Overhauling Minimum Funding Requirements[1]
A Not-So-Radical Proposal

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[1] The views expressed in this paper are solely those of the author and do not represent an official position of his employer or the Society of Actuaries.

Abstract

The contribution smoothing vehicles embedded in the U.S. pension minimum funding requirements can be summarized as follows: assets are allowed to be smoothed, liabilities are smoothed by using smoothed interest rate assumptions, and gains and losses in the unfunded accrued liability are further smoothed by amortizing them over five years. Finally, just as "smoothing" seems to be a major theme of the system, the deficit reduction contribution (DRC) trumps all prior smoothing with its volatility-increasing override. Having a funding system that smoothes input parameters (assets and liabilities) as well as outputs (gains and losses to the unfunded) gives plan sponsors only indirect incentives to manage the true economic state of the plan. The DRC override, though partially effective at increasing the level of plan funding, introduces tremendous contribution volatility into the system despite being based on indirect asset and liability measures of the true economic state of the plan. The challenge this paper tackles is to fix the minimum funding requirements so they balance the need for a healthy funding level with contribution stability and predictability. Rather than suggest patches to the current system, this paper develops a completely new set of minimum funding requirements. This proposal is "not so radical" because it retains the normal cost–plus–amortizations structure of the current system, but it overhauls everything else. The DRC is eliminated, the amortization system is revolutionized, and both assets and liabilities are marked to market. The paper discusses how this system—with several other deviations from the current system— could have significantly lower contribution volatility and earlier contribution predictability while still maintaining a stronger funding level. Although there is no perfect solution to pension funding issues, this system would encourage plan sponsors to manage the true economic state of the plan without imposing excessive contribution amounts or volatility, and it would balance the competing needs of the primary stakeholders in the pension system: plan sponsors, participants, taxpayers, the Pension Benefit Guaranty Corporation (PBGC), and society as a whole.

1. Introduction

Proposing changes to the U.S. pension minimum funding requirements is like walking a tightrope, with the PBGC pushing the tightrope walker in one direction, and plan sponsors pushing in the other. As long as PBGC guarantees exist and employers are voluntary participants in the pension system, all acceptable solutions must balance the needs of both parties. This Proposed System seeks to balance the two opposing forces: the need for smooth and predictable contribution levels and the need for adequate funding levels.[2]

We will start with a brief analysis of the current system: a puzzle wrapped inside an enigma. The contribution smoothing vehicles currently embedded in the minimum funding requirements create a convoluted maze in which

1. Assets are allowed to be smoothed over five years and
2. Liabilities are smoothed by using nonmarket interest rates—the long-term expected rate of return on assets for the ERISA accrued liability, and a four-year weighted average interest rate for the RPA current liability—and liabilities are also smoothed by using long-term assumptions for other items, such as the 417(e) lump-sum interest rate assumed in valuations
3. Gains and losses to the unfunded accrued liability, which are based on these smoothed assets and liabilities, are further smoothed by amortizing them over five years, and
4. All prior smoothing is bulldozed with the volatility-increasing mechanisms built into the DRC.

The first three smoothing mechanisms operate independently of each other, not together, and the fourth is an override feature that often works in the opposite direction of the others. A funding system that smoothes input parameters (assets and liabilities) as well as outputs (gains and losses to the unfunded) gives plan sponsors only indirect incentives to manage the true economic state of the plan. A better system would capture the true economic unfunded liability and have a smoothing mechanism to fund that unfunded over time. The DRC override, though partially effective at increasing the level of plan funding, adds tremendous contribution volatility to the system. A better system would eliminate the DRC, but with the caveat that it must be replaced with another feature to ensure a sufficient funding level.

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[2] The term "Proposed System" is capitalized throughout this paper and refers to the revised minimum funding requirement system described herein.

The current system is a disaster, and many plan sponsors are letting us know it by freezing their plans to minimize their long-term involvement with defined benefit plans. The contribution requirements must be rebuilt from the ground up, and this paper describes a set of alternative requirements. The Proposed System would retain the normal cost–plus–amortizations structure of the current system, eliminate the DRC, and reinvent the basic structure of the amortizations (not simply changing the amortization periods). Further, both assets and liabilities would be marked to market, and there would be a single contribution volatility-reducing mechanism. Since minimizing contribution volatility is absolutely imperative for the survival of defined benefit plans, these changes—along with several additional deviations from the current system—have been designed to significantly lower the volatility embedded in the current requirements.

Further, the Proposed System is designed to allow for more accurate contribution forecasting. Plan sponsors would be able to foresee large contributions several years ahead of when they need to be made. Not only would sponsors be able to better plan for future contributions, they would also have the flexibility to defer those contributions just long enough for the business cycle to improve—avoiding the "kick you while you're down" feature of some proposed pension systems that impose the greatest contribution shocks when the economy is at its lowest point.

Walking a tightrope is challenging. I hope the reader will agree that the minimum funding requirements of the Proposed System balance the needs of all parties involved.

2. Proposed System: Basic Parameters

The minimum contribution would be calculated as the normal cost, plus amortizations, minus the credit balance. A simplified balance equation, without a reconciliation account, would hold

Unfunded Liability = Outstanding Balance of Amortization Bases – Credit Balance.
There are several key differences, however, between the way the current system and the Proposed System calculate the unfunded liability and amortization bases. The Proposed System is outlined below.

2.1 Assets

Assets would be valued at market.

2.2 Liabilities

Liabilities would be valued with current market yields on fixed-income securities, using either a yield curve approach or a single discount rate reflective of long-term fixed-income interest rates. The term "current market yields" should not be interpreted so strictly as to disallow smoothing interest rates over a short period (say, 30 to 90 days) to avoid volatility from temporary interest rate drops, although too much interest rate smoothing can make hedging difficult. This paper does not go into the details of how to compute the appropriate market yield: corporate bonds versus government bonds, a single discount rate versus a yield curve, government mandated versus determined by the actuary, and so on.

Plan liabilities should also be measured with the Traditional Unit Credit cost method (assuming no future salary increases). Future salary increases, like future service, have not become a plan liability yet. Plans should be required to fund benefits as they accrue, but not in advance. Thus sponsors should not be required to fund salary increases that haven't been earned yet. Plan sponsors may strategically choose to fund their plans based on a Projected Unit Credit method, but they should not be *required* to fund to a target in excess of the Traditional Unit Credit.[3]

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[3] There are several inconsistencies in the treatment of projected unit credit accrued liabilities in the current system. First, although final average pay plans are required to fund expected future pay increases, flat dollar union plans that are routinely amended to improve the benefit formula are not allowed to assume such improvements, though the actuary may be reasonably confident that they may occur. Second, though career average pay plans are allowed to use the Traditional Unit Credit cost method, final average pay plans are not. Third, freezing a final average pay plan should reduce future benefit accruals, but not the accrued liability, which is *theoretically* supposed to represent only the piece of

2.3 Deficit Reduction Contribution

The DRC, which was created to ensure that plan funding would not fall below a certain threshold, would be eliminated. It would be unnecessary in the Proposed System, since the accrued liability would be calculated with an interest rate based on long-term fixed-income rates, which would ensure that plan funding remains strong.

2.4 Amortization Bases

The Proposed System would dramatically alter the amortization of bases in several ways. First, it would eliminate simultaneous amortization of gains and losses. Actuarial gains would offset existing loss bases before setting up a new base, and actuarial losses would offset gains before setting up a new base. This would reduce contribution volatility, as discussed in detail in Appendix B, section B.4.

Second, the amortization period for plan amendments would be substantially reduced. Although the current minimum funding requirements allow plan amendment bases to be amortized over 30 years, plans are usually forced to fund them much faster because of the implicit 90 percent funded ratio target in the DRC. This paper presents a contribution requirement system that eliminates the DRC, so it is reasonable to reduce the amortization period for plan amendments. Amendments for improvements to union benefits should be paid for over a period no longer than the time until the next union negotiations. The cost of plan improvements for nonunion groups should be spread over much less than 30 years; a more reasonable amortization period would be around three to eight years.[4]

Liability changes due to modifying plan assumptions represent liabilities already accrued. The Proposed System would group assumption changes, including changes in the valuation interest rate, with actuarial gains and losses for amortization purposes. Their treatment is described below.

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the benefit that is already accrued and can't be taken away. With the Projected Unit Credit method, freezing final average pay plans reduces the accrued liability that is theoretically supposed to represent past service. The term "accrued liability" is a misnomer for cost methods other than Traditional Unit Credit.

[4] The PBGC's guarantees for plan improvements, currently phased in over five years, should also be modified to phase in over a period at least 8.5 months longer than the amortization period for the plan amendment base. It is intuitive to understand why the PBGC's guarantees should be phased in over the amortization period, and the additional 8.5 months is logical because receivable contributions for a plan year can be made up to 8.5 months after the end of the calendar year.

Although plan sponsors are now required to amortize actuarial gains and losses over five years, it is logical to lengthen this period as we eliminate smoothing of the inputs to the actuarial gain/loss calculation, disallowing asset smoothing, and requiring liabilities to be valued with current market fixed-income yields. It is a challenging issue to determine the optimal amortization period for gains and losses. A period that is too short would create excess contribution volatility, making it difficult for plan sponsors to anticipate their future contribution requirements. But a period that is too long would allow extended periods of plan underfunding. We can balance both of these objectives by changing the fundamental structure of the amortizations: abandoning the requirement of level-dollar amortization amounts. If amortization payments could start small and increase over the period of amortization, the immediate shock of actuarial losses on contribution amounts would be reduced, and the actuarial loss would still have to be paid for over a reasonable amount of time. We call this type of amortization an "Increasing Dollar Amortization" (IDA).[5]

Below is an example of how an IDA system might work, assuming a $1,000,000 loss with a seven-year amortization period and a 7 percent valuation interest rate. Appendix G provides greater detail for the derivation of the Proposed System.

Plan Year Beginning January 1st	Outstanding Balance with Level Amortization Schedule (Current Law)	Annual Amortization Amount with Level Amortization Schedule (Current Law)[6]	Outstanding Balance with an IDA Schedule (Proposed System)	Annual Amortization Amount with an IDA Schedule (Proposed System)[7]
2005	$1,000,000	$185,553	$1,000,000	$70,000
2006	884,447	185,553	1,000,000	117,619
2007	760,805	185,553	952,381	161,905
2008	628,508	185,553	857,143	202,857
2009	486,950	185,553	714,286	240,476
2010	335,484	185,553	523,810	274,762
2011	173,414	185,553	285,714	305,714
2012	0	0	0	0

Both amortization schedules pay the entire $1,000,000 loss within seven years. but notice how, in the year immediately after the loss, the level dollar amortization schedule requires contributions to increase by $185,553, whereas the IDA schedule

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[5] The idea of IDA schedules was originally suggested to me by Jeffrey Brown.
[6] Amortization amounts are stated as of the end of the plan year.
[7] Amortization amounts are stated as of the end of the plan year.

requires them to increase by only $70,000. An IDA schedule dampens the contribution shock that the actuarial loss causes. Although the plan sponsor would eventually have to pay the entire amount of the loss in both schedules, the IDA schedule allows sponsors more time to *anticipate* the bulk of the contributions and *plan* their budget accordingly. Plan sponsors have a fierce desire to foresee large contribution increases several years ahead, and an IDA schedule fulfills that desire while still requiring them to fund actuarial losses over a reasonable amount of time (seven years in this example).

From the table above, it may initially seem that an IDA schedule would cause more contribution volatility than level dollar amortizations. This appearance is deceptive for two reasons:

- Some plan sponsors might prefer to contribute based on a level dollar amortization schedule instead of an IDA schedule. If the IDA schedule were law, then sponsors could fund losses on a level schedule and increase their credit balance in the early years of the amortization period. Thus the IDA schedule provides enough funding flexibility to contribute based on a level dollar amortization schedule.
- The large contributions that occur in the last few years of the amortization period might never need to be paid with cash contributions, since actuarial gains could offset the loss amortization bases before the end of the period. This feature would minimize the apparent volatility and danger of the IDA schedule.
- Although the contribution back-loading of an IDA schedule would result in increased contributions for sponsors that invested in equities during an extended bear market, this volatility should be more manageable because the amortization amounts are known in advance and the sponsors would see them coming several years ahead.

Ultimately, the IDA schedule would reduce contribution shocks, decrease volatility, and improve plan sponsors' ability to plan their budgets without allowing an excessively long period of time to fund actuarial losses.

A seeming downside is that IDA schedules require slower movement toward the target funding level when compared to level dollar amortization schedules with the same period. This is not a fair comparison, however, because IDA schedules give plan sponsors greater flexibility and planning capabilities than level dollar amortization schedules with the same period, and IDAs require faster movement toward the target funding level when compared to level dollar amortization schedules with longer periods. IDA schedules offer the best of both worlds, combining the greater planning

ability of longer amortization periods with the fast movement toward the target liability of shorter amortization periods.

An IDA schedule would allow plan sponsors increasing funding flexibility and planning capabilities, while simultaneously preventing plans from remaining underfunded for too long. Further, as compared to a level dollar amortization schedule, plan losses occurring during recessions could be more effectively deferred until the economy improved, thus minimizing the likelihood that pension funding requirements would drive struggling companies into bankruptcy.

2.5 Credit Balance

Plan sponsors would be reluctant to make contributions exceeding the minimum if those contributions would not provide a dollar-for-dollar increase in contribution flexibility for the following year. Thus the Funding Standard Account Credit Balance would continue to exist in the Proposed System and increase when contributions were made in excess of the minimum. Further, the credit balance would increase or decrease each year based on the actual rate of return on plan investments, rather than the assumed valuation interest rate.[8] These provisions would provide funding flexibility and sufficient, but not excessive, incentive for plan sponsors to make contributions exceeding the minimum.

It has been observed that in the current system, there are some severely underfunded plans with large credit balances, which indicates a systematic problem. This phenomenon occurs primarily for three reasons:

1. Amortization bases for plan amendments are funded over 30 years. This is an excessively long time, especially for situations in which amendments are made regularly, such as union negotiations. Funding for these plans can be perpetually lagging.
2. Plans might be well funded based on the smoothed asset value and actuarial accrued liability, often calculated with an interest rate around 8-9 percent, but poorly funded on an economic market-value basis, or even an RPA current liability basis. The interaction of the two liability measures allows plans that are poorly funded based on one measure to have a credit balance generated based on the other.

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[8] The idea of rolling forward the credit balance with the actual return on plan assets rather than the valuation interest rate has appeared in other funding reform proposals including the proposal by Mercer and the issue analysis by the American Academy of Actuaries.

3. Credit balances generated by contributions in excess of the minimum continued to increase at the valuation interest rate, though plan assets might subsequently lose value.

This proposal addresses all of these situations by avoiding lengthy amortization periods, having a single liability measure, and rolling the credit balance forward annually with actual asset returns. Further, in all cases, a plan's funded ratio would be at least as strong as if it made only the minimum contribution. With these revisions to the mechanics of the credit balance, arguments suggesting that the existence of the credit balance weakens the PBGC's financial position fall apart.

2.6 Full Funding Limit

A full funding limit would exist to avoid requiring plan sponsors to make contributions for plans funded above their target funding level. Plans that were overfunded by an amount greater than the credit balance would be required to reset all bases to zero, and the balance equation would not hold.

3. Proposed System: Other Parameters

3.1 Maximum Contribution

Although the purpose of this paper is not to discuss details of necessary revisions to the maximum contribution, I'll note that the maximum contribution must be large enough to allow sponsors a reasonable degree of funding flexibility. Specifically, many plan sponsors would prefer to fund more when their corporate cash flows were strong, and less when corporate cash flows were weak. The maximum contribution must be large enough to allow most plan sponsors to have a funding policy that anticipates the business cycle.

3.2 Retrieving Assets from Overfunded Plans

Plan sponsors are reluctant to create a surplus that they may never be able to use. Consequently, they should have greater ability to retrieve assets without excise taxes if their plans are over 120 percent funded. In situations of largely overfunded plans, with funded ratios in excess of 140 percent, sponsors should be *required* to retrieve assets from the plan trust. Because pension contributions are not subject to corporate income tax, it is reasonable to assess corporate income tax in assets returned to the sponsor, but not additional excise taxes or other kinds of double taxation.

These rules rely on the philosophy that a good pension funding scheme would provide incentives (but not requirements) for plans to target moderately overfunded levels. A moderate level of overfunding is healthy because it provides benefit security for participants, contribution flexibility and volatility protection for plan sponsors, and a safety buffer for the PBGC. But plan sponsors should also be prevented from taking advantage of tax shelters awarded to pensions.

Further, plans that fund between the minimum required and maximum allowable contributions should be viewed by the law as having a reasonable funding policy. If circumstances occur in which the plan becomes massively overfunded, the plan sponsor should not be penalized with excise taxes for having funded within the allowable range.

It should be noted that the issue of asset reversions may become increasingly important in the decades ahead as the number of frozen defined benefit plans increases and their demographics age. As frozen plans age, they will have paid out large fractions of their assets and liabilities. Because of this, and the possibility of asset returns exceeding liability discount rates over a long period, some frozen plans may have

funded ratios well in excess of 100 percent without making additional contributions. Penalizing these plan sponsors with large excise taxes, in addition to being unfair, provides poor short-term incentives to fund plans in excess of the minimum. Sponsors that have frozen plans or are considering freezing their plans have little incentive to ever contribute more than the minimum, even though the plans might be underfunded in the short term. The sponsor's funding policy would be dictated by a strategy of avoiding the possibility of becoming overfunded in the future and being forced to pay large excise taxes on asset reversions, which may not be an optimal funding policy for other pension stakeholders.

To summarize, allowing asset reversions without large excise taxes for plans over 120 percent funded would provide additional incentive for sponsors to target moderate overfunding. Requiring asset reversions for plans in excess of 140 percent funded would prevent pension plan sponsors from misusing the tax shelters provided to pension plans. Together, these two rule revisions would strengthen the pension funding system.

3.3 PBGC's Claim to Company Assets in Bankruptcy

The PBGC has been one of the major drivers of pension funding reform. As background, it should be noted that the PBGC was created to protect defined benefit pensions, and it would be sadly ironic if we made rules to protect the PBGC that resulted in destroying the defined benefit system by making it unpalatable for plan sponsors.

The PBGC's concern—justifiably—is that some plan sponsors have perpetually underfunded pension plans, and then dump the unfunded liability on the PBGC if the sponsor goes bankrupt. Funding law should not provide indirect incentives for weak plan sponsors to increase benefits and take risks at the expense of other parties. There are several ways to address this moral hazard:

1. *Force sponsors to fully fund their plans on a plan termination basis, yielding lower liabilities for the PBGC.* Unfortunately, this could impose tremendous burdens on plan sponsors. They would have to fund at a much higher level, and their contributions would be much more volatile. This would drive some struggling sponsors into bankruptcy, and healthy plan sponsors would exit the defined benefit arena. This solution does not effectively balance the PBGC's needs with those of other stakeholders.

2. *Raise PBGC premiums.* Although this solution would improve the PBGC's financial position, this isn't an optimal solution because it forces healthy

pension sponsors to pay for dying sponsors. Increasing the regulatory cost of having a plan and shifting additional burdens to responsible plan sponsors would drive them from the defined benefit arena.

3. *Give the PBGC a higher claim to company assets in the event of bankruptcy.* This would go further than simply giving the PBGC priority for missed contributions; rather, it would give them a lien on assets up to the unfunded liability. This solution doesn't have the downsides of the first two options. First, it doesn't impose the excessive contributions and contribution volatility that would disrupt plan sponsors' core business operations. Second, it would force plan-sponsoring companies to pay for the pension obligations they promise, rather than requiring that surviving plan sponsors foot the bill for the unfunded liabilities of dying sponsors, and third, it would make plan sponsors more focused on the long-term funding level of their plans as their investors and creditors became more focused on pension funding.

Solution 3 should financially protect the PBGC, while avoiding the pitfalls of other solutions that would cause companies to leave the defined benefit plan arena. Although there is a downside—namely, that equity and bond holders would have a lower claim to company assets in bankruptcy—this is still a better solution than creating regulations that are likely to endanger defined benefit plans or to force taxpayers to foot the bill for failed pensions. Although the PBGC would still have some residual liability in most bankruptcies, solution 3 is optimal precisely because it forces companies to pay for the pensions they promise.

Since this would significantly change the structure of bankruptcy claims, several caveats should be laid out.

- An orderly transition to the new bankruptcy structure is imperative. It would not be fair to change bankruptcy laws to hurt creditors that have already made agreements with plan sponsors, relying on the claim priority embedded in current law. It is reasonable to grandfather existing debt agreements into their current bankruptcy priority and have the new priority system apply only to future agreements.
- The new bankruptcy priority system should not give the PBGC the highest priority among all creditors—such a high priority as to greatly disrupt plan sponsors' core business operations. That is, companies should not excessively fear doing business with pension plan sponsors. The author's goal in suggesting bankruptcy priority changes is to avoid mandating a pension system that substantially increases PBGC premiums or contribution

volatility—things that drive sponsors into financial distress. Bankruptcy priority changes that force more companies into financial distress would not reflect the spirit of this idea.

It has been noted that "the devil is in the details" of any sort of bankruptcy priority reform. This is certainly a fair concern. The author of this paper is not a bankruptcy expert, so those details would have to be worked out by others, keeping in mind the spirit of the reasons for such changes.

3.4 Restructure the PBGC Premium System

The PBGC premium system has not kept the PBGC out of a long-term financial deficit, nor does it treat plan sponsors fairly. Although a comprehensive analysis of this issue is beyond the score of this paper, a few observations will be noted. There are two main issues to address: the PBGC is underfunded based on past liabilities, and there are concerns about its ongoing financial health if the current premium system is not changed. These two issues should be considered separately.

Past deficit: The PBGC's current unfunded liability is a sunk cost, and it will have to be paid for somehow. Some options for this include paying for it with general tax revenues of the federal government, specific taxes on the industries that defaulted the most unfunded pensions on the PBGC (primarily the airline and steel industries), or increasing PBGC premiums to make surviving defined benefit plan sponsors cover the past deficit. All of these options have consequences. It should be noted that making surviving defined benefit plan sponsors pay for the past deficit through increased PBGC premiums would be a very significant burden, and would likely weaken the defined benefit system by making it unattractive for sponsors to continue their plans without freezing participation or benefits. Forcing the surviving sponsors to cover past losses of the PBGC would put a tremendous burden on a system that is already strained, and will likely result in significantly fewer employees covered by defined benefit plans and the long-term erosion of the financial condition of America's workers. Although the specific way to pay for the PBGC's current unfunded liability is beyond the scope of this paper, the ramifications of this decision should be considered carefully.

Future ongoing costs: The flat rate portion of PBGC premiums should be based on plan liabilities, not headcount. The flat rate premium in the current system is based on the participant headcount, without regard for the liability represented by each participant. Two plans with the same assets and liabilities could have vastly different PBGC flat rate premiums. It makes more sense to change the flat rate premium so it is

based on plan liabilities, which has a stronger correlation to the risk incurred by the PBGC.

Second, the PBGC premium formula should be weighted more toward variable rate premiums (based on a plan's underfunded amount) and less toward flat rate premiums. Although it is reasonable to charge PBGC premiums to most fully funded plans, as they still represent some risk to the PBGC, the flat rate portion of PBGC premiums has a disproportionate impact on well-funded plans when comparing the premium amount to the risk a plan represents to the PBGC. Shifting the premium system to place a larger weight on variable rate premiums and a smaller weight on flat rate premiums would not only be fairer, but it would also provide further incentive for plan sponsors to maintain well-funded plans.

Finally, PBGC premiums should be affected by the financial health of the plan sponsor. Financially unhealthy sponsors represent a much greater risk to the PBGC than healthy ones, so they should be required to pay greater premiums. Conversely, financially healthy sponsors should have lower PBGC premiums proportionate to the risk they pose to the PBGC. This type of premium structure would be a Darwinian structure encouraging healthy plan sponsors to remain in the defined benefit system.

4. Ramifications of the Proposed System

The massive changes proposed in this paper would have numerous effects on the pension funding system. An analysis of these ramifications follows.

4.1 Reduces Contribution Volatility

Although many pension actuaries have a preconceived notion that contribution volatility would increase in any system requiring the use of market values for both assets and liabilities, this notion is false, and the contribution rules proposed in this paper are an example of such a system. The Proposed System would reduce contribution volatility in the following ways:

1. Eliminating the DRC, a major source of volatility in the current requirements.
2. Basing actuarial gain and loss amortizations on an IDA schedule, so major actuarial experience shocks would not mandate immediate contribution shocks.
3. Not permitting simultaneous amortizations of gains and losses. By requiring that new gains and losses offset existing amortization bases of the opposite sign, the impact of amortizations on contribution requirements would be diminished. Thus contributions would be more likely to remain near the normal cost.

Finally, it should be noted that even though the current system allows smoothing of assets and liabilities, it does not allow sponsors to avoid contribution volatility when there are significant actuarial gains and losses. By way of requiring sponsors to have a long-term funding target of 90 percent of RPA current liability, the current system prevents plan sponsors from escaping fluctuations in interest rates and assets values. Both the current system and Proposed System require sponsors to fund based on variations of market assets and liabilities, but the Proposed System simply provides a less volatile mechanism.

4.2 Improves Sponsors' Ability to Foresee Contributions

Although reducing contribution volatility is extremely important, it is practically impossible to have a system that eliminates contribution volatility for traditional pension plans that invest in equities. However, a substitute goal would be to allow plan sponsors to foresee large contribution changes well in advance. The current system fails to do that. Sponsors often try to determine what they need to contribute to exceed the

80 or 90 percent thresholds used in the DRC exemption, but they are not able to have the actuarial information they need more than a few months before the receivable contribution deadline.

The inability to foresee contributions makes plan sponsors feel that they have little control over their plans, and the Proposed System substantially curbs this problem. Two features—completely eliminating the DRC and replacing level dollar amortization schedules with IDA schedules—allow sponsors to anticipate and plan for large increases in contributions several years in advance. For this reason, the cash flow requirements of pension plans would be less disruptive to the core business needs of their sponsors.

It should be noted that the author has intentionally not presented empirical simulated data to demonstrate the effect of the Proposed System on contribution volatility. There is an important reason for this. The system proposed here is designed not only to decrease contribution volatility, but also to improve sponsors' ability to anticipate contributions years in advance and reduce surprise contribution shocks. The IDA schedule is not designed for sponsors whose funding policy is to contribute the minimum required contribution every year. Rather, it is designed to provide flexibility so plan sponsors could structure their contribution policy several years into the future. An empirical simulation would not reflect the benefit that in the event of actuarial losses the Proposed System would give plan sponsors a much greater ability to predict contribution increases and decide whether to start funding them immediately or wait a couple of years.

4.3 Provides Accurate and Higher Long-Term Funding Levels

The Proposed System has a long-term funding target of 100 percent of the liabilities, which is higher than the current target of 90 percent of the RPA current liability.[9]

4.4 Improves the PBGC's Risk Position

The Proposed System would improve the PBGC's risk position in two major ways. First, a 100 percent market value–based funding target would reduce systematic pension plan underfunding. Second, giving the PBGC a higher priority claim on residual company assets in bankruptcy would diminish its exposure in the event of bankruptcy. This would also reduce the moral hazard of struggling companies

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[9] Although the Proposed System is described with a long-term 100 percent funding target, the basic structure is robust to different funding targets, as described in Appendix C, section C.2.

anticipating a possible future bankruptcy, negotiating higher union benefits in lieu of cash compensation increases, and forcing the PBGC to cover unfunded liabilities if bankruptcy eventually occurs a few years later.

4.5 Provides Sponsors with a Truer Picture of Plan Funded Status

The Proposed System also would promote transparency and prevent plan sponsors from having a clouded perception of their funded status by not allowing them to measure the plan's funded status based on lagging values of assets or liabilities.

4.6 Encourages Plan Sponsors to Manage the True Economic State of Their Plans

The Proposed System bases contribution requirements primarily on the true economic state of the assets and liabilities of the plan, rather than a complex set of formulas involving assets and liabilities measured with lagging assumptions. Consequently, the Proposed System would encourage plan sponsors to manage the true economic state of their plans more closely, rather than manage their funding policy to strategically hit arbitrary funding targets set by regulators. Aligning regulatory requirements with true economic values would allow sponsors to manage both simultaneously.

4.7 More Closely Aligns Accounting and Funding Results

In the Proposed System, the assets and liabilities used for funding valuations would be better correlated with those used on the plan sponsor's accounting balance sheet. This would make it easier for sponsors to have a contribution strategy that managed both accounting and funding results simultaneously.

4.8 Avoids Unfairly Favoring Assets That Mismatch Liabilities

The current system treats the various types of gains and losses differently. For example, gains and losses on assets can be integrated into the actuarial value of assets over five years, then the resulting actuarial losses would be amortized over another five years (totaling 10 years to pay for asset losses fully, detailed in Appendix E); gains and losses due to changing interest rates are integrated into the RPA current liability using a four-year weighted average interest rate, then paid for over an additional three to four years with the DRC; and gains and losses due to retirement and termination experience must be recognized in plan liabilities immediately and paid for by amortizing actuarial losses over five years. This system of treating some types of gains and losses more favorably than others gives plan sponsors incentives to take risks in the areas that allow

the most smoothing but avoid risks in the areas that allow the least smoothing. Specifically, asset and interest rate gains and losses receive more favorable treatment than other types of gains and losses, which unfairly favors risky investments. The Proposed System would give all gains and losses equal smoothing treatment.

4.9 Prevents Plan Sponsors from Minimizing Contributions to Frozen Plans

Because future asset returns are uncertain, sponsors of frozen pension plans may be in a situation in which they unexpectedly have excess assets a few decades after the plan is frozen. The current system heavily taxes excess assets that are returned to the sponsor. For this reason, many sponsors of frozen plans have a funding policy of minimizing near-term contributions, though their plans may not be fully funded, and this can create contribution volatility. Allowing asset reversions to sponsors of overfunded plans would reduce this fear, and an increasing number of sponsors of frozen plans would not be as reluctant to fully fund their plans.

4.10 Prevents Financial Healthy Plan Sponsors from Paying Disproportionate Amounts of PBGC Premiums

By structuring the PBGC premium system to better reflect the true risk that a plan sponsor represents to the PBGC, financially healthy plan sponsors would not be required to foot the bill for unhealthy sponsors. This would provide greater incentive for the healthy to remain in the defined benefit arena, and the unhealthy to leave.

5. Stakeholder Reactions

There are many stakeholders in the defined benefit pension system, and the changes in the Proposed System would affect each of them differently.

5.1 Plan Sponsors

Most plan sponsors should view this proposal as a net improvement. The volatility of their contributions would be reduced, largely because of the elimination of the DRC. The IDA schedules would improve their ability to budget future contributions several years in advance, and they would be able to retrieve assets from overfunded plans. A downside is that the overall contribution levels would be slightly higher because of a long-term funding target of 100 percent of the plan liability instead of the 90 percent of RPA current liability target embedded in the current rules.[10] For underfunded plans, the transition to the new system might or might not be a greater burden than the DRC, so that factor could work either for or against the sponsor. Additionally, sponsors—especially financially unhealthy companies and sponsors of underfunded plans—might be troubled by the PBGC's increased priority on company assets in the event of bankruptcy. This could increase their cost of borrowing money in the bond market, as bondholders would have a greater risk of default. Overall, although plan sponsors will see both pros and cons in the system proposed here, reducing the volatility and unpredictability of contributions should provide justification for most of them to support the Proposed System.

5.2 Plan Participants

Although stronger long-term funding levels would provide additional security for plan participants, the average participant is not overly concerned with the plan's funding level. However, defined benefit plans provide a valuable benefit to their participants, protecting them from both investment and longevity (mortality) risk. To the extent that this paper's proposed changes to minimum funding requirements will encourage plan sponsors to maintain, rather than freeze, their defined benefit plans, the plan participants would benefit greatly from this proposal.

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[10] It should be noted that over a very long horizon, plan sponsors' funding requirements are based on the benefits they promise in the plan document, and the minimum funding requirements don't affect that. Minimum funding requirements do affect when the benefit promises must be funded. Most plan sponsors take the short-horizon view that increasing the level of funding required is an increase in the plan cost, though this view may not be fully accurate over a perpetual horizon.

5.3 PBGC

The PBGC would benefit from higher long-term pension funding levels as well as its improved ability to collect assets from underfunded, bankrupt sponsors. The PBGC might be concerned with the IDAs, however, because such amortizations do not require huge immediate contributions in years following actuarial losses. But it should be noted that the IDA schedule is an alternative to a level dollar amortization schedule with a *much* longer period of amortization. Although the PBGC must speak for itself, the author suspects that it would be more agreeable to a seven-to-ten-year IDA schedule than a level dollar amortization schedule with a much longer period. A seven-year IDA schedule would provide plan sponsors with a greater ability to budget their future contributions in the years after an actuarial loss, but it would not have the downside of giving sponsors an excessively long period of time to fund the loss.

5.4 IRS

Tax revenue would decrease because of the additional tax-deductible contributions that would be made to fund pensions at a target level of 100 percent. On the other hand, there would be an increase in corporate income tax revenue due to the increased number of asset reversions, though this would be partially offset by lost revenue from the elimination of excise taxes on asset reversions.

5.5 Taxpayers

Although taxpayers would be negatively affected by reduced corporate tax revenues caused by the increased pension contributions (discussed above), they are likely to have to bail out the PBGC eventually if its financial condition further deteriorates. In this sense, a victory for the PBGC is good for the taxpayers.

5.6 Bondholders and Other Creditors of Plan Sponsors

Existing creditors would be grandfathered into the bankruptcy priority they assumed at the time the loan was issued, so they would not be substantially affected by the change in bankruptcy priority. New bondholders, concerned that the PBGC would have an increased claim on company assets in bankruptcy, might demand higher yields from companies with underfunded pension plans. Consequently, neither existing nor new bondholders would be worse off under the Proposed System, although the risk/reward tradeoff for new bondholders would change. Creditors would be positively affected by the plan sponsor's improved ability to run their core business due to

increased ability to anticipate and budget for future contributions, and they would also reap long-term security gains from the improved funded status of plans.

5.7 Unions

Unions are bound to look favorably on some aspects of the Proposed System, and oppose other aspects. They might worry that reducing the amortization period for plan amendments would make it more difficult to negotiate amendments; note, however, that DRC rules in the current system already require sponsors to fund 90 percent of benefit increases over a relatively short period. Unions should be pleased that the Proposed System would reduce the cost volatility burden that defined benefit plans put on their sponsors; this would ease pension benefit negotiations with management.

5.8 Society

Society as a whole benefits from a thriving employer-sponsored defined benefit plan system, which increases the proportion of the population that can meet their retirement income goals and reduces the burden on Social Security and welfare. The Proposed System would make it easier for plan sponsors to maintain their defined benefit plans, and thus society would benefit.

6. Conclusion

Constructing a new system for pension funding requirements is a difficult task that requires balancing the needs of all the pension stakeholders. This paper presents a system that supports plan sponsors' needs for predictable and relatively smooth contribution streams with the needs of the PBGC, pensioners, and taxpayers for a well-funded system. Requirements that favor one set of stakeholders at the expense of others are unacceptable. The specific parameters of the system presented here are negotiable, and there may be other entirely different systems that also successfully navigate the needs of pension stakeholders. The core premise of this debate, however, must be that a strong defined benefit pension system is crucial for the financial health of America's aging work force.

Acknowledgments

Appendix A: Summary Comparison with Current System

The following table is a summary comparison of the current system and the Proposed System.

	Current System	Proposed System
Assets	Allows smoothing up to 5 years	Market
Liability measures	Multiple	One
Liability interest rate	Combination of expected return on assets (accrued liability) and a four-year weighted average of long-term bond yields (RPA current liability)	Current long-term bond yields
Deficit Reduction Contribution	Yes	No
Amortization period for plan amendments	30 years for bases, but often overridden by the DRC's funding target of 90% of RPA current liability	Union plans: length of negotiation period Nonunion plans: 3–8 years
Simultaneous amortization of gains and losses	Allowed	Not allowed
Amortization period for actuarial gains and losses	5 years	7–10 years
Amortization pattern for gains and losses	Level dollar amortizations	Increasing Dollar Amortizations
Amortization for assumption changes	10 years; Level dollar amortizations	Same treatment as for gains and losses
Credit balance	Exists; rolled forward with *expected* asset returns	Exists; rolled forward with *actual* asset returns.

	Current System	Proposed System
Balance equation	Unfunded Liability = Bases – Credit Balance – Reconciliation Account	Unfunded Liability = Bases – Credit Balance
Cost method	Several options, with Projected Unit Credit as the most prevalent	Traditional Unit Credit
Asset reversion for overfunded plans	Difficult and tax inefficient; Large excise tax on reversions	Allowed when funding ratio exceeds 120%; Required when funded ratio exceeds 140%; No excise tax on reversions
PBGC premiums	Flat rate premium based on headcount; Variable rate premium based on plan funded status; Financial health of plan sponsor not considered	Flat rate premium based on liability; Variable rate premium based on plan funded status; Financial health of plan sponsor integrated in premium calculation

Appendix B: Problems with the Current System

The U.S. minimum funding requirement system set up in IRC Section 412 has several major problems. This appendix details some of the most prominent ones. It should be noted, however, that the system is very sensitive to change because it contains so many interrelated components. Changing one of these features in isolation might do more harm than good; the entire system must be overhauled.

B.1. Volatility and the Deficit Reduction Contribution

There is far too much volatility in the minimum funding requirements, and much of that volatility is rooted in the DRC, which is either huge or zero, but rarely in between. Having features with on/off threshold tests that activate and deactivate substantial contribution requirements is inherently volatile. A better system would employ, first and foremost, a sliding scale instead of an on/off switch. Another problem with the DRC is that using smoothed assets delays increased contribution requirements too long before kicking in—and then requires plan sponsors to fund towards 90 percent very quickly. A better system would activate additional contributions earlier when a plan fell below its target funded ratio but would not require drastic contributions to move toward the target funding.

B.2. Asset Smoothing

From an economic standpoint, there is little reason why asset gains and losses should be treated differently than gains and losses from other sources. There are several problems with asset smoothing methods:

1. They mask the true funded status of the plan. Far too many pension actuaries have reported the funded status of a pension plan as the ratio of the smoothed value of assets to the RPA current liability, though the true economic status of the plan should be measured using the market value of assets.

2. Allowing, but not requiring, asset smoothing creates an asymmetric system. Although plan sponsors cannot switch between using a smoothed value of assets and the market value every year, they are able to switch to the more advantageous method every four years, and many plans switched from market to smoothed methods after the 2000–2002 market downturn. By permitting sponsors to choose the better of market and smoothed methods, the actuarial value of assets is systematically biased, even though none of the permitted asset methods are biased when viewed in isolation.

3. By allowing five-year asset smoothing methods to operate independently of the balance equation mechanisms, then requiring five-year gain/loss amortization bases for the minimum funding requirements, the current system implicitly sets up a counterintuitive structure that pays for asset gains and losses nonlinearly over 10 years. A simplified numerical illustration is shown in Appendix E.
4. By providing privileged treatment for asset gains and losses, as opposed to liability gains and losses, the system gives preference to risky investments. Although plan sponsors are—and should be—free to invest in risky assets, the funding system itself shouldn't favor one asset class over another.

B.3. ERISA Accrued Liability Discounts the Liability at the Long-Term Expected Asset Return

Advocates of integrating financial economics into actuarial practice have written much about this topic. To summarize some of their arguments, pension liabilities—the present value of a stream of cash flows—should be calculated independently of the expected return on plan assets and how the assets are invested. Further, although plan sponsors may want to make risky investments in search of higher asset returns, allowing these sponsors to record lower liabilities (e.g., higher valuation interest rates) unfairly encourages such risky investing. Pension liabilities are most similar to streams of fixed-income cash flows and should be valued accordingly.

B.4. Simultaneously Amortizing Gains and Losses Produces Unnecessary Volatility

The minimum funding requirements mandate that plans using immediate gain methods create gain or loss bases each year when they are not fully funded. They do not, however, require actuarial gains to offset loss bases set up in prior years, or losses to offset gain bases in prior years. In addition to being somewhat counterintuitive, simultaneously amortizing both gains and losses creates unnecessary volatility. Thinking about a plan's long-term contribution level as its normal cost, with amortizations representing the short-term deviations from the plan's long-term cost level, it makes sense that reducing the absolute values of the amortization bases would reduce volatility better than having simultaneous large bases working in opposite directions. A simplified numerical demonstration is in Appendix F.

B.5. RPA Current Liability Uses a Four-Year Weighted Average Interest Rate

The RPA current liability, which frequently drives contributions under the current law, is based on a four-year weighted average interest rate. Although this reduces the volatility of the interest rate, it prevents the liabilities from being measured by their true economic value, and thus contribution smoothing cannot be based on the economic value of the unfunded liability. Further, it makes it difficult for sponsors to immunize their investments by not allowing plan liabilities to be measured on their market value.

It should be noted that using a smoothed RPA current liability interest rate would smooth plan liabilities. However, our ultimate objective is not to smooth liabilities; it is to smooth contributions. This paper advocates using a single, more powerful mechanism to smooth contributions, rather than the current system of several weaker mechanisms working independently.

B.6. Multiple Smoothing Devices Working Independently

The current system contains several different smoothing devices, each operating independently of the others. Examples include smoothed assets, weighted average RPA current liability interest rates, long-term average assumptions for inflation and the 417(e) lump-sum rate, and smoothing actuarial gains and losses over five years. Having various smoothing tools working independently of each other, sometimes in opposite directions, creates noise and obscures the ideal of having plan sponsors manage the true economic unfunded state of their plan.

B.7. Long-Term Funding Level Targets

For most plans, the dominant long-term funding level in the current system targets 90 percent of the RPA current liability, which is based on an interest rate derived from long-term bond yields. The dominant target for some plans is 100 percent of the accrued liability. In the debate over pension funding schemes, the optimal target funding level is a hotly debated topic. Although this paper proposes a system targeting long-term funding of 100 percent of the liability based on current market interest rates for fixed-income securities, the system is robust enough to be configured by lawmakers for a variety of different target funding levels. (See Appendix C, Sections C.2 and C.3.) The core purpose of this paper is to present a system that manages contribution volatility optimally and leaves issues of the best long-term funding level target for others to debate.

Appendix C: Possible Modifications to the Proposed System

The contribution requirements of the Proposed System should be viewed as a general framework. Several possible modifications could be made without destroying the integrity of the system.

C.1. Allow Other Cost Methods

Although the Proposed System was constructed with the Traditional Unit Credit cost method (discussed in Section 2.2), it could be implemented with other cost methods.

C.2. Fund a Target Percentage Other than 100 Percent

The optimal target funding level for pension plans is hotly debated. The primary purpose of this paper is not to advocate a specific level (although a 100 percent funding target is used throughout); the goal is to present a funding structure that is more effective than our current system at allowing plan sponsors the ability to foresee contributions several years in advance and plan accordingly, while still being based on market values of assets and liabilities.

The Proposed System was constructed in a way that is robust to a variety of funding levels. For example, suppose policy makers viewed a 90 percent funded ratio as the optimal target. In this case, the balance equation would be modified from

$$(100\%) \times (Liability) - Assets = Bases - Credit\ Balance$$

to

$$(90\%) \times (Liability) - Assets = Bases - Credit\ Balance.$$

New actuarial gain and loss bases would be set up accordingly to maintain this equation.

It would be equally simple to have a target funded ratio above 100 percent. For example, a 110 percent funded ratio could be targeted by using the balance equation

$$(110\%) \times (Liability) - Assets = Bases - Credit\ Balance.$$

A long-term target funded ratio over 100 percent should be acceptable only in exchange for lower contribution volatility, so it is reasonable to accompany an increase in the funded ratio target with a corresponding increase in the amortization period for gains and losses.

The liability target could also be adjusted by modifying the liability interest rate: for example, basing the interest rate on yields of government bonds rather than corporate bonds.

C.3. Have Different Funding Targets for Healthy and Unhealthy Companies

The optimal target funding level could be different for different sponsors. For example, financially healthy sponsors could have a 90 percent funded ratio target, and financially unhealthy sponsors could have a 110 percent target. Although the rules of defining what constitutes "healthy" versus "unhealthy" sponsors might be controversial and complex, this type of modification would provide a Darwinian mechanism for keeping financially healthy plan sponsors in the defined benefit system and encouraging unhealthy sponsors to exit.

C.4. Change the Amortization Periods

The amortization periods in section 2.4 should be viewed as guidelines. They could be decreased to improve the funding level or increased to reduce contribution volatility. The IDA schedule, however, should be considered an essential feature of the Proposed System because it provides sponsors with the ability to foresee contributions well in advance while still funding gains and losses over a reasonable amount of time. This feature should not be eliminated.

C.5. Allow Funding of Future Negotiated Plan Amendments

It might be optimal to allow (or require) union plans to fund a target liability that anticipated future negotiated benefit increases. For example, it might be reasonable to assume that benefit multipliers increase with assumed rates of CPI inflation or the Social Security national average wage increases.

C.6. Eliminate the Credit Balance

The Credit Balance could be eliminated, thus revising the balance equation to
Unfunded Accrued Liability = Bases.

Contributions above the minimum required contribution would reduce the unfunded accrued liability, and thus they would reduce contributions over time by being treated similar to actuarial gain bases in the balance equation. Contributions above the minimum would not, however, serve as a one-for-one reduction to required

contributions in the year immediately after the excess contribution. Consequently, this modification would reduce funding flexibility for plan sponsors.

Another option would be to eliminate the credit balance but allow contributions in excess of the minimum to reduce existing amortization bases. That would provide flexibility for plan sponsors that decide to prefund because the next year's known amortizations from prior bases would be reduced.

C.7. Add an Antivolatility Mechanism

Supplement the Proposed System with an antivolatility mechanism.[11] If we define the "preliminary minimum" contribution as the minimum contribution excluding the credit balance, then the antivolatility mechanism would cap the preliminary minimum contribution based on the prior year. For example, the preliminary minimum might be capped at the prior year's preliminary minimum plus the maximum of 25 percent of normal cost and 2 percent of the accrued liability from the prior year.

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[11] The idea of an anti-volatility mechanism has appeared in other funding reform proposals including the proposal by Mercer and the issue analysis by the American Academy of Actuaries.

Appendix D: Transitioning to the Proposed System

For any change to the minimum funding requirements, a smooth transition is vital. Forcing change too abruptly might cause excessive contribution requirements and make pension plan contributions obstruct plan sponsors from having the predictable and healthy cash flows they need for their ongoing business operations. Although the transition to new minimum funding rules must be palatable to plan sponsors, this paper does not advocate one type of transition. Below are several examples of ways to avoid excessively burdening plan sponsors while transitioning from the current system to the Proposed System.

D.1. Set Up a Single Transition Base

The Proposed System could be fully and immediately implemented, with a transition base created to force the balance equation to hold. The transition base might have a different amortization period than actuarial experience bases, though some type of IDA schedule would be reasonable for the same reasons discussed in section 2.4.

D.2. Phase in the Interest Rate

The Proposed System could be fully and immediately implemented, with a gain or loss base forcing the balance equation to hold, except that the liability interest rate would be phased in over several years. That is, if the ultimate liability interest rate for valuations in year t was X_t, where X_t was the market discount rate for fixed-income securities in year t, then in the initial year discount the cash flows at $X_0 + 100$ basis points, then after one year use $X_1 + 80$ basis points, then $X_2 + 60$ basis points, and so on, until the interest rate was completely phased in and the liabilities were discounted at X_t after t years, for $t \geq 5$. As the interest rate was gradually phased in, liability losses might occur, and they would be handled by creating loss bases. These loss bases would be amortized over several years with an IDA schedule (defined in section 2.4).

D.3. Transition Gradually to Funding 100 Percent of the Accrued Liability

The Proposed System could be implemented fully and immediately, with a gain or loss base forcing the balance equation to hold, except that in the initial year the balance equation would be

$$(90\%) \times (Liability) - Assets = Bases - Credit\ Balance;$$

in the second year, the balance equation would be

$$(92\%) \times (Liability) - Assets = Bases - Credit\ Balance;$$

in the third year the balance equation would be

$$(94\%) \times (Liability) - Assets = Bases - Credit\ Balance;$$

and the pattern would continue until the balance equation ultimately targets 100 percent of the accrued liability. As the balance equation ramps up to targeting 100 percent of the accrued liability, actuarial loss bases might need to be created to make the balance equation hold, and these loss bases would be amortized over several years with an IDA schedule.

Appendix E

For simplicity, assume that normal cost = 0, $i = 0$ (and thus $\ddot{a}_5 = 5$). Further, assume that the actuarial value of assets uses a standard five-year smoothing method, but there were no gains or losses before January 1, 2004, or after December 31, 2004. Suppose there is a $25M asset loss for plan year 2004. We will see how the current minimum funding requirements react to this loss.

Plan Year Beginning January 1st	Actuarial Value of Assets – Market Value of Assets	Outstanding Amounts of 412 Loss Amortization Bases	412 Amortization Amounts	Minimum Required Contribution
2005	$20M	Base 1 = $5M Total bases = $5M	Base 1 = $1M Total amort. = $1M	$1M
2006	$15M	Base 1 = $4M Base 2 = $5M Total bases = $9M	Base 1 = $1M Base 2 = $1M Total amort. = $2M	$2M
2007	$10M	Base 1 = $3M Base 2 = $4M Base 3 = $5M Total bases = $12M	Base 1 = $1M Base 2 = $1M Base 3 = $1M Total amort. = $3M	$3M
2008	$5M	Base 1 = $2M Base 2 = $3M Base 3 = $4M Base 4 = $5M Total bases = $14M	Base 1 = $1M Base 2 = $1M Base 3 = $1M Base 4 = $1M Total amort. = $4M	$4M
2009	$0M	Base 1 = $1M Base 2 = $2M Base 3 = $3M Base 4 = $4M Base 5 = $5M Total bases = $15M	Base 1 = $1M Base 2 = $1M Base 3 = $1M Base 4 = $1M Base 5 = $1M Total amort. = $5M	$5M
2010	$0M	Base 2 = $1M Base 3 = $2M Base 4 = $3M Base 5 = $4M Total bases = $10M	Base 2 = $1M Base 3 = $1M Base 4 = $1M Base 5 = $1M Total amort. = $4M	$4M
2011	$0M	Base 3 = $1M Base 4 = $2M Base 5 = $3M Total bases = $6M	Base 3 = $1M Base 4 = $1M Base 5 = $1M Total amort. = $3M	$3M
2012	$0M	Base 4 = $1M Base 5 = $2M Total bases = $3M	Base 4 = $1M Base 5 = $1M Total amort. = $2M	$2M
2013	$0M	Base 5 = $1M Total bases = $1M	Base 5 = $1M Total amort. = $1M	$1M
2014	$0M	Total bases = $0M	Total amort. = $0M	$0

This simplified example shows how a five-year asset smoothing method can create a 10-year minimum funding requirement that is pyramid shaped: $1–2–3–4–5–4–3–2–1–0. It is doubtful that this was the original intention of ERISA's authors, but this is the system they created by having independent five-year smoothing methods for both assets and 412 bases. This paper advocates having a single contribution smoothing mechanism.

Appendix F

For simplicity, assume that normal cost equals \$5M, $i = 0$ (and thus $\ddot{a}_5 = 5$). Further, assume there were no gains or losses before January 1, 2004. Suppose there is a \$25M actuarial loss in plan year 2004 and a \$25M actuarial gain in plan year 2005, and no gains or losses after 2005. The table below demonstrates how the minimum funding requirements react to these gains and losses.

Current Law

Plan Year Beginning January 1st	Normal Cost	Outstanding Balance of Amortization Bases	Amortization Amounts	Minimum Contribution (NC + Amort.)
2005	\$5M	Base 1 = \$25M loss	Base 1 = \$5M charge	\$10M
2006	\$5M	Base 1 = \$20M loss Base 2 = \$25M gain	Base 1 = \$5M charge Base 2 = \$5M credit	\$5M
2007	\$5M	Base 1 = \$15M loss Base 2 = \$20M gain	Base 1 = \$5M charge Base 2 = \$5M credit	\$5M
2008	\$5M	Base 1 = \$10M loss Base 2 = \$15M gain	Base 1 = \$5M charge Base 2 = \$5M credit	\$5M
2009	\$5M	Base 1 = \$5M loss Base 2 = \$10M gain	Base 1 = \$5M charge Base 2 = \$5M credit	\$5M
2010	\$5M	Base 2 = \$5M gain	Base 2 = \$5M credit	\$0M
2011	\$5M			\$5M

The table below demonstrates what the minimum contribution would be if the assumptions were the same, but the funding requirements required gains and losses to offset each other before creating a new amortization base.

Requiring Gains and Losses to Offset Outstanding Bases of the Opposite Sign

Plan Year Beginning January 1st	Normal Cost	Balance of Amortization Bases	Amortization Amounts	Minimum Contribution
2005	\$5M	Base 1 = \$25M loss	Base 1 = \$5M charge	\$10M
2006	\$5M	Base 2 = \$5M gain[12]	Base 2 = \$1M credit	\$4M
2007	\$5M	Base 2 = \$4M gain	Base 2 = \$1M credit	\$4M
2008	\$5M	Base 2 = \$3M gain	Base 2 = \$1M credit	\$4M
2009	\$5M	Base 2 = \$2M gain	Base 2 = \$1M credit	\$4M
2010	\$5M	Base 2 = \$1M gain	Base 2 = \$1M credit	\$4M
2011	\$5M			\$5M

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[12] There was a \$25M gain during plan year 2005, of which \$20M was dedicated to eliminating the outstanding balance of the prior year's loss base and the remaining \$5M was used to set up Base 2. The \$5M of Base 2 would be amortized over five years at \$1M per year.

In this simplified example, the method allowing gains and losses to offset clearly has reduced volatility in the minimum contribution.

Appendix G: Detailed Illustration of IDA Schedule

This appendix illustrates an example of one way to create an IDA schedule for gain and loss bases. It assumes a seven-year amortization period and 7 percent interest rate. A similar system could be constructed with different amortization periods and interest rates; the author believes that a period between seven and 10 years is most reasonable.

The principal and interest components of the amortizations are calculated separately. The amount of principal to amortize in column (D) starts at $0 in the first year and increases arithmetically such that the entire base is fully amortized at the end of seven years. The interest payments in column (E) simply represent the 7 percent interest rate multiplied by the outstanding balance in column (C).

Date: January 1st (A)	Time (B)	Outstanding Balance with IDA Schedule (Proposed System) (C)	Principal to Amortize (D)	Interest to Amortize (E)	Amortization Amount with IDA Schedule (Proposed System)[13] (F)
			B/21 * $1,000,000	C * 7%	D + E
2005	0	$1,000,000	$0	$70,000	$70,000
2006	1	1,000,000	47,619	70,000	117,619
2007	2	952,381	95,238	66,667	161,905
2008	3	857,143	142,857	60,000	202,857
2009	4	714,286	190,476	50,000	240,476
2010	5	523,810	238,095	36,667	274,762
2011	6	285,715	285,715	20,000	305,714
2012	7	0	0	0	0

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[13] Amortization amounts are stated as of the end of the plan year.

Appendix H: Objections and Other Considerations

Anticipated Objection 1: Doesn't it increase contribution volatility to mandate that assets and liabilities be marked to market?

Not necessarily. Contribution volatility in the Proposed System—or other funding reform proposals—should be viewed in its entirety, not with respect to how it treats one particular input item of the minimum funding requirement calculation. The Proposed System uses one strong volatility-reducing mechanism to replace several weaker methods in the current system.

If the reader still believes that contribution volatility is too great in the Proposed System, consider the effect of implementing the Proposed System with a longer amortization period—possibly 10–12 years.

Anticipated Objection 2: Why didn't this paper include an empirical simulation of contribution volatility?

Empirical simulations to demonstrate the effect of the Proposed System on contribution volatility have been intentionally excluded from this paper. There is an important reason for this. The system proposed here is designed not only to decrease contribution volatility, but also improve sponsors' ability to anticipate contributions years in advance and reduce surprise contribution shocks. The IDA schedule is not designed to minimize volatility for sponsors whose funding policy is to contribute the minimum required amount every year. Rather, it is designed to provide flexibility so plan sponsors could structure their contribution policy several years into the future. An empirical simulation would not reflect the benefit that in the event of actuarial losses the Proposed System would give plan sponsors a much greater ability to predict contribution increases and decide whether to start funding them immediately or wait a couple of years. Thus an empirical simulation would be misleading.[14]

Anticipated Objection 3: Won't this system dramatically increase the long-term contribution level required from plan sponsors?

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[14] To illustrate the misleading nature of an empirical simulation, note that empirical simulations simulating the minimum required contribution would likely show that a level dollar amortization schedules have lower contribution volatility than IDA schedule, though in reality plan sponsors under an IDA system have enough flexibility to contribute amounts equal to level dollar amortizations and generate credit balances with the excess contributions.

Over a perpetual horizon, pension contribution requirements will be determined by the plan definition and investment experience. Over a medium-term horizon, the Proposed System will require increasing plan funding targets from 90 to 100 percent of plan liabilities. This should be viewed in conjunction with the fact that, when compared to the current system, the Proposed System gives sponsors lower contribution volatility and a greater ability to foresee contributions several years in the future.

Anticipated Objection 4: Lots of the ideas seem valid, but not marking the assets to market or discounting the liabilities at current long-term bond rates. Can't we implement this type of system without these two features?

Such an implementation would not reflect the spirit of the system. A key characteristic of the Proposed System is that it measures the true economic value of the plan surplus and smoothes contributions accordingly. A system that smoothes contributions based on smoothed values of assets or liabilities (including interest rate assumptions) encourages sponsors to manage those smoothed input parameters, rather than their plan's true funded position.

Anticipated Objection 5: If we discount the liabilities at long-term bond rates and invest the assets in equities with higher expected rates of return, won't that create a situation where gains are more likely than losses?

Yes. If the plan invests in risky assets and has favorable experience, then there will be actuarial gains. In this situation, the liability returns have a different risk level than the asset returns, so it is natural to have an asymmetric gain/loss exposure.

Anticipated Objection 6: IDA schedules delay full funding of plans that have actuarial losses, so level dollar amortization schedules like those in the current system should be maintained.

A good pension funding system must satisfy two competing objectives: (1) low contribution volatility/predictability and (2) short amortization periods to prevent long-term underfunding. Level dollar systems have difficulty satisfying both of these objectives simultaneously. A long amortization period satisfies objective 1, but not 2. A short amortization period satisfies objective 2, but not 1. IDA schedules succeed where level dollar amortizations fail: they satisfy objective 1 better than level dollar amortizations with short periods, and they also satisfy objective 2 better than level dollar amortizations with long periods.

Anticipated Objection 7: Wouldn't giving the PBGC a higher bankruptcy claim make defined benefit plans less attractive, and thus damage the defined benefit system?

The current system has the PBGC implicitly subsidizing financially weak plan sponsors and contains moral hazards as well that encourage weak sponsors to take risks at the expense of the PBGC. This aspect of the current system must be removed, and no possible solution can make everyone happy. The Proposed System is fair because it strengthens the requirement that companies pay for the pensions they promise, even in bankruptcy. Taking away the "free lunch" embedded in the current system could be viewed as making defined benefit plans less attractive, but the author views it more as leveling the playing field.

Anticipated Objection 8: The Proposed System wouldn't provide enough contribution volatility protection in the event of a "perfect storm" with declining equity markets and interest rates, similar to what happened in 2000–2002.

Plan sponsors are exposed to risk to the extent that they invest in equity assets that do not hedge their liabilities. As long as plan sponsors are investing in equities, this risk cannot be avoided. The Proposed System would perform reasonably well in a "perfect storm" for the following reasons:

- It bases both assets and liabilities on current market values, thus allowing hedgeablity for those sponsors seeking to minimize risk
- It promotes asset and liability transparency, and levels the playing field between equities and other investments—the advantages of investing in less risky investments may become more apparent to sponsors, and they might voluntarily shift their asset allocations accordingly, and
- It allows sponsors to see large contribution increases several years ahead of their due date, so sponsors can plan their budgets better, and these contribution increases will not "shock" the sponsors as much.

Ultimately, the Proposed System is not—and should not be expected to be—a silver bullet that eliminates all problems for all sponsors in a "perfect storm" market environment.

Anticipated Objection 9: Mechanism ABC in the Proposed System would detrimental to pension stakeholder XYZ.

In many cases, I would agree with this type of genericized critique. Unfortunately, no pension funding system can be all things to all people. A more appropriate type of critique would be that the system excessively favors one set of stakeholders at the expense of the others, hurting the pension system as a whole.