing provisions, only if

- the sponsor fully funds those new accruals or
- existing plan assets are sufficient to maintain full funding.⁹

How can such a draconian provision be justified? If a company cannot afford currently to pay its employees' salaries, other companies are not required to chip in. The same standard should apply to a company that provides part of its employees' pay in the form of pensions. If the company cannot afford to pay for those pensions currently, it should not be able to impose on other companies the cost of guaranteeing those pensions. Although dumping pension liabilities on the PBGC is fast becoming a major corporate pastime, encouraging the weak to prey on the strong is neither a fair nor an efficient way to run an economy.

Conclusion

The idea that underfunding pension plans is a way for companies to borrow inexpensively from their employees is a myth. It may be true for companies with weak credit, but only if someone else—someone other than the company—is bear-

ing the pension risk without full compensation. For nonguaranteed pensions, the someone else must be employees who do not recognize the risk they are bearing. For guaranteed pensions, the someone else must be a guarantor who does not charge enough for the risk.

Without a guarantee, informed employees would deeply discount an underfunded pension promise from a weak company. They would discount it, first, for the normal default risk and, second, for the employer-specific nature of that risk. So, they would charge for the borrowing by requiring much larger salaries than if the pension were fully funded. Thus, the employees' inability to diversify firm-specific risk makes them a poor financing source for their employers.

If the pensions are guaranteed, the cost of the pension fund "borrowing" depends on the premiums charged by the guarantee agency. If the premiums are accurately risk based, they effectively impose a market interest rate on the borrower.

In this article, we began with considering an economy without governmental guarantees for pension funding. We found that transparency should lead to voluntary full funding. Otherwise, employers and employees would have inefficient compensation contracts that exposed employees to risk that they could not diversify. We then introduced a guarantee program and found that it reversed the main incentive for full funding. We noted that insufficient funding, however, enables weak or irresponsible plan sponsors to dip into the pockets of other sponsors—and perhaps of taxpayers. So, the government that includes a guarantee program must require plan sponsors to fund their plans; that is, it must compel behavior that would

⁹ This condition would often make the introduction of plan amendments (or new plans) that provide significant "past service benefits" impractical. Although intended as an incentive for employees to render future service, these benefits are credited to employees immediately, creating substantial current liabilities. Gold (2003) suggested an alternative plan design that would credit the benefit increases only over employees' future service, which would improve both the incentive effects and the economics.

occur naturally in an unregulated, transparent pension system.

In short, pension risk is inefficiently borne by employees or governmental guarantors. Full funding eliminates the pension risk. With or without guarantees, full funding is the optimal condition for all stakeholders in the pension system.

I thank Bruce Cadenhead, Jeremy Gold, Tom Lowman, Wendy McFee, Bob North, and Peggy Warner for their comments and suggestions.

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Comments on “Pension Deficits: An Unnecessary Evil”

by Eric Klieber, F.S.A., M.A.A.A., E.A.

Mr. Bader’s paper includes a number of shortcomings that may very well be curable by more detailed treatment. I look forward to a more comprehensive paper from the author on this topic.

A Simple Pension Promise

Assume two vested participants in a defined benefit plan are identically situated and have identical work histories. The sponsor has always made the same contribution to the plan for each of them. They both have the same “pension promise.” One terminates employment in the next year, and the other works until normal retirement age. The latter participant realizes more from his pension promise than the former, possibly a lot more depending on what point in their careers we make our observation. The bottom line is that the pension promise is not simple. Arguments that make perfect sense in the context of the simplified arrangement the author uses in his example may break down entirely when the complexities of actual plans are considered.

Use of a Bond Model

While the pension promise has many characteristics of a bond, it is not a bond and has many non-bond-like characteristics, such as the following: (1) the payment amounts are contingent rather than contractually set; (2) the term is longer than any currently marketed bond even without taking into account future participants; (3) there is no balloon payment date when all or a significant portion of liability becomes due; (4) liabilities behave differently from bonds in certain economic conditions, such as rapid inflation. The author makes an enormous and unjustified leap by applying a bond model under these circumstances.

Tax Arbitrage

Investment advice is not a service most actuaries provide. Indeed, few actuaries have the professional

qualifications to provide such advice. Although there are exceptions, most of those who do provide investment advice to plan sponsors have consistently recommended that a substantial portion, usually more than half, of a plan’s assets be invested in equities. While I have no doubt that the mathematics behind the author’s tax arbitrage argument is impeccable, the fact that those with expertise in this area consistently flout the author’s advice is good evidence that other considerations compete with and, in many cases, override the tax arbitrage argument.

Alternatives to Full Funding

The author states that the only alternative to full funding is that “the government can charge each plan sponsor a premium that accurately reflects the risks that the sponsor imposes on the system.” Another alternative is that such premiums can be charged by a private self-insurance pool or by commercial insurers. Several recent papers have explored this possibility. I would be curious to know how the author views this alternative.

Equity Risk

In his “final and critical problem with permissive funding and investment rules,” the author raises the specter of “a severe and prolonged decline in stock prices.” Historically, even taking into account the worst financial cataclysms, equities always have outperformed bonds when measured over a sufficiently long time period. Therefore, the author must be talking about a scenario worse than any in history. Such a circumstance would likely be accompanied by large-scale defaults on bonds, even among previously highly rated companies, so full funding with bonds would not be a sure remedy. Full funding with Treasury bonds would solve this problem, but this alternative would be costly if all plans decided to cover all their liabilities with Treasuries.

A Critique of “Pension Deficits: An Unnecessary Evil”

by Dimitry Mindlin*, A.S.A., M.A.A.A., Ph.D.

Perspective Is Complete Now

It’s always a pleasure to read, comment, agree, or disagree with Mr. Bader’s papers. Once again, Mr. Bader gives us a great example of his thought-provoking writings. My goal here is to challenge certain arguments utilized in this piece to advance Mr. Bader’s views on the subject of asset allocation for pension plans. A comprehensive treatment of the issues raised in Mr. Bader’s paper, as well as alternative views on the subject, are outside of the scope of this short and somewhat informal piece.

“Pension Deficits: An Unnecessary Evil” is a natural conclusion of a series of ideas presented in Bader (2001), Bader and Gold (2003, also known as *Reinventing*), Bader (2003a), and Bader (2003b). Publication of *Reinventing* became a significant event in actuarial circles and beyond: the paper jump-started a stimulating discussion about foundations of the pension actuarial science and its relationship with financial economics. I’ve always thought that the line of thinking presented in *Reinventing* is remarkably incomplete. While the authors have insisted that the only economically legitimate pension liability is, for all intents and purposes, a bond portfolio, they have stopped short of calling for a similar mandate on the asset side ... until now.

Mr. Bader clearly believes that the only asset class appropriate for pension funds is high-quality fixed-income securities. After all, if you believe that the liability is a bond portfolio, which asset behaves like a bond portfolio? It’s a no-brainer. In several publications, Mr. Bader and like-minded economists essentially have argued that it would be nice if pension plans invested in bonds only. But as long as those niceties remain voluntary, they have the annoying tendency of failing to

materialize. The decision makers for both corporate and public pension plans have been stubbornly investing in a variety of financial instruments that, unlike bonds, make no promises to pay the investors back, offering uncertain chances of value appreciation instead.

Should we allow a bunch of possibly confused and potentially ill-intentioned people—the ones who make the asset allocation decisions for pension plans—to get in the way of a good economic theory? Not according to Mr. Bader. He states that “mandatory full-funding ... is the only practical prevention for the diseases that can afflict a guarantee system” and “a sound government guarantee system must mandate full funding.” Liabilities must be a bond portfolio; assets must be a bond portfolio as well. End of story.

System without Guarantee

As a starting point, Mr. Bader discusses pension funding under an assumption of no government regulations and guarantees. I make the same assumption in this section.

Mr. Bader starts off with two “heroic” assumptions. His first assumption states “a dollar owed to a pensioner” is very similar to “a dollar owed to a creditor.” This assumption is debatable at best: there are significant differences between those “dollars.” His second assumption basically proclaims that we must view employees (and, I may add, all stakeholders) as fully informed about financial health of the pension plan. I agree with this one—no argument should be based on ignorance. There is one more assumption in the paper, although Mr. Bader doesn’t mention it. The third assumption is that the matching bond portfolio exists for every pension

plan out there. I believe that this is a dubious assumption: the matching bond portfolio rarely exists even if we were willing to accept an inexact but “reasonably close” match. But this subject is one for some other time.

For more details regarding the first and third assumptions, see my “Reaffirming Pension Actuarial Science,” Mr. Bader’s comments to that paper, and this author’s response to his comments in this issue of *The Pension Forum*.

Mr. Bader’s goal is to justify the “full funding” by means of investing in “an immunizing bond portfolio.” The section entitled “Preregulatory Environment” contains two lines of arguments in favor of the “full funding”: (1) presence of the company-specific risk and (2) tax arbitrage.

As far as the first line of arguments is concerned, I agree with Mr. Bader that the company-specific risk is a factor. Unfortunately the paper is silent about the magnitude of this factor. I also agree that the pension’s “cost to the employer is greater than its value to employees.” However, this inefficiency is not unique to pensions. In almost every form of compensation, cost to the employer is greater than its value to the employees. A salary, for example, is terribly inefficient in that respect. In the presence of taxes on both the employer and employee sides, it’s not unusual for an employee to get less than \$0.60 for every \$1 the employer spends on her salary. Other employee benefits can be very inefficient as well. An employer-provided health insurance policy could be needlessly comprehensive for some employees; it could also be hopelessly insufficient or even useless for others.

If Mr. Bader’s goal is to maximize the value to the employees for every dollar of labor cost, he must demonstrate that the cost of elimination of the company-specific risk *in the pension plan* is the most efficient way to do so. The paper does nothing of the sort. It is true that the full funding eliminates the inefficiency present in the pension

plan, but the cost of elimination of this inefficiency can be prohibitive. The choice of the pension plan as the best place to spend the labor-cost dollars appears to be unsubstantiated in the paper.

As far as the tax arbitrage arguments are concerned, several important questions are in order. Is the role of the long-term strategic asset allocation to follow every twist and turn of ever-changing fiscal policies? If equities were taxed at a higher rate than bonds, would Mr. Bader and like-minded economists advocate 100% equity portfolios? Is it possible that in the process of taking advantage of the tax arbitrage we may eliminate some other essential advantages that pension plans enjoy over other market participants (e.g., the pension plans’ long-term nature)? As long as these questions remain unanswered, as they are in this paper, the tax arbitrage arguments are less than convincing.

System with Guarantee

A plan sponsor established its pension plan with the intention to make the plan a valuable part of the compensation and fund it properly. Mr. Bader suggests that the very presence of government guarantees fundamentally changes the intentions of the plan sponsor. According to Mr. Bader, “each sponsor’s narrow interest is thus to fund as little as possible.” That’s a very strong claim, and I would like to see much more concrete evidence of that phenomenon than presented in the paper. I find the alleged desire of plan sponsors to unleash the government agency’s awesome power to take over a good chunk of the company’s assets rather exaggerated.

The paper also contains a glaring inconsistency: “a failing company ... may be able to solve that problem by promising outsized pensions and funding them inadequately.” No, it may not. According to the second assumption, the employees “understand the risks of both under-funding and asset/liability mismatches.” They “are able to make

rational trade-offs between pensions and salary”—they will not be fooled by that scheme.

The paper has a very interesting corollary, perhaps unintended by the author. If we assume for a moment that Mr. Bader’s arguments are flawless, then the belief that pension plans should be allowed to take advantage of investment opportunities outside of high-quality bonds and the belief in the usefulness of government guarantees are irreconcilable! Indeed, if one believes in the government guarantees, then, according to Mr. Bader, one must believe that pension plans must invest exclusively in high-quality bonds. I don’t think the founding fathers of the PBGC anticipated that conclusion.

The usefulness of government guarantees is an open question. But that’s not the most important question now—the government guarantees do exist, the PBGC does have real powers. The real question is how much power the PBGC should have. Some may argue that the PBGC needs more authority to improve its accounting statements. It may also be tempting, as Mr. Bader is proposing, to take away the loosely regulated multitude of investment options currently available to the plan sponsors. These solutions strike me as premature and, quite possibly, counterproductive. The danger here is that the plan sponsors may view not the pension deficits, but the pension plans themselves, as an unnecessary evil. They may simply get out of the business of providing secure retirement for their employees. Then the question of the usefulness of government guarantees becomes moot: there will be nobody to regulate and nothing to guarantee. But these issues require more thorough treatment than is appropriate for this piece.

Conclusion

Reinventing (Bader and Gold 2003, p. 10) contains an example of a pension plan that, under certain

conditions, will never have a 100% funding ratio: “Under these conditions, the funding ratio will stabilize at just 70%, *forever* (italics added). Is this result professionally defensible?” I’m supposed to be ashamed of myself for not being scared stiff, but I find myself rather happy for the plan sponsor and participants. Imagine that—people work, earn their pensions, retire and live happily ever after—and the process continues *forever!* The price to pay for this result is the possibility of living with accounting statements that are not good enough for some. But if we force the sponsor into the perfect accounting system, the sponsor may find the “forever” part too burdensome, or expensive, or both. Looking at the current conditions in the pension industry, is it possible that our choice is between “perfect accounting” and “forever”? I’d take “forever,” thank you very much.

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Author's Response to Mr. Klieber's and Mr. Mindlin's Comments

by Lawrence N. Bader, F.S.A.

1. Response to Eric Klieber

Mr. Klieber speaks for many actuaries in his concise summary of objections to the financial economics view of pension plans. Every point he raises deserves more extended discussion than is appropriate here, but I will sketch out a response to each.

1.1 A Simple Pension Promise

Mr. Klieber distinguishes between the pension promises to two vested participants who have identical accrued pensions today, but will ultimately receive very different pensions.

From a corporate finance perspective, only an accrued benefit qualifies as an economic liability of the sponsor and an asset of the participant. Regardless of the attribution provided by the benefit formula and current accounting rules, any incremental pensions are earned only by *future* service. Like future salaries, which are also earned only by future service, these incremental pensions should not be prefunded or thought of as current liabilities. So I reserve the term "pension promises" for accrued pensions only. More detail appears in Bader (2003).

1.2 Use of a Bond Model

Mr. Klieber enumerates several characteristics of pensions that he believes are "non-bond-like," making a bond model unsuitable for understanding pensions.

Of course, there are many differences between pensions and bonds. But both represent well-defined cash flows that must be paid on pain of bankruptcy. When the sponsor writes a check, why does it matter whether it is paid to a pension-

er or a creditor? If a portfolio of bonds has the same cash flow as a pension obligation—that is, the two cash flows are identical in timing and amount (or probability distribution of amount)—why should they have different values to payer or payee?

For any pension obligation, can we identify a bond portfolio with very similar cash flows? Let's consider Mr. Klieber's list of how pensions differ from bonds.

1. *Pension payments are contingent rather than contractually set.* Actuarial valuations of pensions effectively reduce the probability distribution of payments to a single fixed-payment stream (equal to the expected payments). A bond portfolio that matches that stream has the same value as the pension liability, regardless of how the payments are defined. (By the way, many bonds *do* have contingent payments, in the form of options. Bond analysts and traders price these options with sophisticated techniques that reflect the full probability distribution rather than the average outcome.)

2. *The term is longer than any currently marketed bond.* In fact, some \$7 billion of 100-year investment-grade bonds is currently outstanding (November 2004), spread among 17 issuers such as BellSouth, Citigroup, Coca-Cola, Disney, Ford, and IBM.

3. *There is no balloon payment date.* No single bond will match a pension payment stream. But a portfolio of bonds, possibly including zero-coupon bonds, can be constructed to match or approximate most pension streams.

4. *Pension liabilities behave differently from bonds in certain economic conditions, such as rapid inflation.* Per (1) above, pension liabilities comprise only accrued benefits, which are generally unaffected by inflation.

In any event, we need not produce a perfect bond match for every pension stream. The bond market is sufficiently deep and varied to permit excellent approximations for any cash flows, whether or not perfectly matching trading instruments exist. As I remark in my critique of Mr. Mindlin's article in this issue of *The Pension Forum*, many differences exist within the bond market, and between bonds and pension obligations. We accommodate such differences by judgment and arithmetic, not by completely different valuation techniques. A serious challenge to the bond model of accrued pensions must not merely point to these differences. It must show why the differences affect value to the payer or payee in such fundamental ways that they require entirely different valuation models.

1.3 Tax Arbitrage

Mr. Klieber observes that expert practitioners in asset allocation consistently flout my claim that all-bond portfolios are optimal for pension funds, thereby showing that "other considerations . . . override the tax arbitrage argument." He is correct. The "other considerations" relate mainly to transparency, which I assume in my article, but which is certainly lacking in today's pension world.

The transparency assumption is intended not to portray current reality, but rather to illuminate how pension plans would be financed if all principals fully understood their exposure. Current pension accounting rules block this understanding by, among other flaws, converting anticipated equity risk premiums into current corporate earnings. Shifting pension fund assets from stocks to bonds may immediately lower executives' earnings-related bonuses and disappoint investors

who fail to look through the financial reports to the underlying economic reality. Major advances in transparency seem inescapable and should encourage a shift toward bonds.

1.4 Alternatives to Full Funding

Mr. Klieber observes that the only alternative to full funding that I recognize is a government-run insurance system with true risk-related charges. He suggests another alternative: a private system with premiums set by the insurance market.

Mr. Klieber has an excellent point, and I agree that a private insurance system may be viable. Such a system would impose the true risk-based premiums that are politically impractical for a governmental agency. But I believe that such premiums would get us to about the same place as my recommendation for mandatory full funding and immunization. True risk-related premiums would provide powerful inducements toward *voluntary* full funding and immunization.

Here's an oversimplified example. Suppose that a sponsor has an unfunded plan. An insurer of the unfunded liability would charge a premium that covers the risk of the sponsor's default on this debt-like obligation. The appropriate amount would be the default premium embedded in the sponsor's borrowing rate on debt similar to the pension liability—that is, the spread of his borrowing rate over comparable Treasuries.

Instead, the sponsor can fully fund the plan by borrowing in the capital markets and buying an immunizing Treasury portfolio. This transaction would eliminate his risk-related insurance premium. His net cost now would be the excess of his borrowing rate over the earnings of the pension fund, that is, his spread over the immunizing Treasuries.

So, before considering taxes, the sponsor would be just as well off borrowing the money and funding the pension plan. After taxes, he would be

better off because the interest on the borrowing is deductible, while the interest on the pension fund is tax-free.

We can similarly show that it would be more economical for a sponsor to eliminate pension fund investment risk by a capital market transaction than to take the risk and pay an insurer for protection against it (again, neutral on a pre-tax basis and preferable after taxes). The general point here is that we buy insurance when the cost of eliminating a risk is greater than the cost of insuring it. But if the risk can be eliminated through a standard capital market transaction, no insurance carrier, governmental or private, should be able to cover that risk at a lower cost than the capital markets. Therefore, accurate (or excessive) risk-based premiums would strongly encourage the full funding that I regard as the optimal condition for pension plans. The insurance system would then be relieved from insuring systemic risks and would mainly handle accidents such as demographic losses.

1.5 Equity Risk

Mr. Klieber suggests that I am overstating the safety of bonds. He claims that a market crash so deep and prolonged that stocks would underperform bonds over a very extended period would be accompanied by large-scale defaults on bonds, which would not protect pension funds.

Over the past two decades Japan presents an example of extended equity underperformance during which bonds were a safe haven. Closer to home, a look at the Great Depression decade 1930–1939 offers some insight. During this period the average annual return in the U.S. was -0.1% on equities, 6.9% on long-term corporate bonds, and 4.9% on long-term government bonds (Ibbotson and Sinquefeld 1982). If such returns were to prevail during a future (or current) decade, failures would be widespread among corporate pension plans that rely on large equity allocations to produce high-single-digit returns.

Any plans that rely only on earning Treasury rates will be fine if they are wholly invested in Treasuries *or* corporates. Incidentally, the need for the U.S. Treasury to fund trillions of dollars of projected federal deficits over the next decade suggests that a migration of pension funds to Treasury bonds could be part of a solution rather than a problem for the capital markets.

In any event, the argument in my article does not depend on bonds' being perfectly safe, just significantly safer than equities during periods when plan sponsors are failing.

2. Response to Dimitry Mindlin

Mr. Mindlin's contribution to this ongoing debate is written in his customary engaging style. I will confine my response to substantive matters not addressed in our exchange of pleasantries over his own article in this publication or in my response to Mr. Klieber above.

2.1 Inefficiency of Pensions as Employee Compensation

Mr. Mindlin states that whatever inefficiency I identify in the financing of pensions is dwarfed by the inefficiency of salaries. He claims, "It's not unusual for an employee to get less than \$0.60 for every \$1 the employer spends on her salary."

This 60% efficiency figure is surprising, considering that salaries are deductible to the corporate employer and that most payroll taxes confer some benefit on the employee. Whatever the correct percentage, pensions should be more efficient than salary because of their favored treatment with respect to income and payroll taxes. And the possible inefficiency of salaries or other forms of compensation does not excuse a failure to make pensions as efficient as possible.

Mr. Mindlin states that the costs of making pensions efficient "can be prohibitive." But funding unfunded benefits gives a clear tax gain, not

a cost. Assets can be immediately and cheaply reallocated by using futures. The sponsor may adjust the underlying assets over time, by directing contributions and investment income into bonds while depleting the equity allocation through attrition.

2.2 Tax Arbitrage

Mr. Mindlin refers to the twists and turns of “ever-changing fiscal policies” and asks, “If equities were taxed at a higher rate than bonds, would Mr. Bader . . . advocate 100% equity portfolios?”

Such a twist would be both unprecedented and improbable. If it did occur, it would create a conflict between pension safety and tax considerations, and the asset allocation decision would be difficult. But as *both* safety and tax factors now argue for bonds, the decision is simpler.

Also in this section, Mr. Mindlin refers to the “essential advantages that pension plans enjoy over other market participants (e.g., the pension plans’ long-term nature).” In his own article in this *Pension Forum*, he refers to “the sponsor’s . . . risk aversion characteristics [that] may allow the sponsor to take some risk and enjoy (or regret) the results.” In both instances he ignores Principle 5 (Bader and Gold 2003): “Risks are borne and rewards are earned by individuals, not by institutions.”

Neither corporations that sponsor plans nor the plans themselves have investment horizons, risk preferences, or risk capacities independent of their human stakeholders. They are insensate financial entities created to enable shareholders to transact with other parties. I do not feel their pain, and neither do they. Actuaries should confine their pension plan concerns to the real people with stakes in these plans—the shareholders who pay for them, the participants who receive benefits from them, and indirectly the members of the society inhabited by these shareholders and participants. It is these people who have the horizons

and risk tolerances by which we must measure the utility of pension plans.

2.3 Employees’ Understanding of the Risks of Underfunding and Asset/Liability Mismatch

In his section headed “System with Guarantee,” Mr. Mindlin discerns a “glaring inconsistency” in my statement, “a failing company may . . . [promise] outsized pensions and [fund] them inadequately.” “No, it may not,” he objects: under my transparency assumption, employees will see the risks and “will not be fooled by that scheme.”

On the contrary, informed employees will be well satisfied to receive pensions guaranteed by the government, however poorly the company may fund them. The employees are aware that the company’s scheme puts the insurance program rather than themselves at risk. The insurance enables them to happily collect more compensation than their employer can afford.

2.4 Usefulness of Government Pension Guarantees

In the same section, Mr. Mindlin finds “a very interesting corollary, perhaps unintended by the author,” that belief in permitting investments other than high-quality bonds and belief in government guarantees are irreconcilable.

This “perhaps unintended corollary” is the entire point of my paper: with or without government guarantees, full funding (i.e., adequate assets invested in an immunizing portfolio) is the correct standard for the pension system.

3. Conclusion

I thank both commenters for helping to frame and debate these issues that are so crucial to our profession. In particular, Mr. Klieber’s comments on a private insurance system direct our attention to a line of thought that can be productive intellectually and perhaps practically as

well, given the staggering problems now faced by the PBGC.

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Fixing the Pension Plan Funding Rules

by Edward E. Burrows, E.A., M.A.A.A.

Recent events suggest that it is time to reexamine existing pension plan funding rules and consider changes. This is a discussion of how the current rules came into being, their shortcomings, and possible replacing rules.

Responsible pension funding began long before ERISA. For many years, most plan sponsors had worked closely with their actuaries in developing rational funding programs. Generally there were three objectives: smoothing year-by-year contributions, avoiding surprise contribution requirements, and making steady progress toward targeted funding levels. Often these targets involved fully funded accrued liabilities.

One objective rarely discussed was to protect workers in event of business failure. Sponsors had in mind the success and growth of their businesses, not planning for failure. In contrast, the *principal* objective of ERISA funding rules was the protection of workers in event of business failure. Many observers felt this was the *only* legitimate objective.

Despite this difference in objectives, the original ERISA funding rules mimicked, very closely, the funding techniques that responsible employers had followed voluntarily in the years before ERISA. So the brave new world of ERISA was born, and we all sat back to see how the new funding rules would work.

It turns out that sometimes they worked—and sometimes they didn't. When they didn't work, the reasons for failure quickly became so obvious that many planners were chagrined they hadn't anticipated the failures.

The original rules were designed to reach target funding levels gradually and relatively painlessly

over a long period. So far, so good. So long as the sponsor remained healthy over this period of gradual buildup, employees would be fully protected—without any help from the Pension Benefit Guaranty Corporation (PBGC).

However, the gradual buildup applied to the plan as it existed at the time ERISA was enacted. Consider an enhanced benefit added later by amendment. The enhancement was treated as a brand-new plan—with a new gradual buildup period. Now, consider the collectively bargained plan whose benefits were not pay-related. To keep these plans up-to-date, it was necessary to bargain for additional benefits with every contract. Often this meant adding a new piece of benefit every three years. Sometimes it was less than three years. Under the original funding rules, every new piece started its buildup from ground zero as if it were a brand new plan. So the typical bargained plan would make funding progress for three years, receive a setback, move ahead for three more years, receive another setback, and so on. It was tantamount to running in place.

In any dynamic economy there will be a certain percentage of business failures. When sponsors of these perpetually amended plans went under, they inevitably left behind unfunded promises. The PBGC found that its job of picking up the pieces was becoming progressively more burdensome.

So in 1987 we the people, acting through Congress, rewrote the rules. This occurred barely more than a decade after the brave new world had begun. We moved our focus away from orderly funding designed to reach long-term targets. Instead, we focused on what might happen to a plan if its sponsor failed tomorrow. But, instead of

replacing the old rules with the new, we kept the old and layered on the new.

The new rules proved their worth very quickly. However, they did need refinement. So we tinkered. And we tinkered. And we tinkered. We kept tinkering until today we have a mountain of complexity. Section 412 of the Internal Revenue Code, the section setting down minimum funding rules, is now *over 12,000 words long!* It has become a monster practically unfathomable to anyone other than a pension actuary working full-time in this very narrow field of specialization. Enormous amounts of effort are spent in the private sector just to keep up with, and comply with, the rules. Equally enormous amounts of effort are (or should be) spent by the regulators in checking to see whether compliance is taking place.

The problem has been exacerbated by the absence of adequate regulatory guidance on application of these complex rules. It is increasingly obvious that the time has come to step back, rethink our objectives, turn over a clean slate, and rewrite the rules. But, first, we should analyze the mistakes that got us where we are today. There were lots of them.

Mistake 1: New Rules Layered on Old

When we discovered that the old rules weren't working, we added new ones. We probably should have completely replaced the old with the new. That simple step would have streamlined the process enormously.

Mistake 2: Emphasis on Smoothing

Even with the new rules, we placed too much emphasis on smoothing—dampening year-by-year volatility in contribution requirements. Where did we smooth? Just about everywhere.

- Consider the changes in calculated liability that occur when it becomes necessary to true-up assumptions—investment return, future pay changes, mortality, and the like. We didn't

require immediate recognition of these changes. Instead, after we had concluded that a new liability level was the only correct one, we permitted gradual grading to this new level. We did this by establishing the difference between old and new levels, and amortizing that difference.

- Consider the inevitable gains and losses that occur when year-by-year results fluctuate so they aren't always exactly what had been expected. We permitted amortization of these gains and losses too. We failed to consider what might happen if business failure should occur before amortization was complete.
- When it came to asset value fluctuation, we permitted even more dampening.
- We permitted amortization (although not nearly so gradually as before) of the deficits that exist when benefit enhancements outpaced asset buildups.
- We permitted still more dampening when benchmark interest rates changed. We went further and told actuaries they didn't have to use even the dampened rates as long as they used rates that were within broadly specified tolerances of the dampened targets.

In short, whenever it becomes obvious that some aspect of the world around us has changed, we've been telling sponsors they needn't recognize the change all at once.

Mistake 3: Poorly Conceived Interest Rate Rules

Finally, we went haywire in specifying the interest rates to be used for different purposes. Today, depending on the rule being satisfied, the statutory rate might be the actuary's best estimate of future investment return. Or it might be 120% of a weighted average 30-year Treasury bond rate, or 110% of that rate, or 105% of that rate, or 90% of that rate. Or it might be 100% of "the weighted average of the rates of interest on amounts invested conservatively in long term investment-grade corporate bonds"—or 90% of that rate.

There were no differences in the nature of liabilities being valued that might justify these different percentages. For other purposes, it might be 175% of the federal midterm rate. For still others, it might be 150% of that rate. Finally, wonder of wonders, for some purposes, it's simply 5%.

Why We Have Statutory Requirements

Obviously the first step in designing any new set of requirements is to identify the reason or reasons for having requirements at all. Just about everyone agrees that one reason is to protect workers from losing the pensions they've earned if their company should fail. There's an excellent case for the proposition that protecting these earned benefits is the only reason for statutory rules.

Many employers will continue to want to see stable contributions and avoid surprises, just as they did before ERISA. Employers belonging to this group won't need mandatory rules focused on this stability. These employers will voluntarily follow procedures that produce it.

What about other employers? What if an employer will not voluntarily adopt procedures that smooth contributions and avoid surprises? Does society have any business forcing this employer to adopt such procedures? We already have a rule that in general an ongoing employer can't abandon a plan unless all accrued rights are fully funded. If we have funding rules that protect employees of companies that fail, should we be seeking anything more?

Arguably one reason for seeking something more would be to encourage sponsors to maintain their plans even when the going gets tough. If society followed this argument, it would be saying it's not enough to ensure participants that their earned rights are protected. We'd be saying we must protect participants against the likelihood that voluntary plan termination would occur, causing a loss of future accruals. This would be a strange

approach for a society in which the adoption of a private plan is a voluntary act in the first place.

A Basic Funding Rule

Suppose we accept the proposition that the only legitimate purpose for statutory funding rules is to protect employees of businesses that fail, and that maintaining stable contribution levels is something employers may want to do voluntarily but should not be required to do. Given these two premises, the indicated basic funding rule becomes the ultimate in simplicity:

Adjusted assets must always be at least as great as accrued benefits.

All that is necessary is to specify the rules for determining adjusted assets and the rules for determining accrued benefits.

Adjusted Assets

First, consider adjusted assets. The challenge is to obtain protection from the possibility that even if assets are sufficient to cover liabilities today, they might become insufficient tomorrow.

With bonds and similar debt securities, there are two principal risks:

- First, the issuer may go broke, leaving bondholders with an empty bag.
- Second, prevailing interest rates may change.

If interest rates go up, market values of existing bonds will go down. If rates go down, market values of existing bonds will increase, but issuers may call their bonds, forcing bondholders to reinvest at a lower rate. Even if the investor has good call protection, interest received on the bond will have to be reinvested at lower rates. By restricting purchases to high-quality investment-grade bonds, the pension fund manager can minimize the risk of default.

The manager also can obtain protection from the interest rate risk. Suppose a fund's only obligation is a lump-sum benefit to be paid in 12 years. The manager who covers this liability with a non-callable zero coupon bond due to mature in 12 years can be indifferent to interest rate changes. Achievement of this "duration matching" doesn't require that every benefit disbursement be matched with every income receipt. The key is to construct a portfolio of bonds whose market value can be expected to change to the same extent as the present value of pension obligations, given any particular change in interest rates.

All of this means that a duration-matched portfolio of investment-grade bonds will minimize both the default risk and the interest rate risk. A portfolio of this type will come close to providing complete assurance that accrued benefits will be covered if the market value of assets equals the present value of accrued benefits. The residual risks posed by defaults and interest rate changes seem inconsequential.

A portfolio of investment-grade bonds that's not duration-matched will minimize the default risk but not the interest rate risk. The investment manager may have good reason to eschew duration matching. If interest rates seem very low, the manager may want to avoid locking in these low rates. The manager may prefer to invest in bonds of very short duration. If interest rates seem very high, the manager may want to take the opposite approach. The manager may want to lock in these apparently high rates by investing in long-term bonds. Finally, the manager simply may feel that the then-current yield curve favors a particular bond duration.

It would be possible to determine different adjustments for differing degrees to which assets and liabilities are mismatched. However, a refinement of this nature would be difficult to apply and difficult to police. It might be better simply to establish a single rule for investment-grade assets that

are not matched to liabilities. It might make sense, for example, to have a rule that the adjusted value of nonmatched investment-grade assets will equal 90% of market value.

With rules for investment-grade bonds and similar debt obligations clearly established, there remains a wide variety of other investments still to be treated. This third group includes all forms of equity ownership. It also includes non-investment-grade debt obligations. In this third category, equity ownership probably offers the greatest challenge. Here the risk goes far beyond the risk that the issuer will become bankrupt. It includes the risk of a temporary or permanent downturn in the issuer's business operations. That downturn might be unique to the issuer, or it might be epidemic in the issuer's industry. Or it might reflect general economic conditions.

Worse yet, there is the risk of unpredictable and sometimes apparently irrational changes in investor attitudes. About the only thing that can be said definitively about this third category is that short-term fluctuations can (and probably will) be profound. In this third category, it might be reasonable to establish that adjusted assets will equal, say, 60% of their market value.

To summarize, adjusted assets might be defined in three categories. Defining investment grade debt as Moody's AA, the categories might be described thus:

Category	Ratio of Adjusted Value to Market Value
Duration-matched investment-grade debt	100%
Other investment-grade debt	90%
All other assets	60%

These percentages do not, in any way, reflect an attempt to smooth changes in asset values. They

simply reflect an acknowledgement that asset values do fluctuate. If an employer should fail shortly after its pension plan has been subjected to an annual test of funding adequacy, the relationship between assets (at market) and liabilities may have deteriorated.

This approach of discounting the value of certain types of plan assets has been the subject of some considerable criticism. The critics point out that market values are determined in the marketplace, and it's inappropriate to second-guess this determination. But the exercise is not to find appropriate "true" values. Instead, the exercise is to establish a method for ascertaining, with a reasonable degree of assurance, that fluctuations in market value will not cause values to fall below a level sufficient to provide expected benefits.

It seems worth pointing out that the same result could be obtained without mandating the discounting of assets. Instead, a margin or buffer zone could be required. This margin would be the amount by which the market value of assets must exceed the value of accrued benefits. The degree of excess could be related to the nature of the plan's investments. To the extent investments are in duration-matched investment-grade debt securities, a buffer zone might be deemed unnecessary. To the extent assets are in other investment-grade debt, assets could be required to exceed accrued benefit values by 11%. For all other assets, the required margin could be 66%. The result of these surplus requirements would be identical to the result of discounting assets.

This whole notion is not exactly a novelty. During the 1980s there was a certain amount of activity in participating group annuity contracts with customer-selected investments. Investment results, determined explicitly by performance of the customer's selected portfolio, were credited to the customer's account. Pensioner reserves were calculated using standard insurance company procedures. However, it was a requirement that assets

must exceed reserves by specified percentages. These specified percentages were determined in a manner analogous to the asset discount procedures being suggested here.

Accrued Benefits Defined

Establishing an accrued benefit definition to be used in the funding rule seems reasonably straightforward. Congress and the regulators have established a definition of accrued benefits to be used in determining whether a plan has sufficient assets to qualify for plan termination on a nondistress basis. From time to time, changes in this definition are proposed. For example, ongoing attention is being given to the question of protecting death and disability benefits not considered part of the accrued benefit.

However, it appears reasonable at this time to define accrued benefits as those benefits that must be covered by a sponsor wishing to terminate its plan on a nondistress basis.

Valuing Accrued Benefits

Valuing accrued benefits requires assumptions as to interest, mortality, and expenses. Where options such as early retirement or alternative benefit forms are subsidized, it also requires assumptions as to the likelihood that these options will be exercised.

If accrued benefits are to be protected, the assumptions used to value them need to satisfy this rule:

Use of the assumptions must produce liability values at least equal to the premiums that would be required under a contract available from the commercial insurance industry to provide paid-up annuities covering all accrued benefits.

An annuity contract providing such benefits is often described as a "group closeout annuity

contract.” There are a number of alternatives available to satisfy this assumptions rule.

PBGC Rates

The Pension Benefit Guaranty Corporation has developed procedures for determining and updating assumptions that satisfy the rule. These assumptions are used for a number of purposes. A primary purpose is to value liabilities of plans undergoing “distress termination.” A distress termination occurs when a plan has assets insufficient to cover accrued benefits and is being terminated because the sponsor is bankrupt or suffering extreme financial hardship.

The PBGC collects information each quarter from the insurance industry on the rates then in current use for group closeout annuities. Individual insurance companies have proprietary interests in maintaining the confidentiality of their current rate offerings. To protect these proprietary interests, information is furnished in a way that masks the identity of each individual company and its rate bases.

From time to time, observers have compared liabilities based on these PBGC assumptions with premiums actually charged to plans terminating on a sufficient basis. These comparisons lead to the conclusion that the PBGC’s procedures for keeping its rate basis current are extremely effective. On balance, the comparisons have shown remarkably little variance between liabilities based on PBGC rates and premiums under actual contracts.

So one approach to statutory funding is to mandate that accrued benefit values be based on PBGC rates for distress terminations.

A Procedure Parallel to the PBGC Procedure

Many observers have expressed concern over a statutory requirement that minimum funding

must always be based on PBGC rates. They point out that times change, and PBGC rates may not always be as closely related to commercial annuity rates as they are today.

An alternative procedure would be to establish machinery that parallels the PBGC machinery and independently maintains an up-to-date statutory rate basis. The organization or agency responsible for administering this machinery would need to be one that has the trust of the insurance industry. Members of the industry would be understandably concerned if there were any suspicion that confidentiality might be breached. The organization would also need the confidence of the regulators. Either the American Academy of Actuaries or the American Society of Pension Actuaries might be suitable.

A Statutory Interest Rule

Still another option would involve one treatment for the interest assumption and a different treatment for all other assumptions.

The interest assumption generally attracts more concern than the others do. Plan sponsors are concerned that the rate (or rates) might be too low. Entities representing pensioner interests are concerned that the rate (or rates) might be too high. Both factions might be more comfortable with a rule that’s automatic and eliminates discretion.

A rule that produces automatic results might involve reference to a well-publicized index. The index might reflect swap rates. It might reflect bond rates used by an established mortgage agency such as Fannie Mae. Or it might reflect rates maintained by a nationally recognized commercial rating agency such as Moody’s or Standard & Poor’s.

The relevant rate would not necessarily be 100% of the index. It could be a fixed percentage of an index if the consensus is that the index will vary

in sync with the interest rates underlying insurance company premium rates. The index itself might consistently be a fixed number of percentage points higher or lower than the insurance company rate basis. The relevant rate could be defined as a yield curve, matching shorter bond durations to liabilities with shorter duration, and longer to longer.

It doesn't appear feasible to establish a comparable automatic procedure for the other assumptions. Attempts to establish automatic procedures respecting mortality assumptions have not produced satisfactory results. For example, one statutory mortality base is keyed to the rates mandated for the valuation of annuity reserves whenever a new table is mandated by a majority of the 50 states. The problem is the time lag. The new table must be mandated by 26 states, and the federal regulators must acknowledge the mandate. While the world waits, the old table remains in continued use long after it has become dangerously obsolete.

One solution would involve an automatic procedure for the interest assumption, and a joint public/private committee empowered to update the other assumptions. The joint committee might consist of representatives from the private-sector pension actuarial community together with representatives from the Treasury, Department of Labor, IRS, and PBGC.

A Mistake to Avoid

At present, serious discussions are underway regarding an automatic procedure for the interest assumption. At the same time, some participants in the discussions are apparently assuming that updating the mortality assumption is not a priority item. We could, indeed, get along for some time with an obsolete mortality table. However, to do so safely we would need an offsetting adjustment to the interest rate. The interest rate would need to be reduced to offset the inadequacy of the mortality table. This need appears to have gone

unrecognized. Indeed, the PBGC has been chastised for its use of unrealistically low interest rates. The low interest rates are entirely appropriate when viewed as devices to offset the obsolete mortality table currently mandated.

Meeting Sponsor Needs for Smoothness

The statutory funding rules outlined here require just enough funding to ensure that benefits already earned will not be lost. They leave no room for smoothing. Amortization periods and the use of averages are not part of the proposals. If these proposals were adopted, the sponsor who consistently contributes just enough to satisfy statutory requirements would be in for a rough ride. The typical sponsor would find this unacceptable.

Suppose an employer's objective is a pension cost factor that's a stable percentage of payroll or a stable amount per employee. In almost every situation, assurance that this stability will occur would require funding levels exceeding the statutory minimum level. Therein lies the secret. The sponsor seeking smoothing will elect to fund at a level greater than the statutory minimum. This sponsor can then be relatively indifferent to any lack of smoothing in the statutory minimum levels.

Statutory Rules to Accommodate Heavier Funding

The tax code and ERISA currently offer two roadblocks to this higher level of funding. First is the limit on deductible contributions—and its complement, the excise tax on nondeductible contributions. Great strides have been taken in recent years to make this a less serious roadblock, but more needs to be done. We need to redouble our efforts to persuade legislative planners that substantially liberalized deduction limits for contributions to defined benefit plans do not constitute tax giveaways. We need to focus these legislative planners on the concept that with defined benefit

plans the long-term deductible cost is dictated by the plan's provisions. Amounts contributed and deducted today will not be contributed and deducted again tomorrow.

The second roadblock is more difficult, and its elimination will face greater opposition. Consider the funding standards proposed here. There will be a willingness to go voluntarily beyond the levels dictated by these standards if sponsors can be given two new privileges:

- First is the right to make trust fund withdrawals at will. This withdrawal right should apply to any amount by which assets exceed the new minimum funding levels. As will be discussed shortly, a withdrawal tax is appropriate, but it should not be punitive.
- Second is the right, upon plan termination and after all obligations have been satisfied, to withdraw any remaining assets. This too should involve a withdrawal tax, but not a punitive one.

Consider withdrawals before plan termination. Current law forbids this—and with good reason. Under current funding standards, following the rules does not provide an absolute guarantee of termination solvency. If experience losses occur, current rules allow time to restore the balance. The proposed standards don't provide absolute guarantees—but they come much closer. And, when experience losses do occur, the balance must be restored at once. Fairness dictates that if shortfalls must be corrected at once, sponsors should be allowed to correct overages to the extent they see fit.

Consider reversions upon plan termination. In a cynically conceived series of political decisions, we have allowed ourselves to become confused over the status of excess plan assets. The sponsor's job is to provide benefits as promised. There's no room for the notion that assets beyond those amounts needed to perform this job belong anywhere but back in the hands of

the sponsor. Our decision to impose punitive excise taxes on reversions has played an important role in weakening the funded status of many plans. Under current rules, no rational sponsor will intentionally permit assets to exceed termination solvency levels for any extended period. The excise tax that would occur in event of an unexpected need for plan termination would be too painful. The existence of this tax has led to corporate combinations that would have been deemed ill advised if not for the fact that they involved locked-up pension assets.

This is not to say that asset withdrawal taxes have no role. Reference was made earlier to their legitimacy. But their sole purpose should be to reverse the tax advantages that accrued while the withdrawn assets resided in the tax-exempt trust. Such taxes should apply whether the withdrawal is from an ongoing plan or a terminating one.

With these changes—higher deductible limits and access to excess trust assets—sponsors are likely to look favorably on the additional funding necessary to permit a smoothing of contributions. They'll also find the asset adjustment aspect of the proposed minimum funding rules more palatable, knowing that upon plan termination assets will be applied to provide benefits, 100 cents on the dollar, and the sponsor will recover any surplus.

The sponsor who seeks contribution smoothing without exceeding minimum funding standards does have another option. Much of the volatility that would be brought about by eliminating smoothed standards could be regained through investment policy. By emphasizing investment-grade debt obligations, duration-matched to plan liabilities, contribution volatility related to asset fluctuation could be virtually eliminated.

The important thing is that the sponsor, working with the plan actuary, will be able to focus on long-term cost trends and accomplish

contribution smoothing to whatever extent the sponsor deems desirable.

Accounting Concepts to Accommodate Heavier Funding

Changes in the statute would be significant in encouraging heavier pension funding. Another significant factor would be changes in how financial analysts view a sponsor's pension funding. Consider the possibility that financial analysts might fully accept two concepts:

- For accounting purposes, pension assets should be viewed as assets of the employer.
- For these same purposes, investment results on these assets should, indeed, be reflected at once, without smoothing. But they should not be viewed as affecting results from operations. Rather, they should be viewed as items appearing "below the line."

Acceptance of these concepts, coupled with the statutory changes already discussed, would go far in eliminating disincentives for heavier funding. The advantage of heavier funding in terms of smoothing cash-flow demands would then emerge as a powerful incentive without significant offsetting disincentives.

New Plans—and Liberalizing Amendments

Sponsors of existing plans can achieve smoothed contributions by maintaining funding levels that exceed the statutory minimum. However, there remains the problem of a feasible approach to new plans.

Consider the sponsor who establishes a new plan providing significant benefits for past service. Immediate compliance with the statutory funding rules outlined here would require an initial contribution that most sponsors would find totally unacceptable. Sponsors seeking to increase benefits under existing plans would face the same problem.

Providing a Temporary Unfunded Benefit

A solution to this problem would involve initial establishment of a temporary unfunded plan.

These rules might apply:

- The plan would not be permitted to remain in effect for more than, say, five years.
- Throughout the lifetime of this unfunded plan, employee notices would be required each year. These notices would state that
 - The plan is unfunded
 - There are no PBGC guarantees and
 - The sponsor may terminate the plan and revoke all unpaid benefits at any time.
- Throughout the lifetime of the unfunded plan, the sponsor would be permitted to contribute to a tax-exempt trust designed to fund benefits upon termination of the unfunded plan. Deduction limitations respecting such contributions would be based on the benefit structure of the unfunded plan.
- At the end of the five-year period, or anytime sooner at the sponsor's option, the sponsor would need to discontinue the unfunded plan and either abandon it completely or provide its benefits through the funded trust.

This temporary unfunded approach would be available to new plans. It would also be available for any benefit provided as an addition to an existing plan.

Advantages of the Temporary Unfunded Approach

Of all the proposals set forth here, the temporary unfunded plan almost certainly will be the most controversial. The notion of a plan covering a broad spectrum of employees with no requirement that there be assets backing up benefits will, indeed, require some thought.

However, consider the advantages:

- Broken promises almost completely will be removed from the picture. During the temporary existence of the unfunded plan, there will be no promises to break. Once the funded plan replaces the temporary one, funding standards will virtually guarantee payment of all accrued benefits.
- Employees will fully understand their status. During the lifetime of the temporary plan, annual notices will communicate a very simple message: there are no promises. Unpaid benefits are subject to complete and retroactive revocation. Once the temporary plan is replaced by the permanent one, employees will have, with almost no possibility of exception, the same assurance that participants in funded plans always think they have: *full guarantees that benefits will not be lost due to employer failure.*
- It will become possible to set PBGC premiums at extremely low levels. There will be very few circumstances where plan assets will be insufficient to pay promised benefits.

Shutdown Benefits

The unfunded arrangement could also serve as a roadmap for solving a problem that has plagued planners for many years: shutdown benefits. These are benefits that will never become payable—*provided* the sponsor never closes its doors. The proviso establishes the problem. With most plans, the likelihood that the sponsor will close its doors in the near future is remote. It's less remote if, for example, the sponsor has multiple locations or plants. In these cases a sponsor may decide to close some of its doors but not all of them. It's the multiple-plant scenario that's troublesome.

Given the remote likelihood that even some of the doors will really close, the plan actuary will, quite properly, assign a realistically low probability to the likelihood that shutdown

benefits will ever be paid. Multiply the value of the benefits payable if shutdown should occur by the probability that it will occur, and the result is a very low estimated liability. This means that funding against this liability is likely to be totally inadequate if even some of the doors should really close.

Suppose the shutdown benefit is part of a plan providing routine retirement benefits—benefits not contingent on shutdown. Actual shutdown can precipitate payment of shutdown benefits that far exceed the reserve the actuary had established. The result can severely compromise the security of benefit expectations of employees not affected by the shutdown.

Assuming no insurance company will underwrite the risk of voluntary shutdown at anything close to a reasonable premium, there's only one way to solve the problem. That is to establish the shutdown benefit as a completely separate plan and specify that assets of the plan providing routine retirement benefits cannot be used to meet shutdown obligations. Sponsors will be unwilling to make advanced funding contributions to a plan providing only benefits that are considered unlikely to be paid. Hence, the unfunded plan established on a *temporary* basis for nonshutdown benefits will be a natural *permanent* vehicle for shutdown benefits.

Alternatives to Stronger Funding Proposals

Clearly the rules suggested so far are not the only answer. The rules proposed here don't eliminate dependence on the PBGC, but they greatly reduce it.

An alternative would be to move in the opposite direction. We could increase our dependence on the PBGC by eliminating all statutory funding rules. We would define, in much more detail, the risk-related premium structure necessary to permit the PBGC to make up the shortfall whenever an insufficient plan should terminate.

The *amount* of exposure would be evaluated using tools similar to the tools we currently use to calculate variable premiums. Premium *rates* applied to this exposure would be determined much more precisely than variable premium rates are now determined. These new rates would be set at levels adequate to cover the risk. In general, these rates would be somewhat higher than the one currently in use. Even more importantly, sponsoring employers would be underwritten individually. Each sponsor would be assigned to a rating class on a basis that reflects the likelihood that the particular sponsor will become incapable of fulfilling its pension promises.

Some observers point out that this type of rating is already taking place in the private sector, where, for example, insurers routinely write performance bonds. Others argue that the underwriting of performance bonds has never been truly successful. They point out that most insurers are willing to insure performance only, respecting those companies that are so strong the likelihood of failure is virtually nil. Still others will react unfavorably to the notion that a governmental agency should enter the business of evaluating the creditworthiness of a private business. If the equivalent of performance bonds underwritten in the private sector turns out to be feasible, the answer here may lie in transferring the role of the PBGC entirely to the private sector.

Conclusion

The changes suggested here represent major departures from current rules. Existing players—sponsors, bargaining agents, rule makers, and expert advisors—are likely to have difficulty, initially, with the notion that changes this extreme are sensible.

In evaluating these proposals, two questions seem essential:

- First, we must ask ourselves, again, why it makes sense to have any externally imposed

funding rules. It is suggested here that the reason, *the only reason*, is to protect workers at all times from losing the pensions they've earned.

- The second question is just as important, but less obvious. Suppose we didn't currently have statutory minimum funding requirements. Suppose we were writing rules where none existed. Knowing what we now know, what set of rules would we write?

There's clearly a case for avoiding radical shifts. Gradual change often works better than precipitous shifts. But even with gradual change, it's important to establish a focus on where we'd eventually like to be. With this focus, it becomes possible to make incremental changes without losing direction.

This long-term target might run along the lines proposed here, in a way that minimizes the need for a PBGC. It might run along alternative lines, also discussed here, in a way that would increase the role of the PBGC. This alternative approach would eliminate funding requirements and substitute a more highly developed plan termination insurance structure. Or the target might be something that falls between these two approaches.

The casual observer might say the in-between approach is what we have now. This conclusion would be wrong. Even with the in-between approach, we need to reevaluate our methods of determining adjusted assets, our methods of determining liabilities, our approach to smoothing, and our methods of determining PBGC premium rates.

In any event, the important thing is to define the long-term goal. With the goal defined, the steps to achieve it can be developed in a rational manner. We can thus develop the most efficient approach to securing the pension expectations of our nation's workers—with the smallest possible intrusion into the funding practices of our nation's pension plan sponsors.

Reaffirming Pension Actuarial Science

by Dimitry Mindlin*, A.S.A., M.A.A.A., Ph.D.

The pension actuarial community has been in the process of revisiting the fundamental principles of pension actuarial science. Bader (2001) and Bader and Gold (2003) have raised important questions about the validity of the actuarial pension model. They have urged the profession to undertake a major revision of the model in light of financial economics. The works of Bader and Gold, as well as several other actuaries and economists, have become the subject of numerous discussions.

The paper of Bader and Gold (2003) offers a comprehensive list of grievances that the financial economics community has had with various methodologies utilized by the pension actuarial community. The negative role of ERISA enactment, numerous shortcomings of statement FAS87, the importance of understanding of financial economics—these and several others points are very well taken. However, the paper contains several declarations that should be disputed.

The actuarial pension model certainly needs further development, but it needs no reinvention. Misguided public policies, not actuarial models, produce meaningless and burdensome regulations. Faulty assumptions and unwise compromises, not deficient actuarial thinking, lead to opaque financial reporting. The alleged inability of the actuarial model to incorporate the emerging science of financial economics has played no role in creation of the system that very few consider reasonable.

The purpose of this paper is to demonstrate that the actuarial pension model is in complete harmony with the principles of the financial economics. The model is perfectly capable of answering the questions raised in Bader (2001) and Bader and Gold (2003).

Ultimately I believe that the actuarial pension model will be reaffirmed as what it really is: a valuable quantitative methodology and an integral part of financial economics.

1. Actuaries vs. Economists

Financial economists have been unhappy with the contents of various actuarial reports for quite some time. Actuaries have successfully ignored those complaints for quite some time as well. To me, this story began when Lawrence Bader published a short paper titled “The Model Has No Clothes” in 2001. I thought that the paper was provocative enough to attract more attention. It didn’t start a debate, but it came close. Finally, the article of Lawrence Bader and Jeremy Gold (2003) received broad attention and triggered a discussion that was later called “The Great Controversy.”

The paper jump-started a broad review of the fundamentals of the pension practice. Written with great eloquence and style by authors of impeccable credentials, the paper contains a comprehensive list of problems that the authors believe “caused widespread, though rarely recognized, damage to pension plan stakeholders.” The paper presents several principles of corporate finance that, as the authors believe, are applicable to pensions and assert that those principles are “almost ... universally violated by the actuarial model.” Then the authors submit an extensive list of violations of the stated principles by current actuarial practices. The very existence of those violations makes the authors believe that they “have laid out the case for the obsolescence of the actuarial pension model.”

I disagree. I believe the “case for the obsolescence of the actuarial pension model” is based

on questionable interpretation of financial economic principles in Bader and Gold (2003). The goal of this paper is to challenge several misconceptions that lead to dubious conclusions about the pension actuarial model.

2. Statement FAS87 Procedures

For the purposes of this paper, I arrange the arguments presented in Bader and Gold (2003) into two categories. The first category contains the authors' analysis of the existing procedures in the statement FAS87. The second category contains the authors' questioning of pension actuarial science in general. In my view, the second category is much more controversial and important than the first one. However, it is convenient for me to deal with FAS87 first.

Bader and Gold (2003) make a great case against multiple risk-concealing procedures in FAS87. No disagreement here. Eliminate unnecessary smoothings, unwarranted assumptions, and extended amortizations. Granted. The fair value of liabilities should utilize the entire yield curve. Granted. Financial reporting must be transparent and "marked-to-market." End of issue.

This part of the discussion is short and easy for several reasons. For the most part, FAS87 was created for the accountants and by the accountants. Most actuaries never liked FAS87 to begin with; FAS87 doesn't serve the purpose it was created to serve; the investing public is increasingly aware that the pension "earnings" should be separated from the "core" earnings; therefore, no pension actuary should shed a tear when FAS87 replaces its nuts and bolts. However, we should be mindful of the potential damage that unreasonable and burdensome reporting requirements may inflict on the pension industry.

I would like to emphasize that the goal of this paper is to defend pension actuarial science. I advance no arguments on the subject of what makes a good financial statement or a good public

policy. Those matters require more comprehensive treatment than is suitable for this paper. Throughout this paper, when I indicate that a certain idea on the subject of better reporting has merits, I don't necessarily support the idea. I just acknowledge that there are good arguments for the idea that should not be taken lightly; there may be equally good arguments against the idea.

3. Actuarial Science vs. Regulations

It is important to separate pension actuarial science and its various implementations, augmentations, and simplifications in existing actuarial practices. Bader and Gold equate some procedures that practicing actuaries *have* to follow with pension actuarial science. It must be made clear that the tenets of ERISA, Internal Revenue Code, and Financial Accounting Standards do not define or describe pension actuarial science. Actuarial textbooks and articles do. Several regulatory and administrative organizations, including the IRS, PBGC, DOL, and FASB, may have conflicting objectives and require applying the pension actuarial model in questionable ways. It is unreasonable to blame a quantitative methodology called "pension actuarial science" for misguided regulations that utilize that methodology.

A sizable majority of pension actuaries work in the area of traditional pension valuation. That's where the demand is. That's where the jobs are. The main responsibility of an actuary in that area is to certify the plan's compliance with relevant regulations. Most pension actuaries are perfectly conscious of the fact that those regulations are imperfect, to put it mildly. The adjective "insane" is not unusual when the actuaries discuss the regulations. Most "imperfections" of the existing regulations are well known.

Some of those imperfections are presented in Bader and Gold (2003). For the most part, I'm sympathetic to the paper's criticism of certain existing practices. The authors lose me when they declare "The insights of financial economics have

made our science obsolete.” I believe that decades of wonderful developments in financial economics as well as decades of disastrous legislative creativeness have not made pension actuarial science obsolete. Moreover, I think that financial economists would be well advised to learn the insights of pension actuarial science when they venture into the areas that require forward-looking analysis.

4. FAS87 Bias

I would like to identify and discuss a common tendency in numerous publications devoted to the asset-liability analysis of pension plans. For a lack of a better term, I call it “FAS87 bias.” I loosely define “FAS87 bias” as a set of the following assumptions.

1. The matching asset always exists. The matching asset is a portfolio of marketable securities (usually bonds) that has the same (or reasonably close) payouts—in terms of timing, magnitude, and probability—as the benefit payments of the pension plan.
2. There is only one legitimate concept of pension liability: the one that’s equal to today’s price of the matching asset.
3. Pension commitment¹ is similar to debt.

Why do I believe that these assumptions are related to FAS87? FAS87 is a brainchild of the accountants who deal with pensions. The definition of liability under FAS87 is based on assumptions 1 and 2: the liability is equal to the price at which the pension commitment can be settled, or defeased. Assumption 3 represents a viewpoint of accountants and lenders (and, possibly, some investors)—very important groups of stakeholders with a vested interest in FAS87.

The proponents of the “FAS87 bias” may or may not agree with the existing procedures employed

in FAS87. They may or may not restrict themselves to the past service only, as in FAS87. They may or may not agree with the assumption in FAS87 that the promised benefits will almost certainly be paid, and, therefore, the pension obligation should be valued as a high-quality bond portfolio. Nonetheless, I believe that the proponents of the “FAS87 bias” have, for the most part, the same perspective as the creators of FAS87: the accountants. What unites them is the belief that today’s asset prices are all we need to know. In particular, they believe that the only proper way to discount future cash flows is to use today’s yield curve. However imperfect, I think the term “FAS87 bias” has some useful connotations behind it.

Here is my view of the assumptions that define the “FAS87 bias”:

1. *The Matching Asset.* The existence of the matching asset is far from certain. The exactly matching asset rarely exists. The only hope is to find a “reasonably close” matching asset, which is problematic even if we assume that the demographic assumptions are flawless. One of the reasons for that is today’s fixed-income instruments are not long enough for a portfolio that provides complete dedication for a conventional pension commitment. For another reason, I’m not convinced that there is a “reasonably close” matching asset for a benefit stream that is based on the five-year average of the wage inflation in a particular industry.
2. *The Liability Concept.* The fact that there are numerous liability figures out there is a reflection of the fact that a well-organized pension plan management involves numerous responsibilities. Different tasks may require different types of liabilities. To comply with reporting requirements, the plan must submit the price of the matching asset (assuming it exists) as

¹ As introduced in Mindlin (2003), a pension commitment is the stream of benefit payments determined by the plan’s population and benefit package.

the liability. Compliance with the reporting requirements is one of the responsibilities of a pension plan, *but there are others*. For example, one of the most important fiduciary responsibilities of a pension plan is to allocate the assets prudently in the best interests of the plan participants. That task may necessitate utilization of a different concept of liability.

3. *Pensions vs. Debt*. Here is a partial list of objections. (a) If inflation rises unexpectedly, some liabilities rise as well. On the other hand, the value of debt always declines. (b) The similarity between pension commitment and debt is not absolute. Pension commitment may be similar to debt *as far as some lender or investor is concerned*. On the other hand, pension commitment and debt may be very dissimilar *as far as the plan participants are concerned*. (c) It might be a good public and/or accounting policy to disclose pension obligation and debt in the same way. On the other hand, it may be a good corporate policy to treat pension obligation and debt differently. For instance, from a legal standpoint, a dollar owed to a pensioner *must be prefunded* in the best interests of that pensioner; a dollar owed to a creditor should be managed in the best interests of the shareholders, possibly on a “pay-as-you-go” basis.

In short, “FAS87 bias” ignores some very important responsibilities and relationships that are indispensable parts of the pension industry

Identifying the roots of the “FAS87 bias” is no easy task. Here is how McCrory and Bartel (2003) deal with a similar challenge: “If the financial community wishes to regard pensions as debt, this is not an indication of any deep thought or arcane knowledge. Instead, it is just a natural tendency of people to extend concepts with which they are familiar to new situations, even when the

fit between the existing concepts and the new situation is imperfect.” McCrory and Bartel (2003) may be on to something.

Bader and Gold (2003) is clearly “FAS87 biased.” The authors appear to view the pension industry from the standpoint of a single-employer corporate pension plan and its flagship reporting document—the Statement of Financial Accounting Standards No. 87. The paper deals exclusively with the issues of “marked-to-market” financial reporting. A reporting—financial or any other—is an inherently retrospective endeavor. Bader and Gold essentially argue that a properly designed statement FAS87 should have no forward-looking declarations. But expectations are the core of the art of investing. They are just foreign to the accounting mindset.² This makes an “FAS87-based” and an “FAS87-biased” perspective needlessly restrictive and incomplete.

Ultimately I believe that “The Great Controversy” will be viewed as an attempt of the “FAS87-biased” version of financial economics presented in Bader and Gold (2003) to squeeze pension actuarial science into the Procrustean bed of that version’s principles. I would like this paper to be considered as an attempt of pension actuarial science to resist the squeeze.

5. Principles Challenged

Of several great qualities of Bader and Gold (2003), I especially value its style and structure. The authors list several principles and analyze existing practices in light of those principles. In particular, that structure allows the reader to pin down the roots of any statement the reader finds questionable. If one disputes a certain conclusion of the paper, the right way to do so is challenge the underlying principles. That’s exactly what I do in this section.

² In fact, FAS87 contains several forward-looking assumptions. The most notorious of them is “long-term expected return on assets.” That assumption is highly controversial and has been criticized in a number of publications recently.

The heart of the discussion is Principle 4: “A liability is valued at the price at which a reference security trades in a liquid and deep market.” By itself, that statement is not incorrect. If one believes that the price of the matching portfolio is relevant, then one should be at liberty to utilize that value as *the liability*. But once that statement is elevated to the status of a principle, it declares that no other measurement of the pension commitment can be legitimate (here is the “FAS87 bias” in action). This is a bold claim that requires considerable justification. None is presented in the paper. The only potential explanation that I’ve been able to attribute to the Principle 4 is the law of one price. According to Panjer (1998), “two assets (or securities, portfolios, liabilities, and so on) with identical cash flows in the future have the same current price in arbitrage-free market.” Note that *both* securities must be tradable. Even if we assume that the matching asset exists, the stream of pension payments might be considered somewhat tradable only if the sponsor is about to settle its pension commitment by virtue of purchasing the matching asset or a group annuity contract.

The reality is that the overwhelming majority of sponsors of ongoing defined benefit pension plans choose not to settle their pension commitments at the present time. For better or worse, they invest in nonmatching assets. For those sponsors, the pension commitment cannot be considered as a marketable security. Therefore, the law of one price is not applicable. To me, Principle 4, as presented in Bader and Gold (2003), is unsubstantiated.

However, I might have understood Principle 4 as an accounting standard. There might be merits in the statement “A liability is *disclosed* at the price at which a reference security trades in a liquid and deep market.” But the boundaries of accounting are too restrictive to accommodate interests of all stakeholders in the pension industry. *There is life outside of regulated reports in general and accounting in particular.* Different groups of stakeholders

should be allowed to measure the pension commitment according to their needs and risk tolerance. For example, the “FAS87-biased” concept of liability (see assumption 2) may be insufficient for asset allocation purposes. As we’ll see in Sections 7 and 8, some liability values are instrumental in making the asset allocation decision, even though they don’t belong to any conventional actuarial report and are calculated with no reference to today’s yield curve.

In other words, financial *economics* may not require embracing the collective wisdom of today’s bond traders, as expressed in today’s yield curve, for all stakeholders for all purposes. But financial *accounting* might require utilization of today’s yield curve for the reporting purposes.

One may argue that, in the case of a corporate pension plan, the plan is a part of the company and, as such, gets priced every time the company’s shares are sold, and should be valued the same way as a bond portfolio with similar payouts. That might be a good rationale for the purposes of transparent financial reporting. But pretending that the value of the company’s pension commitment has bondlike characteristics can be tremendously misleading. The “liability-is-a-bond” approach obscures the risks imposed on the investors by the sponsor’s decision to invest in nonmatching assets. That approach is a risk concealment methodology by itself.

Let’s turn our attention to Principle 1 now: “\$1 million of bonds has the same value as \$1 million of equities.” This statement appears to be obvious. As we’ll see in the next section, this principle is an easy corollary of basic principles of pension actuarial science. The challenge is to determine the meaning of the word “value.” If we “value” the asset side only, the statement is correct. But if that is the case, then Principle 1 changes the subject of the discussion and misrepresents the actuarial business. Pension actuaries are in the business of calculating pension

commitments and their present values. If we have to “present value” a certain benefit stream, then a \$1 million portfolio of bonds and a \$1 million portfolio of equities may produce considerably different results. While today’s values of the two portfolios are the same, their expectations for the future may be quite different. In that context, Principle 1 is not so obvious.

In other words, the context is important. Principle 1 may be perfect for some accounting statements. It is not so helpful when your job is to manage a variety of risks in the future. Principle 1 in the context of the asset allocation problem may be interpreted as questioning the relevancy of the asset allocation. While asset allocation may be irrelevant as far as the plan’s auditor is concerned, it is exceedingly important for a number of other reasons.

To me, Principle 1, while literally correct, is a manifestation of the “FAS87-biased” mindset that accepts only one form of expressing our expectations—as market prices of assets. This approach places severe restrictions on the methods at our disposal. I have serious reservations about the conceptual suitability and relevancy of Principle 1 to this discussion.

Another problem is misinterpretation of the notion of funding ratio. Here is an example from Bader and Gold (2003). Think of a pension plan for which the price of the Treasury matching portfolio is \$1 million. If the sponsor buys that matching asset, the funding ratio is 100%. However, a \$628,000 equity portfolio would produce a similar result (*but only as far as the valuation report is concerned*): the funding ratio is 100%; we assume that “equities are expected to return 10%.” The authors are unenthusiastic about two different asset values (\$1,000,000 vs. \$628,000) that produce the same funding ratio. Based on Principle 1, the authors conclude that certain members of the plan “have been cheated of \$372,000.” Speaking about the

\$628,000 equity portfolio, the authors also believe that “many pension actuaries would regard such a portfolio as fully funding the plan.” If that is true (which, to me, is extremely unlikely), those “many pension actuaries” are guilty of gross ignorance.

For the purposes of a conventional valuation report, the plan’s actuary produces a schedule of funding progress. A liability is a measurement point on that schedule. The fact that the funding ratio is equal to 100% merely means the plan is right on schedule. The ratio provides no information about the riskiness of the schedule or the likelihood of actually making the promised payments; these matters don’t belong to the valuation report. The considerations to invest in \$1 million of bonds or \$628,000 of equities imply two different funding schedules: one riskless and one risky. There should be no surprise that those schedules require different amounts of assets as of now. “Fully fundedness” of a plan with the funded ratio equal to 100% is little more than a confusing figure of speech.

In this example pension actuarial science provides no support to the decision to invest in equities. If the decision makers for the plan believe that the role of asset allocation is to produce an acceptable looking valuation report at minimum cost at this moment, they are the ones guilty of gross ignorance, not the actuary. In most cases the decision to invest in the \$628,000 equity portfolio is *given* to the actuary. Even if the intergenerational “cheating” does exist, pension actuarial science plays no role in its existence. In other words, don’t blame pension actuarial science for the decision to invest in equities.

6. Some Principles of Actuarial Science

As I mentioned before, I happen to like the “from-principles-to-conclusions” structure in Bader and Gold (2003). I attempt to use the same structure in this section. Here are three fundamental principles that are universally

accepted among actuaries (or so I want to believe).

Principle 1: Present value of \$1 at the end of a period of time is equal to the asset value that has to be invested now to accumulate exactly \$1 by the end of the period.

Principle 2: Present value of \$1 at the end of a period of time is equal to $1 / (1 + R)$, where R is the investment return for the period.

Dear reader, make up your mind now. Principles 1 and 2 have profound consequences. Your support or opposition to these principles will ultimately determine your position in this discussion.

It is important to note that if the return R in Principle 2 is uncertain, pension actuarial science empowers us to use our current expectations and model R as a random variable.³ If that's the case, then the present value of \$1 is a random variable as well. The concept of a random present value belongs to the mainstream actuarial thinking; see Bowers (1997) and Kellison (1991).⁴

Principle 3: Assumptions matter.

This principle is as obvious as it is absolutely essential. The assumptions must be disclosed and followed. Think of a checking account that guarantees 1% annual return and a zero-coupon Treasury bond that guarantees 2% annual return. In order to fund \$1 at the end of the year, we need \$0.99 if we choose to invest in the checking account; we need \$0.98 if we choose to invest in the zero-coupon Treasury bond. If we choose to invest in the checking account, the present value is \$0.99. It is incorrect to claim that the present value is \$0.98 if the money is in the checking account. The fact that we have enough money to

purchase a readily available zero-coupon bond is immaterial. Of course, we can always assume that the money is invested in the zero-coupon bond. Under that assumption, the present value is \$0.98. But it is of crucial importance to make clear that it is just an assumption. It must be disclosed that in reality a different investment option is selected.

As the first application of these principles, let's consider one of the statements in Bader and Gold (2003). Discussing a \$1 million portfolio of bonds and a \$1 million portfolio of equities and their 10-year expected values, the authors declare, "Yet, the present values of the returns of the two portfolios, when correctly discounted to reflect risk, are equal." Apparently, unimpressed by some implementation of the actuarial pension model, the authors imply that the actuarial pension model would have come to a different conclusion. Here's how the actuarial pension model treats the problem. If a portfolio of any assets is worth \$ A now and R_1, \dots, R_N are the portfolio returns for the next N years, then the investment return for the N -year period is $(1+R_1) \cdot \dots \cdot (1+R_N) - 1$, and the future value of the portfolio is $A \cdot (1+R_1) \cdot \dots \cdot (1+R_N)$. Then, according to Principle 2, the present value is equal to $\frac{A \cdot (1+R_1) \cdot \dots \cdot (1+R_N)}{(1+R_1) \cdot \dots \cdot (1+R_N)} = A$

regardless of the actual composition of the portfolio. In particular, \$1 million of bonds has the same value as \$1 million of equities, which is Principle 1 in Bader and Gold (2003). The pension actuarial model and financial economics are in complete agreement.

³ See Klugman, Panjer, and Willmot (1998), section 2.1, principle 3.1.

⁴ See Bowers (1997), chapters 3 and 4, for cases of deterministic discounting procedure and random payment timing, resulting in random present values. See Kellison (1991), chapter 10, for a case of random discounting procedure and deterministic payment timing, resulting in random present value as well. Both Bowers (1997) and Kellison (1991) are standard actuarial textbooks.

7. Case Study

This section shows the principles of actuarial science in action as applied to a simple funding problem.

The plan has to make a single benefit payment of \$100 20 years from now. The market value of assets is \$37.69. At the end of year 20, the company will pay the shortfall or collect the leftover assets. The assets are invested in a portfolio of 20-year zero-coupon Treasury bonds that pays exactly \$100 in 20 years. We ignore taxes and transaction costs and assume that there's no risk of default by the plan sponsor. Essentially the same problem was presented in Bader (2001).

The assets and liabilities are exactly matched now. But let's assume the plan sponsor has just moved the assets from Treasuries to equities and intends to keep the money there. Bader (2001) presented the following questions regarding the plan.

Question #1: How would shifting all the assets from Treasuries into equities affect shareholder value?

Question #2: What discount rate should you use: the Treasury yield, the expected return on plan assets, the company's borrowing rate, the company's weighted average cost of capital, or some other rate?

Getting no satisfaction from his interpretation of the actuarial pension model, Bader also presented his third question.

Question #3: If traditional actuarial models and techniques stumble over questions of pension cost and asset allocation for the simple case described here, is there any reason to think that

they get it right for real-world pension plans and funding practices?

Here are the answers. The answer to Question 1 is obvious—no change. The answer to Question 2—it depends on the purpose of the calculation. For compliance purposes, use whatever is required by the regulations. Outside of the compliance, any fixed discount rate is wrong. The investment return is not fixed for the chosen investment option. The answer to Question 3 is “yes.” Yes, there are compelling reasons to think that the actuarial pension model gets it right for this case as well as “real-world pension plans,” as I demonstrate below.

For this case, I define the liability as the asset value that should be set aside now to fund the commitment. According to Principles 1 and 2, the liability is equal to $\$100/(1 + R)$, where R is the investment return for the period. Let's assume that the annual return of the portfolio of equities is lognormally distributed with the median 8% and standard deviation 17%.⁵ Then the liability is lognormally distributed with the median 21.45 and standard deviation 21.33. Keep in mind that Principles 1 and 2 allow deployment of our current *expectations* for the capital markets, including expected return and risk, to calculate the liability. This liability reflects the risks the sponsor is exposed to on the asset side.⁶ This method stands in a sharp contrast with another way to calculate the liability: to use the expected return as a fixed discount rate, which eliminates all the risks on the asset side before the liability is calculated.

⁵ The conventional language is somewhat imprecise here. The assumption of lognormality of the investment return R usually means that $1+R$ is distributed lognormally, not R . That convention generally applies to investment returns only.

⁶ As defined in Mindlin (2003), this is the asset allocation-related liability associated with the pension commitment of \$100 in 20 years and the policy portfolio that has a lognormally distributed return with the median 8% and standard deviation 17%.

Let's look at some risks and rewards the sponsor faces now. If the sponsor can live with a 50% chance to fund the commitment, the fund must have \$21.45. If the sponsor wishes to have a 95% chance to fund the commitment, the fund must have \$66.90.

The market price for this pension commitment is \$37.69—the price of the zero-coupon Treasury bond that pays \$100 in 20 years. However, the fact that the sponsor can settle the pension commitment and all the risks associated with it (by virtue of investing \$37.69 in the matching asset) does not mean that it has to or wants to do so. The sponsor's financial situation and risk aversion characteristics may allow the sponsor to take some risk and enjoy (or regret) the results. In addition to the main objective of funding \$100 in 20 years, the sponsor may have some other matters of importance (leftover assets, for instance).

Let's deal with the actuarial report and statement FAS87 in this case.

A traditional actuarial valuation report would most likely have the investment return assumption at 8% (= geometric mean return on assets), accrued liability \$21.45, funded ratio 176%.⁷ Let's not call the plan fully funded—there's more than a 20% chance that the fund will not have enough money to carry out the promise.

Statement FAS87 would have discount rate 5%, ABO \$37.69, funded ratio 100%. From the FAS87 perspective, the plan looks “fully funded.” The main problem with these figures is that it is an *assumption*⁸ that the assets are invested in the matching zero-coupon bond portfolio, while, in

reality, that's not the case. The disclosure of \$37.69 as ABO obscures the risks that the sponsor has taken; there is, for instance, a 5% chance that the sponsor *is liable now* for a series of additional contributions that has the present value of at least \$29.21 (= \$66.90 - \$37.69) and, possibly, much higher.

Let's conduct a very simplified asset allocation study. I want to make a minor modification to our example and assume that there are no assets in the pension fund. The sponsor is considering its investment options and an asset value to contribute now. To simplify the case, the only yardstick for the policy selection is the probability to have enough money at the end of the period. To simplify the case even more, let's consider only two investment options: the zero-coupon Treasury bonds and the equities. If the sponsor wishes to have a 50% chance to have enough money to make the payment, then the portfolio of equities looks better; it requires less upfront money (\$21.45 vs. \$37.69). If the sponsor wishes to have a 95% chance to have enough money to make the payment, then the Treasuries look better (\$66.90 vs. \$37.69).⁹

It is important to point out that the Principle 2-based liability concept is providing us with a quantitative methodology for the asset allocation problem. The pension actuarial model doesn't mandate a particular risk tolerance level. *Given* the risk level, the model provides quantitative tools to make an informed decision. Risk tolerance is the key issue here—the issue that traditional liability concepts can't tackle.

⁷ Utilization of the expected return on assets as the discount rate is a common practice. I don't think that mandating the use of the expected return as the discount rate is a good idea. But it doesn't mean that we should discard the expected return altogether. To the contrary, the expected return is a very important part of our expectations. It just shouldn't always be used as the discount rate.

⁸ ASOP No. 27 specifically allows making an assumption about asset allocation: “the discount rate may be selected independently of the plan's investment return assumption, if any. In such cases, the discount rate reflects anticipated returns on a *hypothetical asset portfolio* rather than on the plan's expected investments”.

⁹ The breakeven risk tolerance is roughly 20.8%. In other words, if the risk tolerance is 20.8%, then both investment options require the same asset value.

8. Lessons from the Case Study

There are several important lessons to learn from the case study.

First, I would like to reiterate that, to realize a present value, we have to be *invested* in the asset class that delivers the return used in the present value calculations. It is incorrect to claim that the present value of the commitment is \$37.69 if the money is in the equities. The fact that the sponsor *can* buy the Treasury bond is immaterial. The commitment has the present value \$37.69 only if the money is *invested* in the zero-coupon Treasury bonds.

Second, it may be important to know the “risk-free” market price of the commitment if you are considering your investment options. But if the sponsor has made the decision to invest in a non-matching portfolio of assets, the “risk-free” price is little more than a “nice-to-know” figure. However, if the plan is required to report the “risk-free” price to a governing body, then the price is important. Compliance requirements may give significance to some figures that are irrelevant otherwise. But let’s be clear: the objective has changed. It’s no longer the funding or asset allocation—it’s the compliance. A figure produced for the compliance purposes doesn’t have to be useful or even make sense in other areas. Of course, it would be great if all the figures required to be reported by various governing bodies were useful. It also would be great if all the useful figures were required to be reported by various governing bodies. As we all know, the reality is different.

Third, \$66.90—the 95th percentile of the liability—was instrumental in making the asset allocation decision, although \$66.90 doesn’t belong to any conventional actuarial report. The accrued liability—one of the key elements of the valuation report—was not helpful at all in the asset allocation decision. The ABO was helpful, but only because one of the investment options under consideration was the matching asset.

9. The Controversy

Let’s deal with the most contentious part of “The Great Controversy.” In short, the problem is the following. According to widely accepted actuarial practice on the funding side, higher equity allocation implies higher expected return, which, in turn, requires a higher discount rate, which, in turn, implies lower liability. Thus, higher equity allocation implies lower liability. That is controversial.

It is crucial to understand that the liability concept used in that logic violates Principle 2. A fixed discount rate is selected for the discounting procedure, while the assets are invested in risky assets. The underlying liability may have a nontrivial probability distribution, but the actuarial report analyzes its expected value only. Bader and Gold (2003) states: “The actuarial pension model discounts liabilities at the expected return on the assets held to fund those liabilities; it ignores the risk.” That statement is plainly incorrect. As I’ve demonstrated in the prior sections, the actuarial pension model doesn’t ignore the risk. That risk analysis simply doesn’t belong to a conventional actuarial report.

That is the core of the controversy. The assumption “the same returns in all years” in a conventional actuarial report is unacceptable for a problem that involves comprehensive asset and liability sides. The fixed discount rate assumption produces an internally inconsistent asset-liability model. The main problem is the benefit payments are discounted at actual returns on the asset side and at a fixed discount rate on the liability side. To illustrate this point, think of a contribution of $\$X$ now. Imagine that the accumulated value of $\$X$ is used in N years to pay a benefit payment $\$Y$. If R_1, \dots, R_N are the returns for the next N years, then

$$Y = X \cdot (1 + R_1) \cdot \dots \cdot (1 + R_N).$$

Therefore, the present value of \$ Y in N years on the asset side is

$$X = \frac{Y}{(1+R_1) \cdot \dots \cdot (1+R_N)}$$

On the other hand, the present value of \$ Y in N years on the liability side is

$$\frac{Y}{(1+D)^N},$$

where D is the fixed actuarial discount rate. The discounting procedures on the asset and liability sides are clearly different.

This is a classic “apples-to-oranges” case.¹⁰ To make the model internally consistent, one has to use *the same discounting procedure on both the asset and liability sides*. Since the discounting procedure on the liability side is simply inadequate for a meaningful risk analysis, we should calculate the liability by discounting the payment stream the same way we do it on the asset side, namely, at actual returns. That’s exactly what we did in the case study. The actuarial pension model provided us with liability concept that could deal with risk-related issues.

Why do the conventional actuarial reports look at the expected values only (by virtue of utilization of fixed discount rates)? Well, it is simple, and, at the same time, the regulations allow the simplification of a fixed discount rate. The last thing the pension industry needs now is more complicated calculations. However, the resulting asset-liability model can’t handle any risk-related problem. The conventional valuation and FAS87 reports have multiple objectives, but the risk analysis is not one of them. Those reports are not designed to handle asset allocation problems—their purpose

is to certify the plan’s compliance with relevant regulations. That fact is generally recognized in the pension industry: the risks on the asset and liability sides are usually analyzed outside of the conventional reports.

The main conceptual error in Bader and Gold (2003) is that the authors try to solve a risk-related problem by using the contents and concepts of the conventional actuarial reports. Having run into trouble with those concepts, the authors turned to the principles of financial economics for an answer. They conclude that *it must be assumed that the fund is invested in the matching asset; the liability must be defined as the price of that asset*. The answer given by pension actuarial science is more comprehensive.¹¹ If the fund is invested in the matching asset, the liability is equal to the price of that asset. Otherwise the liability doesn’t have a fixed value; it has a distribution that reflects the risks on the asset side; that distribution should be of paramount importance for the actuarial analysis.

Here’s the key difference between this paper and Bader and Gold (2003) in a nutshell. Bader and Gold see an imperfect actuarial report and blame pension actuarial science for its existence. I see an imperfect actuarial report and blame the imperfect actuarial report. That’s what “The Great Controversy” is all about.

10. Questions to Economists

I would like to present a few questions to the proponents of the “financial economics” approach to pension plans, as defined in Bader and Gold (2003).

¹⁰ Unless the goal is to project the contents of the actuarial report in 10 years. But that’s a completely different story.

¹¹ Mathematicians call it a generalization.

Let's forget about the regulations for a moment and think of a *public* pension plan that chooses not to buy the matching asset (assuming it exists).

Is the current market price of the matching asset relevant to a pension plan that is not interested in exercising that price? Do you know the permanent solvency requirement's price tag?

Now think of a *corporate* pension plan that chooses not to buy the matching asset. Let's also assume that the sponsor has no intention to terminate the plan or file for bankruptcy. The previous question is still valid: Is the current market price of the matching asset relevant? However, it is not unreasonable to think that, as long as shares of the corporation are publicly traded, the value of the pension plan is somehow built into the share price. But does that value always have to be the "termination value" for all intents and purposes? Do the proponents of financial economics advocate valuing every segment of the company's business on a termination basis? Do the proponents of financial economics believe the markets do it that way? Would an "economically enlightened" CFO send her accountants to a local garage sale to determine the "marked-to-market" value of used file cabinets and water coolers?

But for the sake of argument, let's assume that we do want to value the pension plan on a termination basis. Under the assumption of the plan termination, are the proponents of financial economics prepared to price the following: lower employee morale, cost of additional compensation demanded by the employees in exchange for the lost pension, cost of compliance with PBGC regulations, potential loss of key employees, and potential cost of legal actions against the sponsor? Do the proponents of financial economics believe that the ABO already includes all the costs associated with the termination?

11. After Bader and Gold (2003)

I would like to mention a couple of developments that have happened after the publication of Bader and Gold (2003).

First, the debate has been defined as "Pension Actuarial Science in Light of Financial Economics." A separation of pension actuarial science from financial economics is as fictional as it is unhelpful. I believe pension actuarial science is a part of broadly defined financial economics. If experts in geometry had a symposium entitled "Geometry in Light of Mathematics," what would you think about those "experts"?

Second, several publications have portrayed the pension actuarial community as being split into so-called "traditionalists" and "financial economists." The "financial economists" are the ones that agree with Bader and Gold (2003). The rest are the "traditionalists." Since the "traditionalists" are separated from the "financial economists," the "traditionalists" appear to be against principles of financial economics. Such a split is a myth; it would leave no place under the sun for people like this author.

Here's where I stand.

1. I believe pension actuarial science is a fine quantitative methodology.
2. I believe in principles of financial economics as the science of financial markets, asset pricing, and related subjects.
3. I recognize numerous deficiencies in conventional actuarial reports and agree (for the most part) with their critique presented in Bader and Gold (2003).
4. I strongly disagree with the paper's conclusions regarding pension actuarial science.

I think that a majority of pension actuaries and financial economists will eventually support my positions. Or so I hope.

12. Final Remarks

Bader and Gold (2003) is a great paper. The actuarial community should appreciate it for several reasons. First, it started a stimulating discussion. The call for better understanding of the principles of financial economics is well timed and sensible. Second, it made an important contribution to the debate about better reporting procedures. Third, and most importantly, by virtue of being so good, the paper clearly demonstrated severe limitations of the version of financial economics the authors presented in the paper. The need for pension actuarial science is greater than ever.

As far as the liability calculations are concerned, the pension actuarial community has a clear choice: to embrace the “fair value of liability” concept outlined in Bader and Gold (2003) as “the liability,” or to recognize the multitude of challenges the pension plan stakeholders face and the multitude of liabilities related to those challenges. Eventually the marketplace of ideas will sort everything out.

Larry Bader titled his 2001 paper “The Model Has No Clothes.” There’s little doubt that the name was inspired by the Hans Christian Andersen fairy tale “The Emperor’s New Clothes.” I happen to greatly appreciate the analogy between the emperor and the actuarial pension model as well as Bader’s witty allusion. I also believe that the fairy tale is a clever illustration to our story, although with one small exception. It is not the emperor, but the emperor’s accountant who has no clothes. The emperor is dressed magnificently, thank you very much.

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A Critique of Reaffirming Pension Actuarial Science

by Lawrence Bader, F.S.A.

I must begin by thanking Mr. Mindlin for his kind remarks about “Reinventing Pension Actuarial Science” (Bader and Gold 2003, hereafter *Reinventing*). His generous comments and well-organized exposition make me regret that I cannot agree with more of his arguments.

Is Mr. Mindlin Really a Friend of Financial Economics?

He begins by laying a foundation for harmonizing the actuarial pension model with financial economics. He correctly observes that the FASB and ERISA do not define actuarial pension science, and he professes admiration for “decades of wonderful developments in financial economics.” He then defines and criticizes an approach to pension finance that he calls the “FAS87 bias,” of which he finds *Reinventing* guilty.

Mr. Mindlin mentions that he uses “FAS87 bias” for lack of a better term. I will suggest a better term for the approach that he criticizes: “financial economics.” In *Reinventing*, Jeremy Gold and I use the principles of financial economics to price pension obligations in a rules-free environment. We do not directly address FAS87 or ERISA; we aim to identify the true economic cost of pensions to those who bear the costs—shareholders and taxpayers—and to illustrate the poor decision making that can result from mis-measuring those costs.

Challenging Principle 4

In Sections 4-5 Mr. Mindlin challenges the financial economics principles enumerated in *Reinventing*. He disputes Principle 4, which states that the value of a liability is the market price of a “reference portfolio” that matches the liability cash flows. He asserts that such pricing by market values is a “retrospective endeavor.” In fact, it is a

forward-looking approach, because market prices reflect consensus valuations of future risks and rewards.

Principle 4 is not, as Mr. Mindlin states, based on the law of one price. It is based on the simpler notion that like liabilities have like values, and a dollar owed to a pensioner is very like a dollar owed to a creditor. A company should be indifferent between those two obligations, although one may be tradeable and one not.

Suppose that a company with a one-year borrowing rate of 3% must pay \$103 in one year. That obligation has a value of \$100 (ignoring taxes), whether it is owed to a creditor or a pensioner. The value remains \$100 even if the company invests \$95 in equities that it expects will suffice to pay the obligation. (I assume that the company has enough other assets that the performance of the equities doesn’t materially affect the default probability.) Actuaries following ASOP 27 would price the obligation at \$95, while investors would pay \$100 for it. An actuarial model says you can make one-year bonds for \$95 and sell them for \$100 can fairly be called broken.

Mr. Mindlin may point out that pension liabilities are far more complex than this simple illustration. True—but if the actuarial model is wildly incorrect for a simple one-year obligation, why should we even bother to inquire how it handles more complex problems?

Mr. Mindlin refers to differences between pension liabilities and debt that make it problematic to identify a reference portfolio. One is the effect of wage inflation on pensions. However, only the accumulated benefit obligation, which is not subject to wage inflation, falls within the definition

of a liability (Bader and Gold 2003, Authors' Response, footnote 19; see also Bader 2003). Of course, pension liabilities differ from bonds in various ways. But marketed bonds carry maturities from immediate to 100 years, default risk from 0% to 100%, and a wide range of collateral. We find uncertain payment schedules in floating rate notes, Treasury inflation-protected securities, and mortgage-backed securities. This variety is quite adequate to value accrued pension benefits with reasonable accuracy: we do not require basis-point precision. Mr. Mindlin also observes that pension obligations are not marketed, but he does not explain why tradeability changes the value of an obligation from the obligor's viewpoint.

Mr. Mindlin asserts that "different groups of stakeholders should be allowed to measure the pension commitment according to their needs and risk tolerance." What need or risk tolerance would lead a shareholder to value a dollar paid to a pensioner differently from a dollar paid to a creditor? Why would a pensioner value a pension promise differently from an equally secure non-transferable bond of the same company?

Financial obligations vary widely in their legal status, guarantees, time horizons, and payment contingencies. We accommodate such differences by judgment and arithmetic, not by completely different valuation techniques. It is not enough for Mr. Mindlin to point to differences between pensions and other debt instruments. A serious challenge must show why those differences affect value in fundamental ways that cannot be handled within Principle 4.

Challenging Principle 1

Mr. Mindlin also challenges our Principle 1, which states that \$1 million portfolios of stocks and bonds have the same value. He accepts this principle as "literally correct" but a "manifestation of the 'FAS87-biased' mindset that ... places severe restrictions on the methods at our disposal."

The range of methods to justify a preference between stocks and bonds is capacious but not unlimited. Taxes, risk tolerance, the PBGC, peer group comparisons, and surplus ownership are among the factors that we may consider. But a minimal constraint on a discounting method is that it produces equal values for the cash generated by equal amounts of stocks and bonds. We may conclude that stocks are preferable for a particular purpose, but we cannot say that \$1 million of stocks has a higher first-order present value than \$1 million of bonds.

Mr. Mindlin returns to Principle 1 in his Section 6, demonstrating that the actuarial model produces equal values for \$1 million bond and stock portfolios. He concludes that "the pension actuarial model and financial economics are in complete agreement," contrary to *Reinventing*. In our Authors' Response, we stated, "Of course, actuaries who anticipate risk premiums do not literally value a \$1-million equity portfolio more highly than a \$1-million Treasury portfolio. They achieve the same result indirectly, however, when they value liabilities financed by equity more cheaply than the same liabilities financed by bonds." Both Mr. Mindlin and ASOP 27 firmly support the latter practice.

Three Fundamental Principles?

In Section 6 Mr. Mindlin explains that actuaries should measure the present value of pension obligations by discounting at the expected return R of the invested assets. He explains this process in terms of "three fundamental principles that are universally accepted among actuaries (or so I want to believe)."

I must disappoint him. Neither Jeremy Gold nor I, nor any bond investor or private lender, accepts his principles. We cannot value a future dollar without knowing its payment probability. Nor can we take the discount rate R as the return of an arbitrary security. We must know the targeted payment probability distribution; then we define

R as the yield of a security that has that same probability distribution. Perhaps no marketed securities fit the bill precisely, but we surely could bracket the discount rate tightly enough to exclude the use of an equity return as R .

The fact that a plan sponsor expects his risky assets to earn more than the matching asset is not relevant to liability measurement. High-asset returns are always welcome, but they don't reduce liabilities. A successful equity investment, a winning lottery ticket, or a big year-end bonus gives you more resources to pay your mortgage or buy your groceries, but it doesn't lower their cost.

Ignoring Principle 5

In Sections 7-8 Mr. Mindlin responds to the three questions raised in Bader (2001). That article addresses these issues, and I will add here only a comment on Mr. Mindlin's discussion of asset allocation strategy. He suggests that the asset allocation should reflect the plan sponsor's "financial situation and risk aversion characteristics" ("if the sponsor can live with a 50% chance to fund the commitment"). Here he ignores Principle 5 in *Reinventing*, "Risks are borne and rewards are earned by individuals, not by institutions." The "sponsor" does not have to live with the 50% chance: the shareholders do. (Also the participants and PBGC, of course—but Bader [2001] inquired solely about shareholder value.) Shareholder value is determined by how the markets, not the sponsor, price risk. The market is indifferent between equal dollar amounts of bonds and stocks, and the sponsor cannot affect shareholder value by trading marketed securities (apart from second-order effects like taxation).

In Section 9 Mr. Mindlin warns of inconsistency in discounting the asset and liability sides. He calls it "a classic 'apples-to-oranges' case ... one has to use *the same discounting procedure on both the asset and liability sides.*" Financial economics achieves consistency here, not by "using the same discounting procedures," but by

using market prices for both assets and liabilities (using reference securities if the actual securities are not traded).

Questions for Financial Economists

In Section 10 Mr. Mindlin poses a few questions for financial economists.

First he considers a public employees' pension plan that chooses not to buy the liability-matching asset. He asks whether the current market price of the matching asset is relevant to that plan. The answer is yes: the price of the matching asset is the value of the obligation borne by the taxpayers, regardless of how the assets are deployed.

He then turns to a corporate plan that the sponsor has no intention of terminating. He asks, "Is the current market price of the matching asset relevant?" He labels this price the "termination value" and asks whether financial economists advocate valuing all business assets on a termination basis, "[sending their] accountants to a local garage sale to determine the 'marked-to-market' value of used file cabinets and water coolers."

Financial economists find the value (not the "termination value," just the "value") of marketed financial securities by looking at market prices. Those market prices impound the market consensus about the future earning power of those securities. It is no more appropriate to call these market prices "termination values" than it is to regard mutual fund net asset values, or stock prices themselves, as "termination values."

As for valuing a corporation's *nonfinancial* assets, that is done by estimating their collective power to generate future earnings—not by the prices that they would fetch at "a local garage sale."

Conclusion

In conclusion, I again thank Mr. Mindlin for his thoughtful treatment of Jeremy Gold's and my work. His paper will benefit readers who wish to assess the actuarial side of "The Great Controversy." But I must add a cautionary note. In his concluding sentence, Mr. Mindlin suggests that, contrary to the title of Bader (2001), the pension model, and therefore the actuaries who rely on it, are magnificently attired. I advise actuaries who accept this sartorial advice to use plenty of sunscreen.

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Comments on “Reaffirming Pension Actuarial Science”

by Tony Day, B.A., F.I.A.A.

I congratulate Dimitry Mindlin on a useful, well-thought-out, and highly entertaining paper. In particular, I felt that its FAS87 mindset portrayal is justified and quite true. As someone who has no knowledge of U.S. pension accounting rules, I often have trouble communicating to U.S. actuaries about both traditional and financial economics ideas. Having said this, I am not qualified to comment on the FAS87 elements of the paper.

My personal experience of being educated as an actuary is very different to his. In particular, several traditional actuarial concepts that I learned are at odds with basic financial economics concepts:

- What is value? My actuarial training causes me to think of value in terms of utility rather than market price. In particular, the present value of a thing is whatever an actuary calculates it to be rather than the price at which it can be traded for or manufactured.
- What is a liability? Again, whatever an actuary defines it to be rather than the wider use of the term to mean a debt, a negative asset, or a contingent claim.
- What is a stakeholder? I cannot recall if the word “stakeholder” appeared in the course notes.
- What does arbitrage-free mean? On qualification, I thought arbitrage-free was a statement about market efficiency rather than a concept of what a good financial model should strive to be.

I would like to discuss each of these concepts in the context of points raised in the paper.

Value

There are several items of a semantic nature that I feel are important. First, I quote two definitions of value (from the Macquarie dictionary):

- Value (version 1): The worth of a thing is measured by the amount of other things for which it can be exchanged, or as estimated in terms of a medium of exchange.
- Value (version 2): That property of a thing because of which it is esteemed, desirable, or useful.

These are very different definitions, and I believe much confusion results from semantic confusion about the term “value”: to a first degree, traditional actuarial science tends to focus overly on the second definition (value as usefulness or utility to an individual), and financial economics focuses on the first (value as market price).

Take, for example, the value of water. Using the first definition, the value of water (i.e., the market price) is virtually zero; I can leave a tap running for hours, and it would cost me less than a cent. Under the second definition, the value of water (i.e., its usefulness or utility) is very high: without water I wouldn't last long.

Now, the tension between these values is obvious (and a real source of concern for anyone living on the driest continent on earth in the midst of a prolonged drought). For example, I imagine that, as a buyer of water, I am getting a good deal, in that it is not being properly priced, taking into account total costs of manufacture, environmental costs, future scarcity, and so on. Many people reflecting on my situation would declare me a rich man, and I would agree with them. But would a bank lend me more money—perhaps so I could install more taps and increase my wealth even more?

I believe that actuaries often look at defined benefit (DB) schemes and see utility propositions:

massive transfers of risk away from members to companies, enforced consumption deferral, helpful equity prices. The problem is that they then participate in the conversion of these items into a market price that reflects utility rather than exchange. As a result, banks (and others) lend money based on “good deals” that have approximately the same value as water (in both senses of the word).

Liability

To continue the semantic theme, I would like to compare a dictionary definition of liability (again from the Macquarie dictionary) with the definition used in the case study:

- Liability (dictionary): an obligation, especially for payment; debt or pecuniary obligations (opposed to *asset*).
- Liability (case study): the asset value that should be set aside now to fund the commitment.

I don’t think this redefinition of a common term is fair enough. In addition to the common-sense link between liability and debt, the dictionary definition suggests, quite simply, that a liability is the opposite of an asset. The case study definition is one step removed: in addition to the “commitment” (read: liability), we also take into account the “value” of an unrelated “asset.”

To my mind, the definition is equivalent to the following: liability is defined as the dictionary definition of liability less the “good deal” obtained from investing in equities (or whatever). The case study is thus all about whether the sponsor should take on the “good deal” of equity ownership—it has nothing to do with liabilities as commonly defined.

Arbitrage and Stakeholders

The author makes much of the fact that pension assets and liabilities are not usually tradable, or at

least that closely matching assets to pension liabilities may not exist. Yes, of course. He then suggests that this somehow means that arbitrage concepts therefore do not apply. I disagree.

Financial economics is not dependent on the existence of arbitrage opportunities in the world. Rather, it suggests that we should create arbitrage-free models of the world because not to do so invites wrong specifications of value (in the market price sense). It is a failure of traditional actuarial science to recognize the fact that, most often, arbitrage opportunities can be found within the system that is DB pension schemes and do not require outside agents.

I think this failure can be pinned down to an absence of stakeholder analysis in standard actuarial practice. If we do not “see” the various stakeholder groups that form a DB plan, we will, of course, fail to see the potential free lunch given to one party at the expense of another. A quick way to remedy this would be to insist that every piece of actuarial advice should, first, seek to identify stakeholders and, second, declare what interest they have in each financial decision, recommendation, or assumption.

“The majority of pension actuaries disagree with the basic tenets of financial economics. They must disagree given their advice and actions as agents of DB plans. With the exception of this paper, their silence in the face of substantive criticism has been deafening. I share many of Mindlin’s concerns and agree with much of what he says: actuaries do ask questions beyond valuation of liabilities; they should strive to define and add utility value for stakeholders; they should search for and advocate “good deals.” However, whatever the purpose of a calculation or specifics of a question, we should always clearly state which definition of value we use and for whom we are valuing something.

Comments on “Reaffirming Pension Actuarial Science”

by Robert McCrory, F.S.A., M.A.A.A., E.A., F.C.A.

Mr. Mindlin’s paper is a welcome addition to the ongoing discussion on actuarial practice. I hope that a couple of brief comments might be useful.

Whose Risk Is It Anyway?

In reading Mr. Mindlin’s paper, I was struck by the different approaches to risk in his paper and in the Bader and Gold paper and the surrounding discussions. Briefly, in Bader and Gold and related papers we seem to be told that risk is to be avoided or hedged at any cost. A number of reasons are cited for this: optimal corporate structure (the Modigliani and Miller paper), generational equity (applied to either shareholders or taxpayers), accounting rules, effects on the PBGC, reduction or death of the equity risk premium, and the idea that stocks held by corporations in pension plans are suboptimal economically.

In each case I think a counterargument can be formulated, demonstrating that investment risk can reasonably be taken by those responsible for the management of a pension plan. However, that is a discussion for another time.

The most important point to be made here is that the decision about whether or not to take investment risk is not ours to make. The actuarial profession has not been charged with defending generational equity, protecting the PBGC, guarding corporate or national economic structure, or any of the rest of it. We can offer advice, but we do not make the decisions.

Above all, we must not under any circumstances make decisions for our clients implicitly in our actuarial methods, assumptions, or calculations.

Common Ground?

There must be some common ground in this debate.

I think many of us would agree that we can improve our communication of risk to our clients. It is in this area that Mr. Mindlin’s paper is especially useful. He suggests how we can move away from point estimates based on expected values and focus the attention of our clients on the distribution of possible outcomes, and on the risk-reward tradeoffs inherent in those distributions.

Using the approaches outlined by Mr. Mindlin, we can provide our clients with better information concerning the magnitude of the risks they are taking. We can furnish a balanced picture of risks and rewards, and then allow our clients to make their decision.

It is their decision.

Author's Response to Mr. Bader's Comments

by Dimitry Mindlin*, A.S.A., M.A.A.A., Ph.D.

I would like to thank Mr. Bader for further clarifications of the views he and Mr. Gold presented in “Reinventing Pension Actuarial Science” (Bader and Gold 2003), also known as *Reinventing*. I will follow the same convention and call my paper *Reaffirming*. The purpose of these comments is to clarify and amplify the differences between *Reinventing* and *Reaffirming* in light of Mr. Bader's remarks. It is also my unfortunate duty to correct several misquotations and misinterpretations of my views by Mr. Bader.

1. The Great Controversy Once Again

In the conclusion to his comments, Mr. Bader noted that *Reaffirming* would “benefit readers who wish to assess *the actuarial side of* ‘The Great Controversy’” (italics added). Apparently the discussion has a nonactuarial side that I have failed to acknowledge. Since it's desirable to consider the subject of any debate in its entirety, the question is: What's the subject of this debate? Indeed, what are we talking about?

“The Great Controversy” is first and foremost about the risk management of pension plans and its most important component: the asset allocation decision. Bader and Gold (2003) put existing actuarial practices—the conventional valuation and FAS87 reports—in the context of the real world of risky assets and demonstrated that, as far as the “marked-to-market” financial reporting is concerned, the conventional reports contain serious problems. However, those problems were well known to economists and practicing actuaries long before Bader and Gold's paper, so that part was relatively uncontroversial. It is the authors' call to reinvent the pension actuarial science in light of their version of financial economics that attracted a lot of attention and became the starting point of “The Great Controversy.” But as bold and controversial as that call is, it is an offshoot of even bigger claim. Bader and Gold declared that the only economically legitimate

way of measuring a series of future cash flows is to value it as the price of the matching bond portfolio. But we don't measure pension commitments for the sake of measuring. We measure pension commitments primarily to fund them—to determine how much to contribute and how to invest the assets in order to have enough money to make the promised payments.

So let's be clear about the subject of this debate. *It's the asset allocation*, dear reader.

2. *Reinventing's* Principles 4 and 1

Principle 4 is at the front and center of the debate. Unfortunately, in his description of my views, Mr. Bader produced a perplexing mixture of misquotations and misinterpretations. Contrary to Mr. Bader's assertion, I dispute not the language of Principle 4, but the endorsement of that statement as a general principle of financial economics. The declaration “A liability is valued at the price at which a reference security trades in a liquid and deep market” is not incorrect by itself. Contrary to Mr. Bader's assertion, *Reaffirming* is perfectly happy with the pricing by market values. If one has a good reason to value a stream of future cash flows as the market price of the matching asset (assuming it exists), then one should be at liberty to do so. But once that statement becomes a general principle, it takes away our ability to make forward-looking assumptions.

It also reduces our playing field from financial economics to a version of financial reporting.

By definition, the goal of a reporting—financial or any other—is to report what has happened up to this point. Any reporting (not “pricing by market values,” as Mr. Bader attributes to me) is an inherently retrospective endeavor. It is challenging for any reporting to accommodate *future cash flows of uncertain magnitude and timing*—think of future pension contributions or payments to stock option holders.¹ Every substantial forward-looking assumption—an expectation—has a potential of creating a serious problem in financial reporting. (Remember the notorious long-term expected return on assets in FAS87?) Unlike financial reporting, financial economics has no problem with expectations. In particular, various asset allocation and option-pricing² methodologies require forward-looking assumptions.

Principle 4 requires us to value long-term non-transferable pension benefits as a portfolio of tradable bonds with similar payouts. Messrs. Bader and Gold also claim that “the vast majority of thought leaders in the financial community” would share that view. It appears that the same logic should apply to employee stock options: those should be valued the same way as stock options with similar characteristics tradable “in a liquid and deep market.”³ Well, here’s what Lawrence Lindsey and Marc Sumerlin wrote in an op-ed piece in *The Wall Street Journal* on June 21, 2004.⁴ “Employee stock options are long term and nontransferable. The fact that they cannot be sold means they cannot be measured by

market-based option calculators.” In other words, according to Messrs. Lindsey and Sumerlin, an *employee* stock option is not necessarily valued “at the price at which a reference security trades in a liquid and deep market.” It doesn’t sound like much of a consensus on that issue even among economists.⁵

Contrary to Mr. Bader’s assertion, I did not state that Principle 4 was based on the law of one price. The law of one price came up as my best attempt to justify Principle 4. *Reaffirming* is absolutely clear about that principle. As a general principle of financial economics, Principle 4 is unsubstantiated. Period.

Principle 1 is not as controversial as Principle 4. But Principle 1 is not a principle of financial economics, it’s a principle of financial accounting. When Messrs. Bader and Gold say “\$1 million of stocks is the same as \$1 million of bonds,” they simply change the subject of the discussion. The problem of “present valuing” of a stream of future payments is not the same as the problem of asset auditing. Contrary to *Reinventing’s* assertion, the pension actuarial model neither values a “\$1-million equity portfolio more highly than a \$1-million Treasury portfolio” nor values “liabilities financed by equity more cheaply than the same liabilities financed by bonds.” At some risk levels, the present value of the pension commitment⁶ funded by stocks is lower than the present value of the pension commitment funded by bonds; at some other risk levels, the opposite is true. Messrs. Bader and Gold believe this inequality implies “indirectly” that today’s values

¹ The relationship between pensions and options requires more thorough treatment than is appropriate for this discussion.

² See note 1.

³ See note 1. But if you insist, here’s one incredible similarity between pensions and options: accountants hate both of them.

⁴ Lawrence Lindsey and Marc Sumerlin are well-known economists. Mr. Lindsey was director of the National Economic Council in 2001-2002 and is now president and CEO of the Lindsey Group, of which Mr. Sumerlin, former deputy director of the National Economic Council, is managing director.

⁵ It remains to be seen if the arguments of Messrs. Lindsey and Sumerlin on the issue of “employee stock options vs. tradable stock options” apply to the issue of “pensions vs. tradable bonds.”

⁶ As before, the pension commitment is defined as the stream of benefit payments determined by the plan’s population and benefit package.

of \$1 million of stocks and \$1 million of bonds are not the same, but their logic is flawed. While today's values of the portfolios are the same, the present values of a series of payments funded by stocks and bonds are different because our expectations for stocks and bonds are different. Once again, our expectations are the central issue.

3. \$103 in One Year versus \$100 in Twenty Years

Mr. Bader brings up a case of one payment of \$103 in one year. He claims that this author "may point out that pension liabilities are far more complex than this simple illustration." No, I would not. I absolutely agree with Mr. Bader that if a "model is wildly incorrect" for a simple example, we shouldn't "even bother to inquire how it handles more complex problems." I also happen to believe that the actuarial pension model is perfectly capable of handling his example.

Reaffirming analyzes a similar case of one payment of \$100 in 20 years (see *Reaffirming*, Section 7). Apparently Mr. Bader believes that his example is conceptually different than the example presented in *Reaffirming*. Although that conceptual difference eludes me, here are my arguments from *Reaffirming* in somewhat abbreviated form.

For Mr. Bader's example, an FAS87 statement may show the ABO as \$100.98 (assuming 2% as the Treasury one-year rate) or something close to that value. Let's assume the entire fund is invested in equities (please don't blame the actuary for that decision). If the actuary believes that the geometric return for the equities is 8.42% and decides to use that value as the interest rate assumption (contrary to Mr. Bader's assertion, I don't think this practice is a good idea; see *Reaffirming*, note 8), the valuation report will show \$95 as the accrued liability. But this value has nothing to do with any "price"; it has every-

thing to do with compliance with relevant regulations. The model is not broken. Mr. Bader simply misuses the contents of the valuation report. I don't think it's reasonable to believe that the valuation report should be helpful in bond trading.

For his internal purposes, a stock analyst may value the commitment to pay \$103 in one year as \$95, \$100, \$100.98, \$103, \$200, or any other value, depending on the analyst's risk tolerance and the purpose of his calculation. Today's bond traders value a similar bond commitment as \$100, but I'm not sure what to do with this figure: the idea of funding a company's pension commitment with the same company's bonds doesn't appeal to me that much.

The issue of "a dollar owed to a pensioner vs. a dollar owed to a creditor" is not central to this debate, but, since Mr. Bader wishes to revisit the issue, let me touch on it briefly. There are several reasons to treat the pensions and corporate (or state or municipal) bonds differently; some of those reasons are mentioned in *Reaffirming*. There are also good reasons to believe that the pensioners have a better chance of receiving that dollar than the creditors, but these issues are more involved than suitable for this discussion.

4. The Law of One Price

Mr. Bader concedes Principle 4 is not based on the law of one price; my hat is off to Mr. Bader.⁷ He claims the principle "is based on the simpler notion that like liabilities have like values." But that "simpler notion" is simply incapable of validating Principle 4. When there's no way to profit from a seeming arbitrage opportunity, *like objects do not necessarily have like prices*. Here are a couple of examples of that phenomenon.

⁷ There are economists out there who advance similar arguments and insist that their views are based on the law of one price.

1. An insurance company can review the market prices of a particular product and either offer the product at a lower price, or offer the product at the same price as the competitors, or decline to offer the product altogether. In other words, an insurance company doesn't have to accept existing market prices and may use its own expectations to value a product.
2. Disagreements with the market prices are a significant part of the market itself. Even though the market price of a particular stock is \$10 now, investor A's model may value the stock at \$5 and recommend to sell it short and/or buy a put option on the stock. Investor B may value the stock at \$9 and do nothing. Investor C's model may value the stock at \$15 and recommend to buy the stock and/or a call option on the stock.

Market prices are just a tip of the iceberg. Behind the market prices, there is an incredible variety of expectations and valuations that range from a simple gut feeling to the most sophisticated quantitative models. Any valuation depends on some uncertain future events, so the market participant's risk tolerance plays a major role in the valuation. Objects of our interest (assets, liabilities, etc.) can be valued differently for different organizations, different governing bodies, and different purposes. For internal purposes, any organization should be able to value its or anyone else's assets and liabilities any way the organization wants and use the results of the valuation to achieve any objective the organization has. That's what free markets are all about.

Pension liabilities should be no exception, but Principle 4 disagrees and orders everyone to value the pension liability as the price of the hypothetical matching asset. According to Principle 4, there cannot possibly be any need to value pension liability differently, even though the objectives and perspectives of different stakeholders can be entirely different. One of my goals is to demonstrate that there are real problems out there

that require different stakeholders to value pension commitments differently.

5. Why Value Differently?

Mr. Bader brings up the issue of "pensioner vs. bondholder" and asks directly: "Why would a pensioner value a pension promise differently from an equally secure nontransferable bond of the same company?" This is a great question as well as a clear manifestation of the "FAS87 bias."

Here's the answer: because the goals of pension funding and bond pricing are entirely different. One of the most important aspects of the pension funding is the asset allocation decision. We have to make the decision now; the decision involves some future benefit payments; therefore, we have to put the payments on the same footing and bring them to the present. In other words, in order to make the asset allocation decision, we have to calculate a present value of the pension commitment. At this point we don't know which discounting procedure would be appropriate for the present value calculation because the asset allocation objective has not been specified yet.

Let's look at the objectives of the asset allocation. Let's take the *plan participants'* side. Naturally the plan participants would like to be absolutely certain about the safety of their benefits. However, absolute certainty hardly ever exists; some risks are simply unavoidable. Higher contributions would help, but the sponsors' budgets are not unlimited. Therefore, it's not unreasonable to believe that it is in the best interests of the plan participants that the assets are allocated in a way that maximizes the likelihood that the benefits will be paid *at a given level of assets* (which include the market value of assets and present value of future contributions). "[T]he policy is to provide the investor with the highest probability of being able to pay for the groceries when the time comes," writes Peter Bernstein, a prominent economist and historian (see Bernstein 2003).

Now let's take the *plan sponsor's side*. "For a given public or private pension plan benefit structure and for a given funding level, a plan sponsor may want to choose an investment strategy to minimize the present value of future contributions to the plan." I could easily imagine a group of economical purists expressing their rightful indignation at this statement. (Don't you know that the present value of future contributions is equal to the market price of liabilities minus the market price of assets—it's a number! A number is a number—it can't be minimized.) But the group would have a tough road ahead. The quotation belongs to Fischer Black (see Black 1995), a distinguished economist and one of the founding fathers of option pricing.⁸

The two asset allocation objectives raise numerous questions.⁹ Here's a small sample. Under the existing asset allocation, what is the probability that a given asset value is sufficient to pay the promised benefits? What is the highest probability that can be achieved by reallocating assets that a given asset value is sufficient to pay the promised benefits? It may be in *the best interests of a plan participant* to know that probability. If that probability is below, for example, 60%, what is the lowest additional contribution to the fund required to increase the probability to 60%? It may be *in the best interests of the plan sponsor* to know the value of the additional contribution. Ask the same question for the safety levels 70%, 80%, or any other. For every level of risk, there is the lowest asset value required to fund the pension commitment at that level of risk. This required asset value at a given risk level *can be considered a liability*, although it doesn't belong to any conventional actuarial report. It exists only as a tool for risk management purposes.

Would Messrs. Bader, Gold and like-minded economists allow these and similar questions to be asked

and answered? If yes, is it their position that the market price of the hypothetical matching asset is the only present value we need to answer those questions? Is it their position that those questions can "be handled within Principle 4"? Count me as a skeptic. Fortunately our good old friend the pension actuarial model is readily available.

6. Two Worlds

We live in a financial world that contains a multitude of risks. That world is governed by the principles of financial economics. Risk management is an indispensable part of life in that world. Risk elimination is a valuable component of the risk management, but it's not always available. Financial markets play arguably the most important role in the risk management. Market prices are of great consequence, but everyone has the right to disagree and enjoy or regret the consequences of that disagreement. There are many ways to express one's disagreement with the market prices. Countless participants of the markets apply their unique expectations to take advantage of opportunities the markets create. There's no artificial bias toward any asset class. Certain market participants may designate the bonds as their preferred asset class. But that's a choice, not an obligation: they are free to employ every available funding vehicle and allocate the assets in their best interests.

Market participants consider each asset on its merits in terms of return, risk, relationships with other assets, and, most important, the capability of the asset to serve the financial objectives of this particular market participant. The market participants have a great appreciation of what may happen in the next instant, day, year, or century. They use their expectations and risk tolerance to price uncertain future events. Since the market partici-

⁸ You've got to read note 1; it's not even funny anymore.

⁹ The asset allocation objectives specified by Peter Bernstein (2003) and Fischer Black (1995) lead to the same set of optimal policies, but this remarkable fact is outside of the scope of this discussion.

pants have different expectations and risk tolerances, trades happen.

Pension plan sponsors are no exception. In this world the asset allocation decision for a pension plan is of paramount importance. The papers Black (1995) and Bernstein (2003) belong conceptually to this world; they acknowledge the presence of risks and articulate the objectives accordingly.

Reinventing belongs to a different world, or, more accurately, to a small segment of the world of financial economics. In that smaller world, as well as in the statement FAS87, risk elimination is assumed to be always available. There's the preferred asset class: the bonds. Mr. Bader declares that "marketed bonds carry maturities from immediate to 100 years, default risk from 0% to 100%, and a wide range of collateral. We find uncertain payment schedules in floating rate notes, Treasury inflation-protected securities, and mortgage-backed securities. This variety is quite adequate to value accrued pension benefits with reasonable accuracy."

Those "default risk" and "uncertain payment schedules" in various fixed-income securities are contingent events in the future. Today's bond traders use their expectations to price those bonds. These expectations and resulting bond prices are elevated to the status of unquestionable tenet in the smaller world. The only asset class for which expectations are allowed is the fixed-income securities. The only group of people allowed to have expectations are today's bond traders. Everyone else must follow the expectations built into today's bond prices. Just like in FAS87, only the bonds can be used to value pension commitments in the smaller world. Expectations about equities must be excluded: as Mr. Bader puts it, "we surely could bracket the discount rate tightly enough to exclude the use of an equity return."

Just like in FAS87, what may happen in the next instance is, for the most part, of no interest. Just

like in FAS87, the actual asset allocation is irrelevant in the smaller world; after all, \$100 of bonds is the same as \$100 of stocks. Just like in FAS87, we must utilize the imaginary investment in the hypothetical matching bond portfolio for the discounting purposes in the smaller world. That's the mentality Messrs. Bader, Gold, and like-minded economists are presenting as the true financial economics. Taking this logic one step further, Mr. Bader is proposing now to make this way of thinking compulsory. According to Bader (2004), "mandatory full funding ... is the only practical prevention for the diseases that can afflict a guarantee system."

I've tried to come up with an appropriate term for the smaller world. As Mr. Bader noticed, I introduced "FAS87 bias" for lack of a better term. The two other finalists were "accounting economics" and "extreme form of marked-to-market paradigm." Having settled on "FAS87 bias," I still think the term carries useful associations with it.

7. *Reaffirming's* Principles 1 and 2

Once again, I'd like to give Messrs. Bader and Gold a lot of credit for their well-thought-out structure "from-basic-principles-to-conclusions" in *Reinventing*. My intention was to follow suit in *Reaffirming*. It's great that we can express our differences at the level of basic principles. The readers will have a clear choice: to accept or reject those principles.

Unfortunately Mr. Bader's presentation of my views is inaccurate. The statement he attributes to me—"actuaries should measure the present value of pension obligations by discounting at the expected return R of the invested assets"—is incorrect in two ways. First, my position on measurements of pension commitments is, in short, we use different measurements for different purposes. *Reaffirming* recognizes "the multitude of challenges the pension plan stakeholders face and the multitude of liabilities related to those challenges." Some measurements are related to today's

yield curve; some measurements are related to the existing policy portfolio; some measurements are based on someone's wishful thinking—the pension actuarial model is unbiased and can accommodate everyone. Second, the term “expected return” traditionally means a fixed discount rate equal to either geometric or arithmetic return on assets. *Reaffirming's* Principles 1 and 2 do not require utilization of the “expected return” or any other fixed rate.

I agree that “we must know the targeted payment probability distribution.” We may also “define R as the yield of a security that has that same probability distribution,” but only if either the assets are invested in that security or we are willing to assume that the assets are invested in that security (e.g., for the purposes of financial reporting). Mr. Bader claims that “financial economics achieves consistency ... by using market prices for both assets and liabilities (using reference securities if the actual securities are not traded).” So the model that Messrs. Bader and Gold propose is internally consistent for the few plans that have purchased the matching bond portfolio.

What about the ones—and that's almost everyone else—that have not? Don't they need an internally consistent asset-liability model? Apparently they must *assume* that they have purchased the matching bond portfolio and take it from there. However, there are important problems that require utilization of the *actual policy portfolio*. I don't think it's reasonable to believe that the assumption of investment in the hypothetical matching bond portfolio provides sufficient analytical tools to solve for all the problems that require a present value calculation.

It is disappointing that, according to Mr. Bader, “neither Jeremy Gold nor I, nor any bond investor or private lender, accepts” *Reaffirming's* Principles 1 and 2. I'd like to believe that Mr. Bader is mistaken regarding the “any bond investor or private lender” part of that statement.

8. It Is All about Future Earnings

In Section 10 of *Reaffirming* I posed a few questions for financial economists. The purpose of those questions was to illustrate and amplify one of the biggest problems in *Reinventing*. I'd like to thank Mr. Bader for giving excellent answers to some of my questions and highlighting the point I was trying to make.

Mr. Bader declares that “only the accumulated benefit obligation, which is not subject to wage inflation, falls within the definition of a liability.” By definition, the ABO is the *termination* liability: it is calculated assuming the plan has been terminated. Clearly *Reinventing's* position is pension plans should be valued on the termination basis. Dear financial economists, I asked, are you instructing us to value every segment of a particular business on the termination basis? Mr. Bader's answer is perfectly clear and correct. No, the basis for the valuation is future earnings. So here's what Mr. Bader appears to suggest: every segment of a particular business should be valued on the basis of its “power to generate future earnings,” *except the pension plan!* We should apply our expectations to future revenues, but not to the future cost of running the pension plan. Shall we skip the future cost of other employee benefits? What about the future cash compensation? Many stocks will surely look a lot more attractive without the future labor cost.

My views are perfectly clear as well. The purpose of the water cooler is not to appreciate in value and contribute to the bottom line, but to keep the labor force hydrated and productive. A particular business should be valued as a whole (including the pension plan, needless to say) on the basis of its future earnings. Future earnings are equal to the difference between future revenues and future costs. A pension plan, as part of the labor cost, belongs to the latter. Present value of future contributions should be at the front and center of the valuation, but we won't find that figure in FAS87. Accounting in general and FAS87 in particular are

not terribly helpful with the analysis of future cash flows of uncertain timing and magnitude (like pension contributions or stock option payouts). *Reinventing* is a great paper in many respects, but the direction of future developments of the pension actuarial science is not one of them. An “FAS87-biased” version of financial economics, as presented in *Reinventing*, is inadequate for a comprehensive analysis of a pension plan.

9. Conclusion

This discussion has uncovered a number of serious problems in the actuarial analysis of pension plans, particularly in the area of risk management. Messrs. Bader and Gold believe the solution is to employ the version of financial economics they presented in *Reinventing* and surrounding discussions. In their view, the pension actuarial model is “obsolete.” I disagree. The pension actuarial model is perfectly capable of addressing all issues raised in *Reinventing* and, I believe, will be eventually recognized as a valuable part of financial economics.

We use the pension actuarial model to calculate the ABO—Mr. Bader’s preferred liability concept—as well as other components of statement FAS87. We use the pension actuarial model to calculate liabilities for the traditional valuation report. We use the pension actuarial model to answer the questions raised in Section 5 of this response. The need to “reinvent” the pension actuarial model appears to be rather exaggerated.

In conclusion, let’s get back to our emperor. He was introduced indirectly in Bader (2001) and made brief appearances in *Reaffirming* and Mr. Bader’s comments. Let me also bring up investor A from Section 4 of this response, who believes that the intrinsic value of a particular security is \$5, while the security’s market price is \$10. To

demonstrate that “The Emperor Has No Clothes,” Messrs. Bader, Gold, and like-minded economists should prove that the investor can’t value the security by himself; any deviation from the market price should be prohibited; the security’s market price is all he needs to know. Here’s a challenge for them. Dear proponents of the extreme form of marked-to-market paradigm, please demonstrate how to profit from the ostensible arbitrage opportunity investor A has created. When you show the money, it will be obvious to everyone that the emperor is naked.

While they’re in the process of designing that strategy, it would be prudent for the emperor’s accountant to follow Mr. Bader’s advice regarding the sunscreen. The emperor shouldn’t be bothered: he is perfectly safe in his magnificent clothes, thank you very much.

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Author's Response to Mr. Day's Comments

by Dimitry Mindlin*, A.S.A., M.A.A.A., Ph.D.

I'm delighted that Mr. Day finds *Reaffirming* "highly entertaining." However, I wouldn't advertise the "entertainment" component of this discussion. A young aspiring actuary might think, "If these guys consider this stuff entertaining, their day jobs must be unbearably dull." We don't want to make it that obvious.

Mr. Day takes this discussion in a very interesting direction. He is correct to emphasize the importance of the language we utilize. The "items of a semantic nature" present a valuable contribution to this discussion. I respond to Mr. Day's comments in the same order as they appear in his piece.

Value

Mr. Day gives us an intriguing example of an object that can be of insignificant value in one sense and highly valuable in another. But as fascinating as the "running water" example is, it is an imperfect illustration for the subject of this discussion; certain components of the running water example are not readily quantifiable. What would be the value of a glass of water if you were dying of thirst in a desert? It's a great question, but we may want to leave it there for now: the answer has little to do with financial economics. Fresh air would be the ultimate example of an object that has no value: it's free, but, at the same time, it is immeasurably valuable to any breathing being. It remains to be seen if this example is helpful in this debate; count me as unconvinced.

We are in the business of valuing of future cash flows of uncertain timing and magnitude. The values we deal with are inherently quantitative. The desire to stay within the category of quantitative values leads me to a slightly different example, which, to me, serves as a good illustration of the two versions of the value concept.

Think of an automotive vehicle. Version 1 of the value concept from Mr. Day's dictionary is the

price of the vehicle: it is "the worth of a thing as estimated in terms of a medium of exchange." This value is expressed in monetary units.

Let's consider some other properties of the vehicle:

1. 0 to 60 mph acceleration time
2. Towing capacity
3. Number of passengers
4. Mileage
5. Safety grade (1 to 5 stars).

Each property on this list is an example of version 2 of the value concept: it is a "property of a thing because of which it is esteemed, desirable, or useful." All these properties are quantifiable.

While version 1 of the value concept is expressed in monetary units, version 2 of the value concept may be expressed in seconds, pounds, number of people, miles per gallon of fuel, or vaguely defined "stars." Mr. Day believes that the two versions "are very different." While some differences do exist, the two versions are fundamentally similar. Both versions are *measurements* of the object under consideration. The object can be measured in monetary or other units, but the result is the same—we assign a number to the object. "The

tension between these values” is not caused by the difference in the value concepts. Rather, it’s a reflection of the fact that an object can be valued differently for different purposes and by different stakeholders.

For example, the same vehicle can have high mileage and little towing capacity—it can be highly valuable to a student and of little value to an owner of a boat. The difference in the values of water in Mr. Day’s example exists because Mr. Day plays two different roles: a customer of the water service in version 1 and an individual who needs water for his survival in version 2. It comes as no surprise that two different perspectives generate two different values of the same object. Most objects allow multiple measurements. Even cash may occasionally exhibit this quality.

Now let’s get back to the actuarial models. Here’s the difference between *Reinventing* and *Reaffirming* in a nutshell. *Reinventing* declares that the price of the hypothetical matching asset is the only legitimate measurement of a series of future cash flows. *Reaffirming* argues that a series of future cash flows can be measured in many ways. The problem of *funding* a series of future cash flows is more comprehensive than the problem of *pricing* the series. One of the reasons for the existence of multiple measurements of a series of future cash flows is the presence of risk: different risk tolerance levels may require different measurements.

Liability

We look at the issues in this discussion from different perspectives. Actuaries, economists, investment professionals, accountants, et al.—we all have strong views shaped by our education and experience. As we operate in different areas of the pension and other industries, it’s no wonder that we perceive certain matters differently. The liability concept is a good example of this phenomenon.

I am convinced that the word “liability” has been largely overused in the actuarial and financial

literature. There are simply too many objects called a “liability.” Conventional actuarial reports have no shortage of those liabilities: accrued liability, current liabilities, ABO, PBO, and several others. But some authors recognize other liabilities as well. “The investor’s problem is to fund a stream of liabilities,” writes Bernstein (2003). It sounds like that liability is an individual payment in a series of future cash flows. In this context, “a stream of liabilities” most likely means “a stream of payments,” but it is disconcerting that we have to guess about the meaning of the word. Kneafsey (2003) employs a similar definition: “Construct a series of cash flows needed to successfully reach one’s goal. This is the liability.” In Ryan and Fabozzi (2002), the word has two distinct meanings in the same sentence: “the liabilities are valued as the present value of future liabilities.” After all, what is the liability: a series of future cash flows or a single value?

Let’s assume for a moment that we have agreed that the liability is a single value. Principle 4 in *Reinventing* declares that the price of the hypothetical matching asset is the only economically correct measurement that can be called a liability. If that price is greater than the market value of assets in the pension fund when the plan is terminated, the sponsor is liable for the difference in the most stringent interpretation of the word “liable.”

But what are we discussing: the issues of financial economics or the desired stringency levels of the word “liable”? Imagine that the sponsor has created a schedule of contributions to fund its pension commitment (e.g., as a fixed percentage of payroll). If the scheduled value of assets at the present is greater than the market value of assets in the pension fund, the sponsor is “liable” for the difference in a sense that is stringent enough to compel a relatively large group of relatively reasonable people to call the scheduled value an accrued *liability*. So what is the crux of the issue: the scheduled value of assets must not be named a “liability” because the term is reserved for something else, or the scheduled value

of assets must not be named a “liability” because the value is of no interest to anyone?

Reinventing proposes to use the term “liability” exclusively for the purposes of financial accounting. Of course, we can define the liability as the price of the hypothetical matching asset, but that’s a definition, not a principle. Even if everyone accepted the terminology *Reinventing* advocates, we’d still have to come up with a new terminology for other measurements of pension commitments that are of vital interest for the stakeholders in the pension industry. We can argue about wording conventions, but this argument has little to do with financial economics. The argument is an exercise in semantics.

Even if all the governing bodies that regulate the pension industry reinvented themselves and collectively eliminated all definitions of liability except the one that’s equal to the price of the hypothetical matching asset, we would still have a multitude of measurements of pension commitments because *they are needed for the prudent pension plan management*. That “reinvention” would move the pension funding from the tightly regulated area of traditional actuarial valuations to a loosely regulated area of broadly defined asset-liability management. Even if no governing body is interested in looking at the benefit levels the plan participants will get at retirement (the future service included), the rest of us should look at those levels anyway. Even if all the governing bodies are interested in the termination valuation only, the rest of us should still attempt to create a disciplined funding methodology for pension plans that can be reasonably considered as “ongoing concern.” Doing otherwise would be less than prudent.

As far as the semantics is concerned, we have two options on the table. *Reinventing* proposes to reserve the term “liability” for the financial accounting purposes only; the terminology for other objects of our interest must be reinvented. *Reaffirming* proposes the most general definition of liability that can

accommodate everyone. A stream of benefit payments (which may or may not include the future service) is called “a commitment.” To measure (or value) a commitment, we employ a discounting procedure. A broadly defined liability is a commitment discounted via *any* discounting procedure. No reinventing is required.

In light of this definition, the liability, defined in Mr. Day’s dictionary as an obligation to make a series of payments, is a commitment. In that sense Mr. Day is correct: *Reaffirming* has redefined the term. But we do need two different expressions to differentiate series of future cash flows and their measurements in our terminology. The utilization of the same term (liability) to two objects of different nature (a series of payments and a single value) is confusing and highly undesirable. Traditionally pension liability is a single value (e.g., accrued liability, current liabilities, ABO, PBO, etc.), which gives me no choice but to come up with a different term for the promised series of payments. In the case of a pension plan, the sponsor makes a *commitment* to make a series of pre-defined payments to the plan participants. That’s one of the reasons behind the choice of the term. To me, the term “commitment” has certain useful qualities associated with it.

Mr. Day is correct to note that “the case study is thus all about whether the sponsor should take on the “good deal” of equity ownership.” *Reaffirming* is perfectly open about this. The case study is a quintessential funding problem: the objective is to determine how much to contribute and how to allocate the assets. The asset that Mr. Day perceives as “unrelated” is an indispensable component of the solution to the funding problem. However, I understand why the asset may be perceived as “unrelated”: it’s truly unrelated to any accounting statement.

I disagree with Mr. Day that “the case study ... has nothing to do with liabilities as commonly defined.” It is the other way around. Those “commonly defined” accounting liabilities have nothing

to do with the case study. In the case study, the role of the policy portfolio is not to manage the sponsor's accounting statements, but to minimize cost for the stakeholders (shareholders or taxpayers) and maximize safety of the benefits for the plan participants. The matching bond portfolio happens to be one of the investment options. The price of this portfolio is roughly equal to one of the "commonly defined" liabilities—the ABO.

Arbitrage and Stakeholders

When told to think (believe, value, etc.) exactly like someone else, we should demand extraordinarily good reasons to do so. Had it not been for our natural tendency to think independently, most of us would have still been outspoken members of the Flat Earth Society.

Some economists insist that we must value a series of pension benefit payments exactly like today's bond traders value a similar series of future cash flows. What if someone refuses to comply? The punishment for doing so is supposed to be the presence of an arbitrage opportunity, but is it there?

Mr. Day is correct that "we should create arbitrage-free models of the world." But if two analysts assign different values to an asset (or a liability) because their objectives and/or risk budgets are different, this world is still arbitrage-free. If an investor believes that the market price of an asset is higher than the asset's intrinsic value, it doesn't necessarily mean that the investor's methodology must be reinvented. A difference of opinions doesn't necessarily create an arbitrage opportunity.

I agree with Mr. Day that "every piece of actuarial advice should, first, seek to identify stakeholders and, second, declare what interest they have in each financial decision, recommendation, or

assumption." Most importantly, we must identify the purpose of the valuation. As we've seen in this discussion, failure to do so may lead to assigning inappropriate values to highly valuable objects.

Conclusion

My biggest disagreement with Mr. Day is about his statement that "the majority of pension actuaries disagree with the basic tenets of financial economics." I am not qualified to comment on opinions of non-U.S. actuaries. As far as U.S. actuaries are concerned, their professional activities are driven, for the most part, not by their knowledge of financial economics, but by the existing regulations imposed by a number of governing bodies. Even if "arbitrage opportunities can be found within the system that is DB pension schemes," their existence has very little to do with pension actuarial science. There is a tendency out there to blame the actuaries and the actuarial education process for the unfortunate state of affairs in the pension industry. I believe that, for the most part, the blame is misplaced.

The areas of our agreement appear to be much bigger than the areas of our disagreement. I'd like to thank Mr. Day for his witty and thought-provoking comments.

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Author's Response to Mr. McCrory's Comments

by Dimitry Mindlin*, A.S.A., M.A.A.A., Ph.D.

Mr. McCrory is correct to recognize the different approaches to risks as one of the main themes of this discussion. There appears to be no consensus in this area. But I also agree with Mr. McCrory that the appropriateness of investment risk in a pension plan is "a discussion for another time." That discussion has been around for quite some time, and it continues in this issue of *The Pension Forum*; see Mr. Bader's "Pension Deficits: An Unnecessary Evil" and related comments.

It is true that the actuaries do not make investment decisions for their clients. The job of an actuary is to "furnish a balanced picture of risks and rewards" based on actuarial models. What makes a good actuarial model? This is one of the biggest challenges that actuaries face. Mr. McCrory makes a good point that "we must not under any circumstances make decisions for our clients implicitly in our actuarial methods, assumptions, or calculations." A good actuarial model should neither contain a hidden investment advice nor be biased toward any group of professionals that claim to have superior knowledge at this moment. Today's accepted wisdom may look imprudent tomorrow. But above all, a good actuarial model should reflect reality. For example, if a sizable group of plan sponsors invest in non-matching risky assets, a good model should be able to demonstrate the risks and

rewards that this investment decision may bring about.

There's no doubt that certain implementations of the pension actuarial model have serious problems. But at its core, the pension actuarial model is a good one. So far, I have seen neither convincing evidence to the contrary nor a credible alternative.

* *Dimitry Mindlin is a vice-president at Wilshire Associates Inc. Opinions presented in this paper are his own and do not represent positions of Wilshire Associates, Inc.*

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