

A Forward Looking Asset-Smoothing Method

Doug Andrews, MBA, FCIA, FSA, CFA

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(note: The quotations appearing in this monograph are exact, except where capitalization and punctuation were changed in keeping with modern style and grammar guidelines.)

Abstract

Funding of a going-concern pension plan has a long time frame. Satisfactory delivery of benefits is partially dependent on future investment returns. The most common asset valuation methods used today involve either the current market value or an average of the last few years' market values. In a period of protracted market declines, for example, the last few years, either of these methods will show that asset growth has not kept pace with liability growth. This may result in increased contributions. Such additional contributions may turn out to be unnecessary if market returns revert to more normal levels.

These asset valuation methods are limited since they look only at historical values. An asset valuation method for an ongoing plan would provide smoother funding results if it were also forward looking and took into account the potential variability of asset returns. Such an approach would be particularly appropriate where a projected benefit method is used to value liabilities. This paper shows an approach whereby future asset returns and liabilities are modeled taking into account the probability of various returns. It develops an asset-smoothing approach that uses an expected return on the asset mix and averages both historical and projected asset values.

1. Introduction

"Pension Plans Face \$225-Billion Shortfall: Demand for Cash to Close Funding Gap May Force Some Plans to Collapse: Experts," reads a recent *Globe and Mail* headline, and the follow-on article is headed, "Problems Seen Ending Defined Benefit Plans" (Church 2003).

Defined benefit (DB) pension plans are under pressure. A principal reason for this pressure is that most DB pension plans invest in equities, and all around the globe equity markets have dropped dramatically over the last three years. But DB plans are under pressure from another direction—financial economics. An article by Bader (2001) criticizes the traditional approach used by actuaries to value pension liabilities and suggests that the value of most pension liabilities is understated.

This paper will not satisfy those who believe the DB pension system is in crisis. It does not attempt to do so. Rather, the paper presents a pragmatic approach to calculating the value of assets of a pension plan for the purposes of determining funding contributions to the plan. Applied in a systematic and consistent way over the long term, this approach should provide contributions that will remedy the funding deficiencies identified by critics, but in a way that is more likely to be affordable, hence, avoiding some of the negative repercussions of further shocking a system already in a weakened funded position.

This paper attempts to avoid the current raging debate regarding the most appropriate method to value liabilities: the traditional method or the financial economics approach. The asset-smoothing method presented here could be used with either approach to valuing the liabilities, under certain circumstances and provided that the purpose of the valuation is for the funding of an ongoing pension plan. It is very important to recognize that this asset valuation method is only proposed for the purpose of funding valuations of ongoing pension plans. It is not proposed for accounting valuations or for solvency valuations. Certain further limitations with respect to its use in funding valuations are also discussed in the paper.

2. Characteristics of Asset-smoothing Methods

In Canada, it is quite common to use market value of assets when preparing a funding valuation. Proponents of market value touted its use for reasons of simplicity and transparency but acknowledged that it was simply a single snapshot of the asset value. During the 1990s, when asset mixes contained a significant allocation to equities, use of market value produced lower funding contributions:

- The next most common asset valuation method in Canada involves an averaging of historical market values over a period of three to five years. There are two relatively popular variations of this approach. Sometimes these averages are calculated by developing a hypothetical value taking into account contributions, benefit payments and other cash flow and spreading over a period of years a portion of the excess (or shortfall) of investment income and realized gains/losses compared to an assumed investment return.

- Another similar approach, which is simpler to apply, is to calculate the average of the ratio of market value to book value over some period, say five years, and then apply this ratio to the current book value.

During the '90s, when market values were rising rapidly, these methods meant that the asset value derived was often significantly below market value. Where this was seen as a deficiency, occasionally, a further modification was applied to pose a lower limit on the asset value of 80 percent or 90 percent of market value.

In the 21st century, with equity markets having declined substantially, these methods are producing asset values in excess of market value. In other words, the methods are working as they should—to smooth asset values by showing the recognition of both gains and losses. However, if equity markets do turn around, these smoothing methods, which are driven by historical relationships and values, will result in smoothed asset values less than market values. Given the current depressed market value (relative to where people would hope values would be), these methods will likely be used infrequently.

One of the earliest papers on asset valuation methods studied the impact on smoothness of contributions of various methods (Jackson and Hamilton 1968). The method proposed in this paper was developed for the purpose of smoothing funding contributions.

Other characteristics of asset-smoothing methods have been discussed at a number of meetings of the Society of Actuaries at which I have participated, including those Washington, D.C., in 1997 and Dallas in 2001. Bonnar (2001) listed the following desired characteristics of asset-smoothing methods:

- They are unbiased.
- They have no influence on investment decisions.
- They are easy to explain.
- They revert to market value.
- They satisfy external constraints.
- They produce smooth results.

At the same meeting, Andrews (2001) presented the suggested characteristics of an asset valuation method, including the following, which are consistent with those identified by Bonnar (2001):

- Short-term market fluctuations should be smoothed out so that no sharp changes in funding level or contribution rate occur due to market sentiment.
- The method should be objective.
- It should be readily explainable.

Andrews (2001) also listed several other desired characteristics. The method should:

- Value assets and liabilities consistently.
- Result in value that is equally likely to be above or below market value.
- Take expected future economic conditions into account.
- Use current market information.

The method presented in this paper will be compared to these characteristics.

3. The Asset-Smoothing Method

The asset-smoothing method proposed here should be regarded as a type of market-value-based averaging method. It begins by determining the expected return on the asset mix. This could be done in any number of ways. For example, an asset-liability modeling study might be conducted to determine the desirable asset mix most likely to achieve the plan sponsor's and plan administrator's objectives. The expected return from this asset mix would then be derived. This expected return would take into account investment income, realized and unrealized capital gains and losses. It would be converted to a single annual rate of return expected to be earned each year.

If the traditional method of valuing liabilities has been used (Patterson 2003, p. 4–6), the discount rate includes some allowance for the return to be earned due to asset mix. In the proposed method, the expected return to be used in valuing assets would be equal to the discount rate or perhaps a

slightly higher rate if any margins in the discount rate for conservatism in liability valuation are removed.

If the financial economics method of deriving the discount rate to value liabilities has been used (Patterson 2003, p. 7–10), the expected rate of return for the asset valuation method must be derived separately by reference to the actual asset mix. This is because the financial economics approach values liabilities using discount rates related to a notional portfolio of fixed income assets judged to be similar to the nature of the liabilities, adjusted for credit risk. It is recognized that actual asset mix will differ from this notional portfolio since, for most plans, it is impossible to find assets that will precisely model the plan liabilities.

Regardless of the method used, there will be an element of subjectivity in selecting the expected rate of return.

Using the actual book value of assets at a date that is two years prior to the valuation date, the actual cash flow due to contributions, payments and expenses—but ignoring investment income and realized capital gains and losses—apply the expected rate of return to determine the expected book value one year prior to the valuation date and at the valuation date. Then follow the same procedure using anticipated cash flow for the next three years, again excluding investment income and capital gains, along with the expected return, to determine the expected book value one, two and three years after the valuation date. Calculate the average of these five years' expected book values.

To adjust the value to be market-related, calculate the difference between actual market value and expected book value one year prior to the valuation date and on the valuation date. Add 10 percent of each of these two differences to the five-year average expected book value. Ten percent was selected so that one-half of the difference between market value in the two years prior to the valuation date would each have a one-fifth weight in the average.

This method might be called *moving average projected book value*. This is the generalized model; a number of modifications, such as the following, might be considered:

1. The assumption regarding the timing of cash flow and how the expected rate of return is to be applied is not prescribed. The actuary may assume mid-year cash flows on average or make some other assumption.
2. The amount of the difference between market value and expected book value to be recognized could be adjusted. I selected half the difference for each of two years as a reasonable amount of the difference to be recognized and as consistent with the objective of smoothing funding contributions. Other choices are possible, and may be more desirable depending on the objective.
3. If the experience were to unfold exactly as expected, then theoretically the method is anticipating some increase in values; that is, the method uses an average value for a valuation date two-fifths of the way through the period averaged, but the average represents a point halfway through the period. I do not consider this a serious objection since, in practice, market values and expected values are not likely to be the same, and only 10 percent of the differences between market value and expected book for the two years prior to the valuation date is included. However, if the actuary wished to adjust for this theoretical bias, either of the following approaches might be considered:
 - Discount the calculated asset value for one-half year using the expected rate of return in the asset valuation method.
 - Use the average of 2.5 years of expected book value prior to the valuation date and 2.5 years of expected book value after the valuation date, combined with an adjustment for the difference between market value and expected book value in the 2.5 years prior to the valuation. This method would be more complicated to apply since it involves half-year values.

4. When Would the Method Be Used?

The method has been developed for going-concern funding valuations in order to develop contribution requirements. It has been developed for the

Canadian regulatory context but may be acceptable in other jurisdictions.¹ It is particularly appropriate with asset mixes that are expected to be volatile or where there is a significant mismatch between the characteristics of the asset mix and the underlying liabilities.

4.1 Canadian Funding Context

In Canada, actuarial valuations for funding purposes are required to be prepared and filed with the regulators at least once every three years, or more frequently if there is a substantial change that affects the financial position of the plan or the contribution rate. The valuation is performed on two bases: (1) assuming the plan is a going concern and (2) assuming the plan is terminated at the valuation date (referred to as a *solvency valuation*). The assumptions used for the going-concern valuation are selected by the actuary, with some rather broad limitations imposed by regulators and the Canadian Institute of Actuaries (CIA) and with a conservative bent (as compared to being "best estimate assumptions"). The assumptions used for a solvency valuation are market-related with some constraints established by regulation. Regulation requires the use of commuted values in accordance with standards developed by the CIA.

The going-concern valuation determines the normal actuarial cost. In addition, any shortfall of assets compared to liabilities results in special contributions that may be paid in level installments over up to a 15-year period. The asset valuation method does not affect the normal actuarial cost, but can affect the value of any surplus or deficit and, therefore, impact the ability of the sponsor to take contribution holidays or require sponsors to contribute to deficiencies. Any deficiency revealed by a solvency valuation results in special contributions that may be paid in level installments, generally during up to a five-year period.

These valuations are performed for the regulators who have responsibility to protect the interests and benefit entitlements of plan members. The valuation results might be used to support tax deductions

¹ This method might be acceptable in the United States under the "Proposed Actuarial Standard of Practice, Selection of Asset Valuation Methods for Pension Valuations" issued by Actuarial Standards Board in December 2001.

and could also be subject to scrutiny by the Canada Customs and Revenue Agency, which administers the Income Tax Act and its regulations.

In Canada, for a going-concern valuation of a pension plan that provides benefits based on a formula related to future earnings, such as final three-year average earnings, or average of the best five consecutive years earnings in the last 10 years, etc., accepted actuarial practice is to project earnings using a salary scale. The accrued benefit at the valuation date is based on the proportion of the projected benefit that has been earned to date. Hence, there is some "overstatement of the accrued benefit" in the sense that, if the plan were to terminate at the valuation date, the benefit on which the valuation is based would be overstated.²

4.2 Other Uses

It would be appropriate for use with final-average-earnings type plans where projection of benefits is included in the value of accrued benefits. It could be used in the valuation of flat dollar plans if any projection of benefits has been included in the liability valuation. Because it provides smoother contribution requirements, it would be appropriate to use in plans where there are constraints on contribution variability, for example, plans where there is a negotiated contribution rate based on an employee contribution rate. In the Canadian context where the Income Tax Act and its regulations restrict the contributions if the surplus exceeds a certain level, the method might be used in periods of strong returns (which are considered unsustainable) as a way of maintaining contributions even though there is significant surplus. In such cases, less than a 10- percent adjustment might be applied to the difference between market value and expected value in the prevaluation period.

Outside of the pension plan environment, the method could be applied in calculating the spending rate for an endowment fund. Most university endowment funds in Canada spend at a fixed percentage of moving average market value. Because most endowments have significant asset allocations to equities, in light of the dramatic downturn in global equity

² This is true of most private-sector plans, which typically do not provide for any further increase in benefits after termination. Public-sector and quasi-public-sector plans typically provide for some increase in pensions after termination to take account of anticipated inflation or wage increases.

markets in the last three years, endowments are faced with the prospect of spending cutbacks. The proposed asset valuation method, which anticipates consistent asset returns, would produce less volatile, more level, spending rates—a highly desirable feature when managing the budget of a business such as a university.

5. Advantages and Disadvantages of the Method

Comparing the method described here to the list of desirable characteristics suggested by Bonnar (2001) and Andrews (2001) provides the following assessment of advantages and disadvantages.

5.1 Advantages

- *Unbiased.* The method may produce values above or below market value. Although it will generally produce gradually increasing asset values, this may not occur when market value is significantly less than expected book value in the two years prior to the valuation.
- *No influence on investment decisions.* Investment decisions are independent of the asset valuation method. The method calculates the expected rate of return based on the asset mix selected.
- *Produces smooth results and reduces volatility.* This is a major feature of the method and the primary reason for its adoption. Even during periods of severe market decline or rise, it assigns little weight to such actions.
- *Objective.* The method is objective in the sense of being unbiased and independent; however, the selection of an expected rate of return on the asset mix involves subjective judgment.
- *Takes into account expected future economic conditions.* By using an expected rate of return related to the asset mix, future economic conditions are taken into account.
- *Value equally likely to be above or below market value.* This is the case as discussed above.
- *Uses current market information.* Although current market information has a relatively minor impact on the asset value, market information for the two years prior to the valuation is included in the determination of asset value.

5.2 Disadvantages

- *Difficult to explain.* Although this is not a huge difficulty, it is certainly more challenging to explain a method that uses the average of five hypothetical values and an expected rate of return that may be viewed as subjective or arbitrary, and that involves adjustments.
- *Not that simple to apply.* The method requires the development of expected book values, which involves projections for three years of cash flow and the determination of an expected rate of return.
- *May revert to market value, but not in a readily explainable manner.* The averaging process with adjustments means the method can exceed, be less than or equal market value, but it is not obvious under what circumstances the method reverts to market value.
- *Does not directly relate the valuation of assets and liabilities.* Although the asset valuation method is independent of the liability valuation method, a couple of suggestions have been made as to how a closer relationship could be made between the two valuations. For example, an asset-liability study might be done to determine the asset mix and the expected return or, if liabilities have been valued using traditional actuarial practice, the expected rate of return would be that used in the valuation of liabilities, with or without margins.

6. Conclusion

The proposed asset valuation method is recommended for use in Canada for funding valuations where stability of contribution rates is an important factor. It is best suited to plans that use a projected benefit valuation method. It will appeal to plans that have significant equity exposure and have suffered significant declines in asset values over the last few years. It may also appeal to those managing endowments who are facing potential drops in spending rates.

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