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Presenting Market Value Liabilities for Public Employee Retirement Systems

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Synopsis

In a world that is calling for more transparency with respect to the status of public pension plans and with the ideas and concepts of financial economics as applied to pension plans (hereafter referred to as pension finance) being discussed more and more, this author believes that it is past time for actuaries to introduce the ideas of pension finance into the ongoing information flows of Public Employee Retirement Systems (PERS) in the United States.

Pension finance ideas and estimates of obligations, usually very rough, are being developed and published by academics, ratings agencies and others. These results are often developed for specific purposes, are not always well constructed or theoretically robust values, and many times are used to present sensational and distortive pictures of the financial state of PERS. If actuaries would disclose these numbers for the PERS for whom they provide other financial information, with such additional disclosure the actuary deems appropriate, then those seeking this information would have more accurate values and explanatory information from which to work. In addition, actuaries would now be seen as experts on this information and sought out for their expertise on it.

This article discusses some of the ideas of pension finance, how to present such information, and how it was presented to the New York City Retirement Systems (NYCRS) in a way that made it available to other interested parties, including the public.¹

Introduction

Beginning in 2003, as the Actuary and technical advisor for the NYCRS, I developed and presented for each of the five major NYCRS a market-value-related liability (aka Market-Consistent Present Value, Economic Value, Financial Value, Market Liability, and Market Value Liability, or MVL). For reasons discussed later in this article, these MVLs for the NYCRS were determined by discounting benefits accrued to date using U.S. Treasury spot yields and are equal in amount to so-called Solvency Liabilities.

¹ The views expressed in this article are those of the author and do not reflect any official policy or opinion of the New York City Retirement Systems or the City of New York.

While determining the accrued benefit components can be done in slightly different ways, I initially utilized and developed each MVL consistent with Accrued Benefit Obligation (ABO) methodology and referred to this MVL as a Market Value Accumulated Benefit Obligation (MVABO).

Specifically, the MVABO is calculated by projecting the accrued portion of benefits (i.e., the benefits earned to date without use of future salary increases or benefit service credits, allowing eligibility service to grow) and discounting at each payment date those accrued benefits using discount rates equal to U.S. Treasury spot yields.

Dividing the Market Value of Assets (MVA) for each NYCERS by its MVABO as of each measurement date provides a market-related funded ratio (referred to hereafter as a Market Value Funded Ratio, or MVFR). This article discusses the impetus for developing and presenting the MVABO and MVFR, sets forth how the MVABO is calculated, compares MVFR with more traditional funded ratios, and sets forth how the MVABO and MVFR provide valuable financial information on the key financial and risk characteristics of a PERS.

Note: While the annual change in the MVABO was not presented, providing this measure would also be useful and a discussion thereof can be found in an article by Jeremy Gold and Gordon Latter titled “The Case for Marking Public Plan Liabilities to Market.”²

Current Funding and Disclosure Requirements

Most PERS in the United States are governed by state and local laws, and their financing is not subject to the funding rules set forth in Internal Revenue Code (IRC) Sections 412 and 430. Consequently, actuaries for PERS enjoy broad freedom to design financing mechanisms, subject, of course, to whatever limitations are established by State and local legislatures, plan sponsors and/or boards of trustees.

Disclosure of funding status is generally provided in footnotes to financial statements that are prepared following Generally Accepted Accounting Principles (GAAP) and in accordance with rules set forth by the Governmental Accounting Standards Board (GASB).

With respect to defined benefit plans, until a few years ago, the primary GASB pronouncements on pensions were GASB Statement No. 25 (GASB 25), which covers financial reporting by the PERS themselves, and GASB Statement No. 27 (GASB 27),

² Gold, Jeremy and Gordon Latter. 2009. The Case for Marking Public Plan Liabilities to Market. In *The Future of Public Employee Retirement Systems*, Olivia S. Mitchell and Gary Anderson, Eds., New York: Oxford University Press.

which covers financial reporting by employers. With respect to certain disclosures of funded status, each of these was modified by the issuance of GASB Statement No. 50 (GASB 50).

Starting with fiscal years beginning after June 15, 2013, GASB Statement No. 67 (GASB 67) superseded GASB 25, and starting with fiscal years beginning after June 15, 2014, GASB Statement No. 68 (GASB 68) superseded GASB 27. GASB 67 was amended slightly by GASB Statement No. 82 (GASB 82), and GASB 68 was amended modestly by GASB Statement No. 78 (GASB 78) and GASB 82.

In addition, most major PERS publish a Comprehensive Annual Financial Report (CAFR) that is prepared in accordance with a format prescribed by the Government Finance Officers Association (GFOA). The CAFR format includes a section presenting the financial statements, generally prepared by the PERS staff and audited by an outside accounting firm.

The CAFR format also includes sections that present actuarial, statistical and investment information on the PERS. Of particular interest to this discussion, a CAFR presents information available as of its preparation date plus certain historical information. Thus, within any individual CAFR, and by comparing CAFRs from year to year, users can gain significant insight into trends.

Under the requirements of GASB 25, the funded status of a PERS was generally equal to its Actuarial Asset Value (AAV) as a percentage of the Actuarial Accrued Liability (AAL), where the AAL is usually computed under the Actuarial Cost Method (ACM) used to fund the PERS.³ Under the requirements of GASB 67, the funded status of a PERS is generally equal to its MVA as a percentage of the AAL, where GASB 67 requires the use of the Entry Age AAL (EAAAL), calculated using an individual-participant version of the Entry Age Actuarial Cost Method (EAACM), to determine that AAL.

Unfortunately, in the situation of certain spread gain ACMs (e.g., Frozen Entry Age ACM or Frozen Initial Liability FIL ACM), reporting in accordance with the GASB 25 and GASB 27 rules historically resulted in funded ratios that provided little informational value. While GASB 50 attempted to fix the conceptual problem, GASB 50 actually applied only to the Aggregate ACM and not the other spread gain methods.

³ GASB 50 expanded the requirements of GASB 25 to require, for PERS that are funded using the Aggregate ACM, the presentation of the AAV as a percentage of the Entry Age AAL (EAAAL) (i.e., the AAL calculated using the Entry Age ACM). Under GASB 25 and GASB 27, preparers of financial statements were not required to disclose (or were prohibited from disclosing) funded ratios where the Aggregate ACM was utilized. Under the requirements of GASB 50, effective beginning most fiscal years 2008 and later, PERS that utilized the Aggregate ACM were required to disclose funded ratios based on the EAAAL. Note, however, that GASB 50 did not apply the same requirement to other spread gain ACMs, thereby not fully fixing the concerns identified with the Aggregate ACM.

For example, prior to fiscal year 2012 (July 1, 2011 to June 30, 2012), the NYCERS used the FIL ACM,⁴ and under this ACM, the AAL equaled the Unfunded Actuarial Accrued Liability (UAAL) plus the AAV.

To illustrate, the New York City Police Pension Fund (POLICE) reset its UAAL to zero as of June 30, 1999, based on the Entry Age ACM but with the UAAL not allowed to equal less than zero. While it was anticipated that some UAAL might be established in the future, no new UAALs were ever created under the FIL ACM. Consequently, the AAL under the FIL ACM each year from June 30, 1999 to June 30, 2009, equaled the AAV. With the AAL and the AAV reported as equal under GASB 25, the funded ratios shown in the financial statements equaled 100% every June 30—from June 30, 1999 until the ACM was changed to the EAACM as of June 30, 2010. The reported funded ratio of 100% did not change, no matter what changes occurred in benefits or in economic conditions.

Note: Because a UAAL under a spread gain ACM is generally amortized over a fixed period with scheduled payments, even where a UAAL were to exist, the AAL would equal the AAV plus the UAAL, and, again, little information would be derived from the resulting uniform, year-by-year progression of the reported funded ratios.

Concepts Supporting MVABO

The MVABO was designed to follow the principles of pension finance, where pension benefits are recognized as having financial characteristics similar to traded securities (e.g., primarily bonds). Further, whatever obligations exist should be evaluated in reference to their characteristics, not the characteristics of any assets that might support them.

Following are some of the applicable principles of pension finance:

- Assets and liabilities should be marked to market.
- The discount rate used to determine Market Liabilities should be independent of the asset allocation or the expected rate of return of the funds supporting the liabilities.
- Market Liability is determined by reference to a portfolio of traded securities that matches the benefit stream in amount, timing and probability of payment.

⁴ The FIL ACM is a spread gain ACM that may incorporate a frozen UAAL of any amount including a zero UAAL. FIL with a zero UAAL could be considered the same as the Aggregate ACM were no UAAL ever expected to be created. Both the Frozen Entry Age ACM and the Aggregate ACM were acceptable ACMs under GASB 25 and GASB 27 and were effectively the ACMs used by the NYCERS. The description of the ACM used by the NYCERS as the FIL ACM allowed for using a single ACM description to cover all of the NYCERS and anticipated the possibility of new UAALs. GASB 50 changed disclosure requirements for PERS using the Aggregate ACM but, probably inadvertently, not for PERS using other spread gain ACMs, such as the FIL ACM.

- Solvency Liability is determined by reference to a portfolio of default-free securities that matches the benefit stream in amount and timing.⁵
- When interest rates are lower, payments are more valuable, and vice versa.

Development of MVABO and MVFR

With the requirements of GASB 25 and GASB 27 resulting in funded ratios that provided limited information to the users of the financial statements of the NYCERS, and desiring to create more transparency for the financial status of the NYCERS, beginning fiscal year 2003, the MVFR was published in the actuarial section of the CAFR for each NYCERS and the MVA and MVABO on which the MVFR was based.

As noted earlier, in these calculations, MVABO equals a projection of the benefits payable in accordance with the ABO methodology, calculated on a going-concern basis using the same actuarial assumptions, except the discount rate, as are used in the regular actuarial valuation.

Note: Given the minor difference in results for the NYCERS, changes in actuarial software and the desire for reduced programming challenges, for the June 30, 2012 and later calculations, accrued benefit cash flows for the NYCERS have been determined using Unit Credit ACM.

Going forward, it makes sense to use the Unit Credit ACM for calculating accrued benefits to determine MVABO, since determining accrued benefits under the Unit Credit ACM is completely consistent with what is needed and is readily available under most actuarial computer programs currently in use. The only issue now for me is whether MVABO should now be called MVAB (i.e., Market Value of Accrued Benefit).

Note: The choice of either ABO or Unit Credit methodology to determine the portion of benefits earned to date is consistent with pension finance theory.

The choice of benefits accrued to date, without salary or future service projections, also follows the logic that, since the MVA represents the value of assets accumulated to date, the comparable value for liabilities should be based on the value of benefits accumulated to date.

Once developed, accrued benefit cash flows are then discounted using U.S. Treasury spot yields.

⁵ In the case of the NYCERS and many other public pension plans, Solvency Liability and Market Liability are effectively equal, given an almost 100% likelihood of payment of the benefits.

As noted earlier, the use of U.S. Treasury spot yields derives from pension finance theory, which calls for using a Reference Portfolio of securities whose characteristics match the expected benefit payments in amount, timing and probability of payment. For the NYCERS, where the payment of benefits is virtually certain, the appropriate Reference Portfolio consists of a portfolio of U.S. Treasury securities.⁶

Source of U.S. Treasury Spot Yields

I chose to discount the ABO benefits using a Reference Portfolio of U.S. Treasury securities with spot yields by a noncommercial source.

Until 2012, the source of U.S. Treasury spot yields was the U.S. Department of the Treasury's Asset and Liability Price Tables, published quarterly by the Office of Thrift Supervision (OTS).

Since 2012, the source of U.S. Treasury spot yields may be found under the Treasury Yield Curve subsection of the Resource Center, Economic Policy section of the U.S. Department of the Treasury website. The spot yields can be readily derived from the spot rates that have been developed by James A. Girola and his colleagues, which are the result of sophisticated analyses, are updated as of the end of each month, and represent a superior product for use as input to the MVABO calculations.⁷

Illustration and Comparison of Funded Ratios

A fuller presentation of the dollar amounts and funded ratios, together with commentary on them, can be found in the POLICE June 30, 2014 CAFR,⁸ beginning on page

⁶ A further discussion of Reference Portfolios can be found in the "Pension Actuary's Guide to Financial Economics," published by the Society of Actuaries and the American Academy of Actuaries, at <http://www.soa.org/professional-interests/pension/research-thinking-ahead/actuary-journal-final.pdf>. Additional information regarding pension finance can also be found on the Society of Actuaries website. A Reference Portfolio consisting of U.S. Treasury securities is appropriate for determining a market-related liability for the NYCERS, since it is the belief of this author that the benefits provided by the NYCERS are virtually certain to be paid. Specifically, the benefits of the NYCERS are secured by both assets in Trust and by the taxpayers through Constitutional protection (i.e., the benefits of membership in a New York State PERS may not be diminished or impaired). Thus, for the NYCERS, the MVL developed is appropriately close to or the same as a Solvency Liability, which has no adjustment in discount rates to account for possible payment default.

⁷ It would require a separate article to discuss all of the issues involved with obtaining appropriate U.S. Treasury spot yield information. There are multiple considerations involved in deciding whether to use spot yields derived by bootstrapping from, for example, yields based on Constant Maturity Treasuries (CMT), as published in Federal Reserve Statistical Release H.15; to use market information on U.S. Treasury STRIPS securities; or to use other techniques and yields derived from swap rates, and so on. Wanting the choice of U.S. Treasury spot yields to be transparent and from a noncommercial source, I found limited options and chose the spot yields published by the OTS. However, these OTS spot yields were published at the end of each calendar quarter only until Dec. 31, 2011. Subsequently, and fortunately, the U.S. Treasury developed its own U.S. Treasury spot yield tables and has been publishing them (average monthly and month-end values) at <https://www.treasury.gov/resource-center/economic-policy/corp-bond-yield/Pages/TNC-YC.aspx>.

⁸ See <http://comptroller.nyc.gov/wp-content/uploads/2015/01/POLICE-CAFR-2014.pdf>.

142 under the section “Other Measures of Funded Status.” The following table presents a subset comparison of various funded ratios for POLICE for each June 30 from 1999 to 2013. All actuarial liabilities (exclusive of MVABO) before June 30, 2010, were determined using a discount rate of 8.0% per annum, with a discount rate of 7.0% per annum used on and after June 30, 2010.

***New York City Police Pension Funds
Comparison of Funded Ratios***

JUNE 30	AAV/AAL ^a	AAV/PBO ^b	AAV/EAAAL ^c	MVA/EAAAL ^c	MVA/ABO ^d	MVA/MVABO ^e	MVABO DISCOUNT RATE ^f	MVABO AVERAGE DURATION ^g
1999	100%	116%	124%	124%	134%	108%	6.0%	11.8
2000	100	103	109	111	117	94	6.0	12.4
2001	100	100	105	91	98	76	5.7	11.9
2002	100	96	97	74	82	65	5.8	11.1
2003	100	92	92	70	76	52	4.7	12.4
2004 ^h	100	87	85	74	81	63	5.5	11.5
2005 ^h	100	80	76	69	82	54	4.2	13.6
2006 ^h	100	74	69	69	80	61	5.4	12.4
2007 ^h	100	74	69	76	90	66	5.2	12.5
2008 ^h	100	77	71	70	81	55	4.5	12.8
2009 ^h	100	78	71	55	64	42	4.2	12.9
2010 ⁱ	60	58	60	52	55	36	3.7	13.3
2011 ⁱ	61	60	61	61	63	44	4.1	13.0
2012 ^j	64	63	64	61	62	34	2.5	15.2
2013 ^j	67	66	67	67	68	43	3.3	13.9

- a. AAL based on funding assumptions and method in accordance with GASB 25 and GASB 27.
- b. Projected Benefit Obligation (PBO) based on funding assumptions and method required under historical GASB Statement No. 5 (GASB 5).
- c. EAAAL (most common ACM for PERS and required under GASB 67) based on funding assumptions.
- d. ABO based on funding assumptions.
- e. MVABO based on funding assumptions and ABO, except for discount using U.S. Treasury yields.
- f. Weighted average discount rate.
- g. Average duration measured in years.
- h. Changes made in actuarial assumptions and in the Actuarial Asset Valuation Method (AAVM) as of June 30, 2004.
- i. Changes made in actuarial assumptions, actuarial methods and AAVM as of June 30, 2010.
- j. Preliminary figures. Changes made in actuarial assumptions, actuarial methods and AAVM as of June 30, 2010.

Observations on Funded Ratios

As the table illustrates, funded ratios for the POLICE based on AAVs and traditionally calculated actuarial present values (e.g., AAL, PBO, EAAAL) provide either little or misleading information (AAV/AAL) or provide smoothed and lagged information (e.g., AAV/PBO or AAV/EAAAL).

Although funded ratios that compare MVA with ABO, PBO or EAAAL (based on a constant discount rate) reflect the impact of investment market volatility, prior to GASB

67 and GASB 68 these funded ratios were not routinely published, were not required by GASB 25 or GASB 27, and limited the presentation of market volatility to only the asset side of the equation.

However, MVFR fully reflects the annual impacts of benefit improvements, investment returns and changes in the level of interest rates.

Not surprisingly, funded ratios based on MVA tend to be volatile, especially where the asset and liability characteristics are mismatched.

In the case of funded ratios based on discount rates that remain constant over time, the primary source of that volatility is the fluctuation in the MVA.

In the case of MVFR based on market-related discount rates, the greatest source of volatility is usually the fluctuation in the MVA, but that volatility can be exacerbated or mitigated by changes in discount rates. During recent periods, discount rates based on market conditions have sometimes decreased during times when the economic conditions were unfavorable for equity investments. Both of these conditions correlate with lesser MVFR.

That said, it may be surprising to some that MVFR can be less volatile than funded ratios based on MVA compared with ABO, PBO or EAAAL (determined using a constant discount rate). Indeed, while the annual changes in the dollar amounts of MVABO are usually more volatile than those of traditionally calculated funded ratios, MVFR may be less volatile for a PERS where MVABO and MVA are relatively close in balance and there is a reasonable portion of bonds in the investment portfolio.

In the POLICE table shown, during the early years of the 10-year period from 1999 to 2009, MVFRs based on market discount rates were less volatile than the ratios of MVA to ABO and the ratios of MVA to EAAAL, where ABO and EAAAL were determined using a constant 8.0% percent per annum discount rate.

Overall, it appears that the volatility of all the funded ratios is primarily a function of the investment return volatility. However, when reasonably well funded on a MVABO basis, the use of market-related discount rates appears to dampen the volatility of MVFR, since the value of a portion of the assets (i.e., that invested in bonds) tends to move more closely with the market-related liabilities than the liabilities reported on a constant discount rate. This leads to less overall volatility in MVFR.

Where MVFR is not close to 1.0, the impact of interest rate changes may exacerbate the volatility of MVFR relative to funded ratios based on constant discount rates.

Where MVFR is close to 1.0 and the characteristics of the assets in an investment portfolio were to match the benefit payments in amount and duration, changes in market conditions would have only a modest impact on MVFR year to year.

Additional Comments on MVFR

I like to describe MVFR as an asset/liability-sensitive measure of the financial status of a pension plan. Given how it incorporates the economic impact of both assets and liabilities, it can be useful in thinking about asset-liability mismatching and considering liability-aware investing. However, of course, MVFR is not the only useful number and is best reviewed over a period of years.

In addition to providing a market-related evaluation of funding status at a given point in time, MVFR is also a measure that changes directly in response to key impact factors:

For example, MVFR changes when (all other things being equal):

- Benefits go up: MVFR decreases.
- Contributions are not paid: MVFR decreases.
- Investment returns do not meet MVL growth: MVFR decreases.
- Interest rates decrease: MVFR decreases.

In theory, the first two of these issues could be controlled and the impacts of the other two issues could be hedged.

In one measure, MVFR provides more insight than any other funded ratio measure. MVFR highlights and illustrates the risks implicit in benefit policy, funding policy and investment policy, directly and immediately. Such information can help policymakers and others in their overall understanding of the financial dynamics of defined benefit pension plans.

An observation that becomes immediately apparent from the POLICE table is that the greatest annual changes in MVFR occur during periods of financial market volatility, where the mismatch of assets and liabilities (e.g., equities invested to support bond-like pension benefits) is the greatest. This is further exacerbated when the MVFR is not close to 1.0. For example, during fiscal years 2002 and 2009, equity markets and interest rates declined simultaneously and MVFR declined significantly.

That said, having information on MVFR and the related MVABO and MVA at a given point in time is valuable but only as a stepping stone to a broader discussion of the economic value of pension plan benefits and the risks inherent in financing defined benefit plans with assets whose characteristics are mismatched with the characteristics of the liabilities.

MVABO can also be particularly important for discussing the economic value of pension benefits as a component of total compensation. Discounting certain-to-be paid benefit payments and/or benefit improvements using actuarial expected rates of investment return almost universally undervalues this extremely valuable component of total compensation. Such undervaluation has often resulted in plan sponsors committing

current and future generations of taxpayers to providing levels of defined benefits that may become unsustainable—or sustainable at the expense of other governmental services or by breaking promises to their employees. Neither of these situations is desirable when recognition of the economic value of these benefits can guide sound public policy.

Although traditional actuarial budgeting techniques may forever be used to determine annual employer contributions to most PERS, I believe that publishing the MVABO and MVFR provides interested parties with useful information and can increase appreciation for the economic value and real financial risks of defined benefit pension plans.

MVABO and MVFR also provide actuaries with a useful vehicle to introduce the ideas of pension finance and Market Liabilities and the ability to use that information for more extensive discussions with interested stakeholders.

Conclusion

In summary, the financial community wants more transparency regarding the economic status and risks of PERS. In addition, extensive press coverage has made trustees and plan sponsors more concerned and sensitized to the risks of their defined benefit pension plans.

Ultimately, I believe that the greater understanding of the economic status and risks inherent in defined benefit pension plans can help improve their management and chances to survive as useful elements of total compensation for their participants and for society. By supplying information such as MVABO and MVFR, actuaries can help increase the knowledge of interested parties and be central to more robust discussions on the financial obligations and risks inherent in these plans.⁹

The author wishes to thank Jeremy Gold for all of his knowledge and education on pension finance over the years.

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⁹ I am pleased to note that, during 2016, the Pension Task Force appointed by the Actuarial Standards Board suggested that actuaries be required to report a solvency or settlement value in funding valuations. As suggested, an acceptable proxy for such value would be the accrued benefits calculated under the traditional Unit Credit (TUC) actuarial cost method, discounted at U.S. Treasury rates. This suggested approach is identical to the MVABO reported by the NYCRS in the last few years.