The Good, the Bad, and the Ugly of Pension Accounting

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Pension Accounting and the "Economic Mainstream"

There has never been a shortage of criticism of pension accounting (throughout this paper, the term "pension accounting" should be understood in a broad sense that includes both conventional accounting and funding sides). There has always been a concern that a particular pension accounting figure is either opaque, or deceptive, or impractical, or all of the above plus some other transgressions. Consequently, pension accounting rules and conventions have been frequently "reformed" and augmented. Every major development in this area has been accompanied by seemingly convincing arguments that "this time we got it right," only to be declared inadequate later. Meanwhile, the funding and financial reporting regulations have been increasingly perceived as too burdensome and unfriendly to plan sponsors. This perception has made a significant contribution to the general negative attitude toward defined benefit plans we are witnessing now.

Another powerful surge of criticism of pension accounting is currently in full swing. These days, it is common for the leading national and industry periodicals to publish articles highly critical of pension actuaries and other practitioners in the pension industry. The criticism is increasingly directed toward the actuaries working for public pension plans. A recent article in the *New York Times* is a good example of this trend.[1] Among other disapproving statements about practitioners in the pension system, the author makes the following declaration:

"*Most of all, public pension actuaries use old methods that have fallen far out of sync with the economic mainstream.*"

The problem is not the calculations actuaries perform - few have accused actuaries of using incorrect math. The problem is the *assumptions* actuaries make to produce the results that are allegedly "far out of sync" with the self-proclaimed "economic mainstream."

The main culprit is usually the assumption for the future investment returns. Most pension actuaries utilize a deterministic rate of return. The assumed rate of return is typically used in a "riskless" manner, even though the rate may contain a sizable risk premium. The results of such calculations are described as "vulnerable to distortion, misunderstanding and abuse" in the article. The riskless rates obtainable in the marketplace are currently much lower, which makes conventional actuarial figures also vulnerable to the charges of "misinformation." Greg Abbott, the Texas attorney general, is perfectly clear about this matter (as quoted in the article):

"*Actuarial assumptions based on misinformation are a recipe for disaster*."

So, what exactly is this "economic mainstream" that is supposedly impervious to the charges of "misinformation"? Without a doubt, it refers to "marked-to-market" pension accounting. These days, the practices that do not comply with the "marked-to-market" mindset are denounced. The practitioners who do not support "marked-to-market" conventions routinely face the accusations of being insufficiently educated as well as guilty of the demise of DB plans.[2]

The intense scrutiny conventional actuarial practices have endured lately is well-deserved. Indisputably, these practices must be improved. I do not believe, however, that "marked-to-market" paradigm alone presents a credible alternative. The harsh criticism actuaries and other practitioners have experienced lately comes largely from *the desire to apply conventional accounting concepts beyond the scope of their applicability*.

The purpose of this paper is to demonstrate that the virtues of "marked-to-market" pension accounting are greatly exaggerated for both public and private pension plans. I demonstrate that the "marked-to-market" paradigm, as applied to pensions, is based on a questionable economic foundation and may produce plenty of "misinformation" of its own. I take a short journey to the foundations of the concepts of present value and discounting, analyze the principles behind the "marked-to-market" mindset, describe the aspects of this mindset that make sense and the ones that do not, and sketch a better way to measure pension plans.

A Sensible Aspect of Pension Accounting

When one has to "account" for a pension plan, it is not unreasonable to attempt to value the benefits already granted to the plan participants. The price of a group annuity contract with a highly rated insurance company that pays all these benefits is a good candidate for a fair value of the promised benefits calculated for the accounting purposes. As an economic concept, the cost of plan termination (settlement) deserves consideration and represents a sensible aspect of "marked-to-market" pension accounting.

At the same time, conventional actuarial reports do not concentrate exclusively on the cost of termination. Public plans, for example, do not necessarily report the cost of termination, and more than a few authors want to challenge this premise. Furthermore, some authors claim that "marked-to-market" pension accounting has much more substance than the cost of termination.[3] Some assert that the "marked-to-market" paradigm comes from one of the core principles of financial economics – the law of one price.

The Law of One Price

Here is the essence of "marked-to-market" pension accounting as applied specifically to public plans.

"*The most basic concept in the field of finance is that of the present value of a future payment, whereby the future payment is discounted at a rate that reflects the risk associated with the payment. Public pension payments are risk-free for all intents and purposes. Accordingly, a theoretically correct discount rate is the yield of long-term U.S. Treasury bonds*."[4]

We have hypothetically matching payments of different nature – bonds and pensions. The law of one price states that two financial instruments that generate identical cash flows (in terms of timing, magnitude, and likelihood) and tradable in an efficient market must have the same price. Otherwise, there would be an arbitrage opportunity, which cannot exist in an efficient market.

Therefore, the price of the bond portfolio is the only "theoretically correct" valuation of the pension commitment.

Or that is what the proponents of "marked-to-market" pension accounting want everyone to believe. This logic does not work because the following two important conditions are not satisfied. First, the law of one price requires *both* financial instruments to be tradable, and pension benefits are not tradable (at least, not yet). The tradability requirement for both instruments is not a mere technicality that can be easily dismissed. The ability to take advantage of the arbitrage opportunity created by the "mispricing" is the foundation of the law of one price.

Second, the two payments must be perfectly, and not hypothetically, matched. Matching bonds may exist for some pension payment and may not exist for some others – even "long-term U.S. Treasury bonds" are not long enough. Furthermore, while public pension payments are risk-free in a sense that they will certainly be paid, they are not risk-free in a sense that their timing and magnitude are far from certain. In particular, since *public pension plans are on-going*, their benefits may depend on the wage inflation in a particular region and/or occupation (at least, to some extent), but U.S. Treasury bonds are not diverse enough to provide a perfect hedge for this type of risk for all plans.

Overall, the law of one price is inapplicable. The theory according to which "a theoretically correct discount rate is the yield of long-term U.S. Treasury bonds" contains a major flaw.

Essentially, to value a pension plan as the hypothetical matching bond portfolio is a choice, not a necessity. In reality, different valuations of a particular pension plan do not necessarily create arbitrage opportunities. To value the pension commitment and the matching bond portfolio similarly may be a very sensible choice, but the driving force behind this choice is the usefulness of this valuation, not a flawed economic theory and an illusory arbitrage opportunity that a "mispricing" may create. In other words, calculations must be useful for something. Forcing actuaries to produce calculations for the sole purpose of satisfying a flawed economic theory is not a good idea.

The Basics of Present Value and Discounting

Clearly, the debate about the proper place for "marked-to-market" pension accounting has created a lot of confusion, at least partially due to the fact that the fundamental concepts of "present value" and "discounting" have been often misunderstood and misrepresented in the debate. In order to clarify these issues, let's get back to the basics.

Think of portfolio P and its starting market value PV (stands for "Present Value"). After a period of time, the market value of portfolio P is equal to FV (stands for "Future Value"). To measure the asset value change, we define investment return R_P as the ratio of the investment gain over the present value:

$$R_P = \frac{FV - PV}{PV} \qquad (1)$$

This definition establishes a relationship between *PV*, *FV*, and R_P. If we need to calculate future value *FV* when present value *PV* and investment return R_P are known, simple transformations of definition (1) produce the following equation:

$$FV = PV(1 + R_P) \qquad (2)$$

The distribution of return R_P is usually analyzed using a set of forward-looking capital market assumptions that include expected returns, risks, and correlations between various asset classes. Given present value *PV*, any portfolio generates future value *FV* calculated using (2).

Pension plans, however, face a different challenge. For a pension plan, future values – the promised benefits - are relatively predictable. In contrast, present values - e.g. the present value of future contributions – are much more volatile. The plan's main challenge is to determine the optimal asset allocation, contribution and benefit policies *at the present*. Therefore, the problem is to calculate present values given future values.

To do so for a given portfolio *P*, a simple transformation of equation (2) produces the following equation for present value *PV*:

$$PV = \frac{FV}{1 + R_P} \qquad (3)$$

Formula (3) represents the concept of *discounting procedure* – given portfolio *P*, it produces the asset value *PV* required to be invested in this portfolio at the present in order to accumulate future value *FV*. It must be emphasized that return R_P in (3) is generated by the actual portfolio *P*, as *there is no discounting without investing*. Any discounting procedure assumes that the assets are actually invested in a portfolio that generates the returns used in the procedure. Given future value *FV*, any portfolio generates present value *PV* calculated using (3).

It is essential to distinguish discounting *procedures* and discount *rates*. A discount *rate* is used when return R_P is certain, or risk-free. A discounting *procedure* is used when return R_P is not necessarily certain. As a result of a discounting procedure generated by a portfolio of risky assets, the present value of a cash flow may be uncertain and, as such, have a substantial volatility. Since most pension plans fund their commitments via investing in risky assets, present values of their pension commitments are uncertain. It should be mentioned that uncertain present values belong to the mainstream of actuarial science.[5]

Let's revisit the statement "*a theoretically correct discount rate is the yield of long-term U.S. Treasury bonds*" from Ennis [2007] quoted in the previous section. It is clear now that the statement contains little substance. When it is stated "the future payment is discounted at a *rate*," then it is effectively *assumed* that the return is risk-free. The statement essentially declares that if the return is risk-free, then it is generated by the U.S. Treasury bonds. Actuaries of all persuasions must be glad we got this thing straight, although it is not clear how this knowledge may affect their practices.

The Fallacy of "Marked-To-Market" Pension Accounting

In light of the concepts of present value and discounting we just discussed, let's look at "marked-to-market" pension accounting in action and consider the following example. A pension plan has made a commitment to make one payment of $100 in a year from now. If one-year zero-coupon Treasury bond yields 3%, then the cost of "termination" (settlement) is equal to $97.09 in a perfectly "marked-to-market" accounting report. We assume that the plan has $97.09 *invested in stocks*. The plan has enough money to buy the matching bond, and it is common to call this plan "fully funded."[6]

However, the fact that the money and the matching bond are readily available does not mean that the plan has actually purchased the matching bond. The report shows that the plan assets are sufficient to buy the matching bond and absolutely ignores the fact that the actual portfolio has nothing to do with the matching bond. *This report completely conceals the riskiness of the plan's existing portfolio and, therefore, is* ***manifestly deceptive****.*

Now, let's consider the existing portfolio (100% stocks), assuming that stocks return *R* has geometric mean 8.00% and standard deviation 16.00%. As discussed in the prior section, the *required assets* (*RA*) associated with the plan's stock portfolio and the commitment to pay $100 in a year is

$$RA = \frac{100}{1+R}$$

The mean and the standard deviation of *RA* are 93.58 and 13.72 correspondingly.[7] The existing asset value $97.09 is equal to the 63th percentile of *RA*, so there is only a 63% chance that the plan will have enough money to pay the promised $100 and a 37% chance that it will not. Does this plan look "fully-funded" to anyone? Will anyone stand up and say "misinformation"?

If the only "theoretically correct" discounting procedure is discounting by "the yield of long-term U.S. Treasury bonds," then the only "theoretically correct" policy portfolio is "long-term U.S. Treasury bonds," as other portfolios would generate other discounting procedures. One may plausibly argue that it makes little sense to fund the plan's short-term financial commitment via investing in stocks and the matching bond is a better investment solution. But this is an asset allocation preference, not a theoretical economic concept. As a theoretical concept, *the necessity of discounting by "the yield of long-term U.S. Treasury bonds" is unsubstantiated.*

The biggest deficiency of this concept, however, is not its theoretical flaws, but the severe restrictions it imposes on the risk management tools available to the plan's stakeholders. Using the discounting procedure that utilizes the full range of returns generated by the plan's actual portfolio (instead of "the yield of long-term U.S. Treasury bonds"), the plan's stakeholders can determine that the plan has just a 63% chance to fulfill its promise. Moreover, they may want to reduce the riskiness of the plan and, using a similar discounting procedure, determine that investing 20% of the plan's assets in a broad index of fixed income instruments and leaving the remaining 80% in stocks would increase this chance to 69%.[8]

Looking at the "marked-to-market" accounting statement alone, the plan's stakeholders have no way of knowing all of that. The inability to measure and manage the plan's riskiness clearly illuminates the fallacy of "marked-to-market" accounting.

What we have here is the inherently *uncertain* cost of funding and, on the other hand, accounting conventions that require *certain* values to be reported. The ambition to find accounting entries that fully and transparently describe the uncertain cost of pension funding is little more than wishful thinking.

The Cure May Be Worse Than the Disease

For decades, actuaries have used a single discount rate to calculate present values of pension commitments. The single discount rate is somewhat close to the portfolio's geometric expected return, and, therefore, may include the risk premium. This practice is no longer required for corporate plans; for public plans, this practice is widely used.

The problem with this practice is it implies that there exists a portfolio that delivers risk premium without risk, which makes little sense. Many critics, however, understand that criticism without a viable alternative is a non-starter. Consequently, many offer "marked-to-market" pension accounting as the alternative.

The trouble is the cure may very well be worse than the disease. It is true that the conventional practice assumes an imaginary investment in a portfolio that delivers the risk premium without risk. But "marked-to-market" accounting also assumes an imaginary investment in an imaginary bond portfolio. The conventional practice completely ignores the riskiness of the existing portfolio, but "marked-to-market" accounting does exactly the same.

At the same time, the conventional practice – as inadequate as it is - has certain advantages over "marked-to-market" accounting. The conventional practice is based on the assumption that the objective of the stakeholders of a pension plan is to *fund* the plan. In contrast, "marked-to-market" accounting is based on the assumption that the objective is to *price* the plan, which may be helpful only for the purpose of plan termination. The conventional practice has some relationship, however imperfect, with the plan's actual portfolio. In contrast, "marked-to-market" accounting has nothing to do with the plan's actual portfolio. The conventional practice at least attempts to deal with the cost of running the plan – it contains some estimates, however imperfect, of the present value of future contributions. In contrast, "marked-to-market" accounting has nothing to do with the cost of running the plan.

In reality, the cost of running a pension plan is inherently uncertain. It depends, among other things, on the plan's policy portfolio and future investment returns. While we can measure and manage the uncertainty of cost, there is no single value that perfectly and transparently describes this uncertainty. The future is not transparent. There is nothing anyone can do about it.

I believe the most promising way to help pension plan managers to run their plans efficiently is to apply powerful risk management methodologies to *uncertain present values of pension*

commitments generated by various portfolios under consideration. This subject, however, is outside of the scope of this paper.[9]

Conclusion

Here is the crux of the matter. The proponents of "marked-to-market" pension accounting are correct to say if you can't account for risk, don't use the risk premium. Since conventional accounting concepts don't deal with risk, the risk premium can't be used in a conventional accounting framework. But the rest of us do not have to limit ourselves to the Potemkin villages of conventional accounting. The risk premium along with other expectations of capital markets can and should be incorporated into the calculations of present values of pension commitments.

The "marked-to-market" straitjacket is a choice, not a necessity. Without it, the information available to the decision makers of the plan is much more comprehensive, as was discussed in prior sections. It includes, but is not limited to, the cost of termination, risk measurements of the existing policy portfolio and alternative portfolios. Ultimately, I believe the marketplace of ideas will sort everything out.

Meanwhile, the proponents of the "marked-to-market" pension accounting demand to incorporate "marked-to-market" values in actuarial valuation reports (even for public plans). In today's environment of low tolerance to any perceived lack of disclosure, they may very well get their wishes granted. If it happens, these "marked-to-market" values – as inapplicable, stale, vague, "vulnerable to distortion, misunderstanding and abuse" and, most of all, unhelpful to most plans as they are - will be disclosed in every valuation report.

In this case, everyone who wishes the DB system well should demand that the nature of this "disclosure" is unmistakably disclosed. The "marked-to-market" figure should not have the term "liability" attached to it in any way. In the spirit of transparency, it must be clearly labeled as what I believe it really is: *the cost of termination* - a figure of questionable utility for a majority of plans published several months after the moment this figure might have been meaningful.

Let's not kid ourselves, however, about what this disclosure will have accomplished: we will have another deficient methodology to follow. Moving in that direction, we won't be getting closer to giving pension plan managers the valuable risk management tools they need.

When the actuarial valuation report (released sometime in June, if we are very lucky) reveals the cost of termination *as of January 1*, it will be up to the proponents of "marked-to-market" pension accounting to educate the plan's decision makers why the cost of imaginary plan termination is vital and no other measurement is needed. It may be a good idea to remind them that time is of the essence, as the decision makers still have to take care of another important responsibility – to manage the plan, thank you very much.

References

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Endnotes

[1] See "Actuaries Scrutinized on Pensions", by Mary Williams Walsh, *The New York Times*, May 21, 2008, http://www.nytimes.com/2008/05/21/business/21pension.html?_r=1&oref=slogin
[2] For example, see "Who Killed DB Plans? All the Usual Suspects" by Douglas A. Love, Pensions&Investments, December 11, 2006.
[3] For example, see SOA-AAA, [2006] (page 4): "*If company assets or liabilities are valued at anything other than fair market value, arbitrage is introduced into that asset/liability valuation*."
[4] See Ennis [2007], p. 39.
[5] For example, see Bowers [1997], chapters 4 and 5, or Kellison [1991], chapter 10.
[6] For example, see Ennis [2007], p. 40: "a fully funded plan to be one for which the market value of assets equals the ABO. If assets exceed the ABO, the plan has a surplus. If assets fall short of the ABO – for whatever reason – the plan has a funding deficit."
[7] Throughout this paper, I assume that all portfolio returns are distributed lognormally.
[8] We assume the index return has geometric mean 5.00%, standard deviation 5.00%, and correlation with stocks 0.3.
[9] For initial steps in this direction, see Mindlin [2008].