

**A PRACTITIONER'S OBSERVATIONS
ON SOME INNOVATIVE IDEAS
FOR PENSION PLAN INVESTMENT**

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ABSTRACT

Many defined benefit plans are in deficit. Proponents of financial economics would not be surprised. They would note that the investment policies of many plans, which involved extreme mismatches of assets and liabilities, were likely to lead to funding deficiencies at some point in time. Where should investment policy go from here? This paper examines a number of possible approaches and identifies practical limitations in their implementation, including:

- Securitizing the unfunded liability, full-funding of accrued liabilities, and investing in suitably matched investments;
- Continuing to invest with a mismatch strategy but hedging the risk using Margrabe options;
- Continuing to invest with a mismatch strategy but incorporating more flexibility into the pension deal in order to share more risk with plan participants;
- Using dynamic asset allocation techniques.

KEYWORDS

Asset-liability management, Canada Pension Plan Investment Board, dynamic and optimal asset allocation, hybrid plan, intergenerational transfers, Margrabe options, Minimal Risk Portfolio, mismatch strategy, pension guarantee funds, risk-absorbing instruments, securitizing unfunded liability, solvency valuation, surplus

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1. INTRODUCTION

In the early part of this decade, Canadian pension plans experienced the perfect storm. Their assets which included substantial equity investments tumbled as the technology bubble burst, feverish preparation for Y2K which had accelerated corporate activity ended, the global economy slowed, and most stocks' prices dropped dramatically. Bond yields also declined. Moreover, actuaries and plan sponsors began to pay more attention to the financial economists who denounced the practice of anticipating equity risk premiums in valuing liabilities. Valued using the lower bond yields, liabilities appeared to suddenly rise substantially. Consequently throughout most of this century, the majority of Canadian pension plans have had unfunded liabilities.

An obvious solution to eliminate unfunded liabilities is for the employer/sponsor to make special additional contributions to the pension plan in the amount of the unfunded liability. This is not the preferred solution for most employers/sponsors for reasons which include: the high cost; concerns with the asymmetric rules regarding surplus ownership that, if the funding position improves to a surplus position, the excess funds will not be recoverable; denial that the plan is actually so expensive; and the desire for an alternative solution. In a simple world where none of the foregoing concerns existed employers/sponsors would make an additional special contribution equal to the unfunded liability, change the investment policy to one which was

liability driven, and “live happily ever after”. Because the above concerns are real, employers/sponsors are seeking creative solutions which include lower payments than the amount of the unfunded liability and the opportunity to invest in other than liability-driven investments.

This paper reviews a number of suggestions presented by others and identifies practical limitations in implementing such suggestions within the Canadian pension context. It then proposes modifications to the suggestions to adapt them to the Canadian private pension plan legal and tax environment. The proposed modified suggestions are presented for discussion and consideration in an attempt to find a practical approach to getting out from under the perfect storm cloud without either a major initiative to terminate defined-benefit plans or a significant default on pension promises.

2. SECURITIZING UNFUNDED LIABILITIES

In a recent paper, Gold (2005) proposes securitizing the unfunded liabilities of pension plans by having plan sponsors issue private placement bonds equivalent to their pension plan’s unfunded liability. This bond would be purchased by the Pension Benefit Guaranty Corporation (“PBGC” or the Pension Benefits Guarantee Fund in Ontario) through the issue of PBGC bonds of equivalent amount. Typically the credit ranking of the sponsor would be lower than the

PBGC, requiring the sponsor to pay a higher rate. However, this rate differential would eliminate the need for PBGC premiums to vary by sponsor's credit rating.

This suggestion has merit from a number of perspectives, including:

1. The unfunded liabilities of the pension fund would no longer be unfunded, they would be secured by an obligation of the PBGC. This will enhance the security of plan members.
2. By requiring the sponsor to issue securities equivalent to the market value of the unfunded liabilities it would make more transparent the pension obligations of the sponsor and their impact on the sponsor's creditworthiness. By incorporating the pension obligations into the sponsor's debt structure, the sponsor's ability to make additional borrowings or other financial transactions would be directly affected and limited. In this regard, securitizing the unfunded liability would provide a greater degree of financial restraint on the sponsor, which should be beneficial for pension plan members.
3. The cost of insurance to guarantee benefits in the event of sponsor default will include an adjustment for the creditworthiness of the sponsor. Certainly the creditworthiness of the sponsor is an important factor to be incorporated in any actuarially-sound insurance-guarantee rating-system. It is not currently included in the premium rate structure for the PBGC or in the premium rate structure for

the Pension Benefits Guarantee Fund (“PBGF”), the guarantee fund in Ontario, the only jurisdiction in Canada with a guarantee fund. However, in the United Kingdom’s relatively new Pension Protection Fund (“PPF”), creditworthiness of the sponsor is considered in setting premiums. A credit rating agency, Dunn and Bradstreet, assesses the creditworthiness of sponsors and the sponsors’ premiums to the PPF are adjusted accordingly. One might argue that by the sponsor having to securitize the pension fund’s debt, a more accurate assessment may be made of the creditworthiness of the sponsor, since the counterparty to the transaction is issuing securities and is subjecting itself to risk of default by the sponsor, whereas in the UK model, the rating agency is only setting a rating for premium purposes. One would anticipate that the rating agency may not be able to demand or to receive the same extent of credit information on which to base an assessment as would a counterparty where actual securities are being issued. Moreover, the consequences (to a rating agent) of mis-rating are small, some impact on its reputation, compared to the consequences of mis-rating on a counterparty which will assume a financial burden for its error.

There are a number of practical problems in implementing such a proposal. Gold (2005) states “it is a legislative non-starter” because the legislation enabling the PBGC to issue securities in return for sponsor securities is not in place. There are a number of other practical problems including:

1. Many jurisdictions do not have a pension guarantee fund, e.g., all but one of Canada's eleven jurisdictions does not have a fund and the fund in the one jurisdiction (Ontario) only protects the benefits of members (typically residents) in that jurisdiction.
2. The unfunded liabilities of the pension plans may exceed the capacity of the guarantee funds to issue securities. For example, in Ontario only certain benefits are subject to guarantee by the PBGF but the plan may provide and have other unfunded pension benefits. Unless all the unfunded benefits are securitized the plan will not be fully funded (one of Gold's objectives). Moreover because assets are not legally tied to specific liabilities, in the event a plan defaults the previously "secured" guaranteed benefits might be unfunded, in part. Also, one wonders why the guarantee fund would wish to exchange securities in respect of the obligations it is not required to insure and, if it did so wish, whether it would have sufficient capacity to do so.

Considering these practical limitations in the Canadian context, the following proposal is presented for consideration:

1. Pension legislation might be revised to require that unfunded liabilities either be:

- funded by the sponsor over a relatively short period, say three years (the maximum permissible time between valuations); or
 - to the extent they will not be so funded, secured by a letter of credit from an acceptably-rated financial institution or other agency.
2. In the event the unfunded liabilities cannot be paid by the sponsor or cannot be secured by an acceptably-rated financial agency, the Canada Pension Plan Investment Board (“CPPIB”) might act as an agency of last resort and provide a security exchange with the sponsor.

In 1997, the Canada Pension Plan (“CPP”) began a series of contribution rate increases which established the total contribution rate (split equally between employees and their employer) at 9.9% of covered payroll per annum, which exceeds the pay-go rate. At the same time the CPPIB was established to manage the investments of the fund comprised of the excess contributions and investment income thereon. The CPPIB intends to invest in equities to diversify from the provincial debt obligations which existed prior to the establishment of the fund. Initially it invested in broad equity indexes but it is now considering a wider range of alternative investments, including private equity. In this regard, the CPPIB might make a private equity investment in the sponsor by depositing cash or issuing a bond to the sponsor’s unfunded pension fund (when all other sources to secure the unfunded liabilities had been exhausted). Such an approach could be available to sponsors and plans across Canada regardless of whether

there were pension benefit guarantee funds. It would provide private equity investment opportunities for the CPPIB. It would provide for greater member security on an ongoing basis and in the event of sponsor default, and it would enhance the pension system.

3. MARGRABE OPTIONS

Hans Buhlman has suggested¹ that Margrabe options might be used by insurance companies to provide greater financial security if a company followed an investment policy which permitted equity investments that were mismatched to liabilities. A simple Margrabe option provides the holder an option, i.e., the right but not the obligation, to exchange an asset for another asset at a future date. This idea might be extended to the pension context as discussed in this section.

In Canada, each actuarial valuation must include both a going concern and a solvency valuation. The going-concern valuation¹ is based on the assumption that the plan continues indefinitely and uses assumptions regarding future experience. The solvency valuation is performed on the assumption that the plan is terminated at the valuation date and uses market-related assumptions current at the valuation date. For the solvency valuation, an interest-rate basis prescribed by regulation, developed by the Canadian Institute of Actuaries, is a two-rate basis related to mid and long-term Government of Canada bonds. The basis is updated monthly. This basis is unlikely to be the same as the basis which would be developed using an analysis of the plan's expected cash flow requirements.

Suppose the actuarial valuation indicated the pension plan were fully funded at the valuation date, from the perspective of solvency. Suppose that the asset mix of the fund was not fully aligned with the liability structure in terms of expected cash flow and expected date of payment. The plan might prepare an expected cash flow analysis and determine a dedicated portfolio of fixed income assets, likely government bonds, perhaps with a mixture of nominal and real returns (which might be referred to as the Minimal Risk Portfolio (“MRP”). The plan would then purchase a Margrabe option available for exercise at the next solvency valuation date permitting the exchange of the actual assets held by the fund for the MRP, (or permitting an exchange of the portion of the actual assets which do not fit the MRP for a comparable portion of MRP assets). In this way the pension fund could benefit from upside appreciation of the asset mismatch but would be assured that it would still be solvent in the event that the mismatched assets underperform (the comparable MRP assets).

The following discussion presents practical issues in implementing such an investment strategy, in increasing order of practicality of implementation. Three implementation issues would be:

1. Finding a counterparty and setting a suitable price;
2. Determining the suitability of the replicating portfolio in light of solvency valuation requirements; and
3. Trading considerations during the inter-valuation period.

3.1 Counterparty and Pricing Considerations

In the simplest form of implementation, the Margrabe option would provide for the exchange of a portfolio of equities for a portfolio of government of Canada bonds with an appropriate set of replicating characteristics as of the previous valuation date.

From conducted inquires, the Margrabe option market is relatively thin, so finding a counterparty for the transaction might be difficult. Moreover, perhaps because the market is so thin, the pricing of the options is relatively firm; hence, the price of the option might be approximately equal to the difference between the value of the actual value of assets and the MRP of government bonds, which would not likely be attractive to the prospective purchaser. Finally, Margrabe options are more readily available and more accurately priced when a single asset is to be exchanged for a single asset. In the present context, in which consideration is given to an exchange of a portfolio of assets (say equities, for a different portfolio of assets, say government bonds) pricing would be especially difficult. Given the already thin nature of the Margrabe option market, a transaction of increased complexity would be more difficult to complete at a satisfactory price.

Jeremy Gold has asked² whether a suitable asset to be exchanged by the issuer of the Margrabe option might be deferred annuity contracts. From the viewpoint of the purchaser, such an asset would be an appropriate one to have exchanged since it removes all the risks associated

with a mismatched portfolio of assets that is under-performing the MRP. The issuer of such an option would likely be an insurance company.

Although this might be an appropriate investment solution, there are practical difficulties arising due to Canadian pension legislation. Under Canadian pension law, members who withdraw prior to retirement have the right to transfer the commuted value of their pension to an individual savings vehicle, subject to certain constraints being placed on the savings vehicle³. This makes it very difficult to purchase deferred annuities in respect of the liabilities for active members, because, if such members terminate at a later date, the annuity provider would have to provide a transfer option using a basis at least as favorable as that prescribed by regulation (that basis is updated monthly based on changes in long-term government of Canada bond rates). This requirement has rendered the (supply side of the) deferred annuity market for active lives (virtually) non-existent in Canada.

However extending this line of thought, a suitable asset to exchange could be annuities in respect of retired lives. There is an active market for retired life annuities and the risk is sufficiently well-defined that it could form one side of a price-able Margrabe option. For the sake of clarity, the following example is illustrative.

A final average-earnings pension plan with 35% of its liabilities in respect of retired lives would begin by calculating the MRP, which might consist of nominal and real-return long

government-bonds. It would then replace the 35% of its assets in respect of retired lives with equities and a Margrabe option. The Margrabe option would provide the right, in one year's time, to exchange the portfolio of equities for a portfolio of bonds (that replicated the retired-life liabilities in the MRP). Since the retired-life liability of a set group of lives will decline each year, a natural element of "margin" is introduced as a partial offset to the potential volatility of equities relative to long bonds and to help pay the cost of the Margrabe option, i.e., if a portfolio of equities in the same dollar amount as the portfolio of bonds in the MRP is exchanged then the Margrabe option is an additional cost; whereas, if the dollar amount of bonds in the MRP required in one year is less than the amount today there is an available differential which might be sufficient to cover the cost of the Margrabe option. Extending this example, the more mature the plan, the larger the proportion of retired-life liabilities to active-life liabilities and the larger proportion of MRP assets that could be invested in equities and an appropriate Margrabe option. Hence, it seems we have at least a viable basis for considering a Margrabe option contract. Let us next consider two other implementation issues.

3.2 Solvency Valuation Considerations

Pursuing the example in the preceding paragraph, in a normal interest rate environment where the yield curve is upward sloping as term to maturity increases, it is likely that the present value of the actual liabilities based on a cash-flow matching portfolio would be less than the value of the liabilities based on the prescribed interest-rate basis for solvency purposes, described at the beginning of this section 3. Furthermore, if the yield curve retains this normal shape, the

spread between the value of the portfolio of actual cash-flow matched bonds compared to the value on the solvency basis will have widened by the subsequent valuation date. Even more spectacular differences are possible if the yield curve makes a strong downward move over the year and/or changes shape. The practical approach to addressing this issue would be to have the regulators revise their solvency requirements to define the value of pension liabilities in respect of retired lives to be either the value as determined using the CIA basis or the value of a portfolio of government of Canada bonds with expected cash flow equivalent to the liabilities where the “expectation” is determined not just by amount but also by the timing of the payment. Note that this would be how the **value** would be calculated for regulatory purposes. There would not be a requirement to actually hold the replicating portfolio of bonds; otherwise, the approach of replacing the portfolio of government bonds in respect of retired lives by other assets and a Margrabe option would not work. Of course this difficulty is eliminated if the Margrabe option is to exchange retired-life annuities for the other assets and the option writer has priced the annuities to be issued without reference to the solvency liabilities.

3.3 Trading Considerations

Another implementation issue to be addressed would be considerations regarding trading of the (equity) assets in the portfolio during the year. It is unlikely that the fund’s administrator or investment manager would believe that the value of a portfolio of equities would be maximized by merely holding it for one year. Yet if trading is permitted it might be difficult to complete the exchange, in one year’s time, for the portfolio on the other side of the Margrabe

option. A proposed solution would be to agree to exchange a well-defined portfolio of (equity) assets such as the TSX index, the S&P 500, the MSCI World, or some combination of the above. This defined portfolio would make the pricing of the Margrabe option easier. Also, once agreed, the pension plan could purchase options (or futures) on the specified indices in the appropriate amounts for delivery in one year's time. The amount of options (or futures) held, would be adjusted (marked to market) during the year as values of the actual assets and the basket of assets on each side of the Margrabe option changed. The remaining assets⁴ could be invested in equities which could be traded.

Such a concept: using Margrabe options in respect of retired-life liabilities, with the right to exchange a portfolio of stock indices for a prescribed portfolio of retired-life annuities, would face some implementation issues, but appears to be a viable starting point for discussion with regulators, the CIA, and prospective issuers who would likely be insurers.

4. INTERGENERATIONAL TRANSFERS

This section continues the discussion of mismatched asset-liability investment policies. Cui et al. (2005) show that a form of hybrid defined-benefit plan can provide the highest utility (welfare) to plan participants compared to other plan designs. The hybrid design described has two risk-absorbing instruments:

1. When deficits exceed a certainty level, pension benefits to existing retirees are reduced by cutting indexation (cost-of-living) adjustments without change in the contribution rate; and
2. When surpluses exceed a certain level, (and any previously reduced benefits have been restored), then contributions are decreased.

Hence the design is considered a “hybrid” because the level of defined benefit is not delivered in all circumstances.

Their paper lists a number of reasons why such a design is welfare enhancing, including:

- By allowing flexibility, outcomes may be improved;
- The design permits the holding of assets, e.g., nominal bonds or equities, which are not necessarily an appropriate match for the liabilities but which may increase utility through their impact on consumption; and
- The risk-absorbing instruments increase utility by sharing risk.

These authors propose that a pension fund is always a zero-sum game in terms of value. However, it is potentially a positive-sum game in terms of welfare. There are certain

assumptions made in the set-up of the analysis that are not present in the Canadian private pension system, or in the pension systems in many other countries, including:

- Mandatory participation;
- No labour mobility;
- Indexation as part of the pension promise;
- A strong degree of intergenerational solidarity; and
- Constant absolute risk aversion (although the authors claim that the assumption of constant relative risk aversion produces similar results).

All but the last assumption may be quite satisfactory in the context of a social security system, such as the CPP, and may not be unreasonable for public sector pension plans. However, for private sector pension plans, as they currently exist in Canada, all assumptions are questionable. In Canada, the private sector pension system may be characterized as:

- A primarily voluntary decision by employers (sponsors) on whether to establish a plan (and few sponsors are voluntarily establishing any new defined-benefit plan);
- Increasing pressure to permit employees to decide if, and when, they will join the plan;
- Significant labour mobility;

- A strong “what’s in it for me while I’m employed” mentality as opposed to a consideration of intergenerational solidarity; and
- No commitment to indexation in private sector pensions; although post-retirement cost-of-living adjustments are frequently made on an ad hoc basis, if considered affordable.

Increasingly, private pension plans are seen as one possible part, but not an essential part, of one’s retirement savings plan. Employers tend to view pension plans more as a tool for attracting, retaining and managing a workforce through the delivery of tax-effective compensation than as a method to ensure that long-service employees have adequate income in retirement.

Nonetheless, an approach of having a more flexible defined-benefit promise with risk-absorbing instruments that would permit a broader range of investments (than a fully immunized/matched portfolio) is an appealing one. The following proposal describes how it might work in a Canadian private pension plan context without the requirement for intergenerational transfers.

1. The basic pension promise would be defined on career-average earnings and would not include post-retirement indexing. It would be funded by the

sponsor/employer and invested on a “sound” basis using liability-driven investment techniques.

2. There would be an employee contribution⁵ at a fixed rate, such as 5% of annual salary, but this contribution could be reduced or stopped by the employee as described in 3 below. These accumulated contributions with investment income thereon could be used to upgrade the ancillary benefits accompanying the basic pension, both pre- and post- retirement, Pre-retirement, the basic pension could be upgraded to inflation-adjusted (or final average) earnings. Post-retirement, the basic pension could be upgraded to include cost-of-living adjustments and survivor benefits. The investment of the employee contribution account could be directed by the employee, if desired, and could be invested in equities or other (mismatched) assets.

3. The risk-absorbing instruments are that the employee contribution account might be insufficient (due to the amount of contributions and or investment performance) to fully enhance the basic pension, so the retiree might have less pension than desired. Alternatively if the employee contributions with investment income appear to be likely to provide a more enhanced pension than the employee desires, the employee contribution could be reduced or stopped. (For

administrative convenience, decisions to reduce or stop the employee contribution might be limited to once per year or even to once only).

Such an approach does not require intergenerational transfers or solidarity. All adjustments to the final pension level are managed over the period of employment to retirement. But the “sound” investment policy backing the basic pension provides a high level of benefit security, and likely a high level of participant utility. The range of investment options for employee contributions, and the ability to vary contributions as retirement objectives appear likely to be attained, provides flexibility which would also likely enhance utility. With careful consideration of the Canadian taxation rules for pension plans, such a pension design would be an effective way of delivering tax-assisted compensation in Canada.

5. DYNAMIC AND OPTIMAL ASSET ALLOCATION

From the 1960’s in North America, and perhaps earlier elsewhere, pension and investment consultants have advocated investing pension plan assets in equities to capture the equity risk premium and thereby reduce the cost to the sponsor of the pension promised. Prior to the ascendancy of consulting firms as principal advisor to plan sponsors, insurance companies offered deferred annuity contracts with the liabilities backed by fixed-income investments. In the past decade, financial economists, recognizing the debt-like nature of pension obligations, advocated fixed-income investments with similar characteristics to the liabilities in respect of

amount and timing of payments, as appropriate investments. Nonetheless, considerable interest remains in mismatched strategies involving equities. A number of papers have been written regarding dynamic and optimal asset allocation where optimal is defined in the context of each paper. This paper presents certain ideas from the literature and makes observations on how these ideas may pertain to the current funding environment in Canada.

Leibowitz et al. (1992) discussed an approach to surplus control involving an asset mix of equities and bonds which enabled a plan to pursue traditional asset return objectives while reducing volatility of surplus. In today's environment, few plans have a surplus control consideration; however, there are some interesting points from the article that are relevant today. First, the authors found that as the funding ratio (ratio of assets to liabilities) declines, the choice of asset portfolios becomes increasingly limited and the duration of the fixed-income portfolio is forced to approximate more closely an immunizing duration. When the funding ratio is 80%, no portfolios meet the dual-shortfall conditions advocated by the authors. A notable feature of this paper is that it works with the Accrued Benefit Obligation (ABO) as the measure of liabilities which would be similar in Canada to working with solvency liabilities for funding purposes.

Rudolf et al. (2004) also discusses surplus management. They find that the optimum intertemporal expected utility of the surplus occurs for investors holding four funds:

1. The market portfolio;

2. The hedge portfolio for a state variable;
3. The hedge portfolio for the liabilities, and
4. A risk-less asset.

Further, they find that the liability hedge portfolio holdings depend only on the funding ratio and not on the form of the utility function and that the lower the funding ratio, the higher the percentage of the liability hedge portfolio. Once again, underfunded plans reduce the plan's ability to invest prudently in equities. In contrast to the Leibowitz et al. (1992) paper, the liabilities are defined to include growth rates of wages and salaries, which would be similar to liabilities determined on a going-concern valuation. Rudolf et al. (2004) suggest the opportunity for a new product to provide a liability hedge against unanticipated growth in wages and salaries, which could be offered by investment banks.

Although it was not the intention of the authors of either of these papers to show that unfunded plans should pursue an investment policy that uses fixed-income investments to hedge liabilities and that due to the unfunded position there is little flexibility to invest in other asset classes, one may conclude this from the papers. Moreover, the conclusion holds whether one uses solvency or going-concern liabilities to define investment policy. One would expect that plans will become better funded over time. What is the optimal asset allocation policy for a fully funded plan?

In a complex paper, Detemple et al. (2006) extend the work of an earlier paper by Detemple et al. (2003). The more recent paper considers the funded ratio,⁶ the terminal value, the intermediate dividend policy, and is able to incorporate other constraints such as minimum thresholds. It assumes all risks are hedgeable and notes that hedging demands tend to increase the demand for stocks. It develops an optimal portfolio rule with two components: the excess of liquid wealth over the value of a floor; and an insurance portfolio that finances the minimum liability coverage. Each of these components include investments in risky assets, e.g., equities.

The papers analyze many different possibilities using different utility functions and risk aversion definitions. The Monte Carlo method described in the 2003 paper provides a number of computational advantages over other methods.

Setting aside any considerations of the practicality of the utility and risk aversion assumptions, the following comments present some practical limitations to using such an approach in the Canadian pension environment. The assumption that all risks are hedgeable is idealistic. Examples of unhedgeable risks are:

- Unanticipated wage and salary growth;
- Termination experience with the option of the terminating member to take a commuted value calculated on a prescribed basis⁷ or to retain the right to a deferred pension; and

- Mortality experience which involves a joint annuitant for whom data is often not available.

If one wishes to reform the Canadian pension requirements to increase hedgeability, one could require that plans be fully funded on a solvency basis and eliminate the going-concern valuation requirement. Furthermore, one could eliminate the option that terminating members receive to elect a commuted value or retain the right to a deferred pension. From the perspective of making investment policy more manageable, a requirement that the terminating member receive a commuted value would fit well with requiring plans to be funded on a solvency basis, since the same actuarial basis is used.

Another important analytic component is the intermediate dividend policy, i.e., the ability to withdraw funds when funds in excess of a specified level arise. In Canada, it is extremely difficult for the sponsor to withdraw excess funds and even if there are situations where excess funds can be withdrawn, there is a cumbersome bureaucratic process which would delay significantly any withdrawal. To be able to invest optimally in Canada requires revision of the surplus withdrawal rules to permit sponsors to make withdrawals freely and easily when funding exceeds a specific threshold which should be defined. Hamilton (2006) observes that surplus can be expected to grow to unnecessary levels in mature pension plans if the ability to withdraw surplus is not available.

Van Binsbergen et al. (2006) also discuss optimal asset-liability management. They analyze the utility of a fund manager who is attempting to maximize return but who strongly dislikes losses which require the sponsor to make additional financial contributions. They show that preventive risk constraints restrict the manager's set of allowable portfolio weights and result in suboptimal policy decisions. Preventive risk constraints are the type commonly found in a Statement of Investment Policy and Procedures, such as short-sale prohibitions and maximum weight limitations on equity investments. Further, they show that punitive risk constraints which are triggered based on investment performance, that affect the manager through loss of compensation and reputation, result in investment performance more aligned with the plan's objectives. Plan administrators should consider these results in developing investment policy. Under the banner of good governance, the current trend has been toward increasingly specific (and restrictive) investment policies which may not be in the best interests of the members from an investment perspective (and consequently are not an act of good governance).

Van Binsbergen et al. (2006) also analyze the impact of asset-liability management where a smoothed rate is used to determine liabilities. They show that, when short-term objectives are defined with respect to a smoothed measure, the objectives can induce the investment manager to increase its risky positions. This arises because, in a rate environment where the yield curve is changing, the smoothed value may not provide the correct indication of the next rate move. For example, if rates have been rising, the smoothed rate lags the actual

increase and indicates a further increase, when, in fact, the actual next move may be downward as reversion to the mean occurs. This could result in a significant miscalculation of the value of liabilities to be hedged.

Although these authors are describing a U.S. valuation context, one could make a similar comment regarding the current basis in Canada to calculate solvency liabilities and potential dangers in using the solvency liabilities calculated on the prescribed basis for performing asset-liability management in Canada. As described previously, the solvency liabilities use a two-tier rate based on mid and long-term Government of Canada bonds. This provides a form of smoothing compared to discounting liabilities using the full yield curve. In today's environment with a very flat yield curve there is not much distortion, but the distortion will increase when the curve ceases to be flat.

6. CONCLUSION

This paper has reviewed a number of innovative suggestions regarding plan investments and has identified practical limitations with implementing these ideas in the current Canadian pension environment.

Based on this review, the following changes would make the Canadian pension system one where better investment returns were likely to be achieved which would be beneficial to both sponsors and members:

1. Require plans to be fully funded on a solvency basis. Unfunded liabilities would be required to be fully funded, secured by a line of credit, or be securitized by the sponsor. The PBGF and the CPPIB would be lenders-of-last-resort in this securitization process.
2. Eliminate going-concern valuation requirements and permit the computation of solvency requirements using a cash-flow analysis and the full Government of Canada yield curve.
3. Specify an asset threshold above which sponsors could make surplus withdrawals easily and on a timely basis.
4. Eliminate the option of terminating members to retain the right to a deferred pension and mandate a commuted value.
5. Require administrators to perform cash-flow analysis based on solvency liabilities to establish a Minimal Risk Portfolio (MRP) and require administrators

wishing to invest differently from the MRP to develop an investment policy supported by asset-liability analysis that might employ options to hedge the risks.

ENDNOTES

¹ Hans Buhlman presented this idea in a lecture at the University of Waterloo in June 2006.

² Jeremy Gold raised this point for discussion in the question period to Seminar 116 at the Society of Actuaries' meeting in Chicago on October 17, 2006.

³ Deferred members subject to Quebec legislation have this right not only on termination but at five-year intervals subsequent to termination until the deferred member attains age 55. Such an option is extremely difficult to purchase.

⁴ Remaining assets being defined as the residual value of the original amount of assets in respect of retired-life liabilities determined through a matching analysis based on expected cash flow (and representing one side of the Margrabe option transaction) less the premiums for the options on the stock indices (and any margin calls if futures are used).

Employee contributions to pension plans, up to certain annual limits, are tax deductible in Canada.

⁶ Referred to as “funding ratio” in the paper.

⁷ For the purpose of understanding this point, it is sufficient to recall the earlier discussion under Margrabe options concerning deferred annuities and to recognize that the basis used to calculate solvency liabilities is used to calculate commuted values.

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