

# THE ACTU



The debate between financial economics and the traditional actuarial approach to pension funding has been divisive.

But there may be some pieces from the financial economists' wardrobe that will fit traditional actuaries just fine.

# MORIARTY'S NEW CLOTHES

## A Canadian Perspective on the Financial Economics Debate

**P**ENSION ACTUARIES HAVE BEEN FACING SOME STRONG CHALLENGES from financial economists over our approach to the funding and investment of pension plans. The debate focuses on two main issues: the appropriate discount rate used to value pension plan liabilities, and how pension plan assets should be invested.

Financial economists contend that pension benefits are bond-like and therefore should be valued by reference to a matching bond portfolio. Furthermore, if pension benefits are indeed bond-like, then not only is backing those obligations with equity investments imprudent, the common actuarial practice of discounting those obligations using the expected rate of return on the assets, without considering the risk of not achieving those returns, is unsupportable.

This position was first presented by Lawrence Bader in 2001 with his seminal article “The Model Has No Clothes,” in the Society of Actuaries’ *Pension Section News*. The debate gained significant momentum two years later with his follow-up article in *Pension Forum*, “Reinventing Pension Actuarial Science,” co-written with Jeremy Gold.

The “model has no clothes” concept captured the imaginations of many actuaries. The ensuing debates were laced with entertaining potshots as to who really was prancing around in the altogether, coupled with sage advice that the frockless professionals protect themselves with sunscreen.

As I was delivering a presentation some months ago, defending the traditional actuarial approach, I was feeling oddly grateful for the protection of the podium I was standing behind, in case I too had fallen victim to the swindler who had sold me my magnificent actuarial clothes. My discomfort

stemmed not so much from becoming convinced that the financial economics approach was “right,” but from a growing awareness of some of the shortcomings of the traditional actuarial model in its ability to help pension plans weather financial storms.

Perhaps, I thought, though there are a number of shortcomings in applying the financial economics model to going-concern valuations, these two models aren’t irreconcilable after all.

### Four Financial Economics Principles

There are four basic financial economics principles around which the debate has focused:

➤ **PRINCIPLE NO. 1—One dollar of bonds has the same value as one dollar of equities.** Financial models should be free of arbitrage opportunities. If an arbitrage opportunity can be created, then there’s something wrong with the model.

## PERHAPS, I THOUGHT, THOUGH THERE ARE A NUMBER OF SHORTCOMINGS IN APPLYING THE FINANCIAL ECONOMIC MODEL TO GOING CONCERN VALUATIONS, THESE TWO MODELS AREN'T IRRECONCILABLE AFTER ALL.

To borrow one of Bader's examples, let's suppose that you and I enter into the following swap agreement: In 10 years' time, I agree to pay you the proceeds of a \$100,000 investment in the S&P/TSX Composite, a large-cap Canadian equity index. You agree to pay me the proceeds of a \$100,000 investment in Canadian government (GoC) bonds.

My S&P/TSX portfolio is expected to return 10 percent per year over the next 10 years, whereas your bond portfolio is expected to yield only 5 percent per year over this same period. So, how much should you pay me for this swap?

Based on the discounted value of the net expected return on these investments, you should pay me \$37,000. The real-market or economic value for this type of swap, however, is \$0. Paying me \$37,000 for this swap would be giving me a risk-free profit.

Here's how it would work: You pay me \$37,000 up front for this swap. I pocket the money. Then I borrow \$100,000 at the GoC bond rate and invest the proceeds in the S&P/TSX. At the end of the 10-year period, I pay you the proceeds of my S&P/TSX investment and repay my loan when I receive the proceeds of your investment in the GoC bonds.

Now, why would you pay me \$37,000 for this swap if you could have kept the money and invested in the S&P/TSX yourself?

➤ **PRINCIPLE NO. 2—The law of one price.** If assets and liabilities have the same matching cash flow, then they should have the same value.

According to this principle—which follows quite naturally from Principle No.1—since pension liabilities are bond-like, their fair value should be determined by reference to a bond portfolio with cash flows that match both in terms of timing and probability of payment.

As a corollary to this principle, the liabilities of a well-funded pension plan, sponsored by a company with a strong balance sheet, should be valued using high-quality corporate and government bonds with matching cash flows. An unfunded plan of a weak plan sponsor should be valued using a higher discount rate—perhaps the interest rate such a sponsor would have to pay to borrow money—since the probability of a plan beneficiary getting a pension would be very closely linked to the sponsor's ability to pay.

This is at odds with the current Canadian and U.S. accounting standards, which require pension obligations to be valued using the yield that can be achieved on high-quality corporate bonds. (In this regard, actuaries haven't been the only targets of criticism from financial economists. Accountants, too, have been getting their fair share.)

➤ **PRINCIPLE NO. 3—The value of an asset is independent of how that asset is financed.** The expected return on assets to fund debt shouldn't affect the value of the debt. If a company borrows \$1 million to invest in its business, the value of its debt is \$1 million, not the discounted value of expected future profits.

To the financial economist, therefore, the typical employer-sponsored Canadian pension plan is a debt obligation backed by financial assets that make up a significant amount of equities (about 60 percent). By using a discount rate to value the liabilities that reflects the expected long-term rate of return on assets, actuaries are effectively creating a risk-free arbitrage opportunity for the current generation of shareholders and passing on the risk to future generations. In a nutshell, the traditional actuarial approach to valuing pension plan liabilities violates the above three financial economics principles.

These first three principles speak to how pension plan liabilities should be valued. Principle No. 4 speaks to how pension plan assets should be invested.

➤ **PRINCIPLE NO. 4—The irrelevancy principle.** Effectively, when considering first-order factors only, the debt/equity mix of a company is irrelevant in determining its value. If, for example, a company decides to increase its debt/equity ratio and the shareholder disagrees with that decision, she can rebalance her own portfolio to reflect her overall debt/equity preference.

This same principle can be applied to company-sponsored pension plans. The asset allocation decision to back the pension plan's debt obligation is irrelevant from the perspective of the shareholder, who can adjust his own portfolio accordingly.



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The second-order effects—such as taxation, the competing interests of the various stakeholder groups, and surplus ownership—are relevant in determining the asset allocation of a pension plan.

In this regard, financial economists have observed that those making the asset allocation decisions (whether it's pension plan assets or the company's debt structure) aren't the company's owners but their agents—the company management. And management interests aren't always completely aligned with those of the shareholders.

From the financial economists' perspective, the second-order factors suggest that equity investments don't really belong inside pension plans. Let's consider their arguments.

### Misalignment of Interests

Financial economists view the company and the pension plan it sponsors as a single entity. From this point of view, therefore, what could possibly be gained from investing pension plan assets in equities? Investing in equities to back pension plan obligations is no different from issuing debt and investing the proceeds in equities. Companies just don't run their businesses that way (unless, of course, they're in the investment business).

So why should your business practice be any different inside the pension plan? An investor buys a company's stock for its ability to earn profits by making widgets, not for its investment expertise. By investing in equities, the pension plan isn't doing

anything the shareholder can't do directly. Hence, equity investments don't improve shareholder value.

From management's perspective, however, equity investments do have the potential to lower pension costs and improve the bottom line. Financial economists see this as a prime example of the misalignment of interests between shareholders and their agents.

In Canada, equities are also suboptimal from a tax perspective. If bonds are taxed at a higher rate than equities outside of the pension plan, then the tax shelter advantage of investing in bonds inside the pension plan is greater (at least to the tax-paying shareholder).

In the Canadian pension environment, the risk/reward relationship of equity investment is somewhat asymmetrical, since plan sponsors are responsible for the deficits and have restricted access to surplus. Why then, should a company take risks for rewards that it can't reap?

To the financial economist, investing pension plan assets in a matching bond portfolio has the advantage of transparency for the investor. The value of pension plan liabilities is clear and unequivocal. Actuarial assumptions are much less subject to "actuarial judgment" and manipulation by management.

Managers can also focus more on the operation of the business because pension plan costs are now more predictable and less volatile. The asset/liability mismatch risk—and hence the risk of having to fund future deficits—has been significantly reduced. So, too, has the opportunity to generate surplus.



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## A PLAN IN A DEFICIT POSITION ON WIND UP MAY BE PULLED OUT OF ONE WITH EQUITY INVESTMENTS, BUT SUCH A STRATEGY IS AKIN TO TOSSING A COIN AND CROSSING YOUR FINGERS—NOT A WISE BUSINESS STRATEGY.

### Implementing Financial Economics Principles

*Windup valuations.* Financial economists are concerned with the fair measurement of contractual obligations. For them, a pension plan has only one value: the market value of the benefits earned by the pension plan beneficiaries as of the valuation date.

In Canada, this is essentially the windup value. Windup valuations are performed when a plan sponsor decides to terminate the pension plan or when a plan sponsor goes bankrupt and a windup is ordered by the pension regulators.

The Canadian Institute of Actuaries has employed financial economics principles in its standard of practice for the calculation of pension plan windup liabilities. Pension plan assets are also to be valued at market, and reserves must be included in the balance sheet to cover pension plan expenses and certain subsequent events that may affect the windup position of the plan.

Although there is some variation among the provincial pension jurisdictions, when a pension plan is being wound up, benefits must generally be settled through lump-sum transfers of the present value of members' benefits or through the purchase of annuities from an insurance company within a fairly short time (five years or sooner).

Since the investment horizon of a pension plan in a windup situation is significantly shortened, actuaries typically recommend a closely matched bond portfolio. A plan that's fully funded at the windup date can be thrown into a significant deficit if the liabilities aren't properly immunized. And a movement in the other direction would deliver a surplus-sharing headache for the plan sponsor.

A plan in a deficit position on windup may be pulled out of one with equity investments, but such a strategy is akin to tossing a coin and crossing your fingers—not a wise business strategy.

*Going-concern valuations.* In a windup situation, accepted Canadian actuarial practice and financial economics principles are clearly compatible. It's the going-concern (or funding) valuation where actuaries have the greatest difficulty with the principles of financial economics. Since financial economists' main focus is the fair measurement of current contractual obligations, they don't take into account future salary increases or future ad hoc post-retirement cost-of-living adjustments in the measurement of these obligations. Thus, they offer little guidance on the measurement of future values.

Actuaries are very much concerned with the measurement of future values. Going-concern valuations are performed for the purpose of advising pension plan sponsors how much money must be put into a pension fund to ensure that the pension plan obligations can be met over the long term with reasonable certainty. In making funding recommendations, it makes little sense, from an actuarial perspective, to ignore the nature of the plan investments. It's also prudent funding policy (and required by all Canadian pension regulators) to include assumptions regarding future salary

increases when valuing final-average-earnings plans.

So, traditional Canadian actuarial practice in performing going-concern valuations is to value the pension plan liabilities using a discount rate that reflects the long-term expected rate of return on the assets that are backing the liabilities, with some margin for conservatism. (Implicit in this approach, but rarely stated, is that the assets backing the liabilities will continue to be invested in accordance with the plan's current investment policy.)

Let's now explore the implications of adopting the financial economics approach to establishing a discount rate and investing pension plan assets in today's environment.

### The Elusive Matching Bond Portfolio

Although pension plan obligations bear many similarities to bonds, for a going-concern pension plan there are some significant differences. First, there are no bonds in the market that are linked to salary increases (although real-return bonds may provide some matching of the inflationary component of salary increases).

Further, the life contingency of a pension payment stream, the early retirement options, and employee terminations before retirement are all features of a pension obligation for which no matching asset exists. The asset/liability mismatch risk, therefore, can never be completely eliminated.

### The Discount Rate

Let's assume for a moment that you can structure a bond portfolio to match your pension plan liabilities. This would mean valuing your liabilities using the current yields in the bond market, or at a discount rate of about 5 percent, a drop of about 1.5 percent to 2 percent in the assumed discount rate currently used for most pension plans invested in a balanced fund. Such a drop in the assumed discount rate would immediately result in an increase of 25 percent to 35 percent in the pension plan liabilities (for a plan with a 50/50 mix of active and pensioner liabilities) and a 50 percent to 70 percent increase in the current service cost.

And what are the implications of actually investing in a risk minimizing portfolio? Will volatility and risk really be reduced in this type of arrangement? In a perfectly matched, fully funded pension plan, any increase or decrease in the assets would be offset by a corresponding increase or decrease in the liabilities, thus significantly reducing future deficits and surpluses. Although this funding approach may reduce the volatility in the annual pension cost by eliminating—or at least reducing—future deficits, the current service cost will fluctuate in accordance with changes in the bond rates each year.

In the real world, a perfectly matched portfolio can't be structured. In the absence of a perfectly matched portfolio, deficits (or surpluses) resulting from this mismatch will continue to emerge. So some margin in the already rather low discount rate will be necessary to protect the plan against adverse deviations.

## Are Equity Investments Really Ill-Advised?

If equities have no place in corporate pension funds, why are they so prevalent? The single most important reason is that equity investments make pension plans more affordable, not only to plan sponsors but to plan beneficiaries as well. They also provide good protection against inflation over the long term.

If an organization decides to sponsor a pension plan, then assets must be set aside in a trust, separate and apart from corporate assets, to fund the pension obligations. If assets must be set aside, then why not put those assets to work in a manner that will either generate surplus for future benefit enhancements or reduce future costs?

Pensions paid to plan members are ultimately funded through a combination of contributions and investment earnings. Higher rates of return lead to lower contribution requirements or better benefits. And over the long term, equities have been shown to provide consistently higher rates of return than bonds.

For a going-concern pension plan, a diversified mix of stocks and bonds provides an excellent risk-adjusted rate of return over the long term. An examination of historical returns demonstrates that, over 25-year periods, a hypothetical balanced fund portfolio shows similar volatility to a bond portfolio but a significantly higher rate of return.

From 1950 to 2003, 25-year annualized real rates of return on a hypothetical balanced fund portfolio with a 50 percent equity investment ranged from 2 percent to 8 percent in excess of inflation. The corresponding range for a 100 percent bond portfolio

was 0 percent to 6 percent.

Unlike a plan that's being wound up, a going-concern pension plan has a very long time horizon and will therefore have a much greater tolerance for the risk inherent in equity investments.

## The Equity-Risk Premium

Let's return for a moment to the financial economist's criticism of using a risk premium in setting a discount rate. In my entire 20-plus years in the pension actuarial consulting business, I've rarely witnessed assumed discount rates deviate from the 6 percent to 8 percent range when performing going-concern valuations for funding purposes. (This includes the early 1980s, when long-term-bonds yields were around 12 percent.)

We certainly wouldn't have been accused of incorporating an equity-risk premium in the discount rate 15 years ago when bond rates were around 10 percent. In fact, long-term-bond yields didn't start falling below 7 percent until the late 1990s, and this was at the end of historically high gains in the equity market. It's little wonder that the clarion call of the financial economists has been sounded only in the past few years.

If we're being criticized by financial economists today, it's because, for the first time in about 35 years (perhaps longer), we're employing a long-term discount rate assumption that's higher than long-term-bond yields.

So, today we find ourselves in a low interest rate environment and financial economists are telling actuaries that our discount

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rates are too high, that our “expected return” approach to establishing discount rates doesn’t take appropriate account of the risks of not meeting those returns, and that by incorporating an equity-risk premium into the discount rate we’re passing on the risk to future generations. In other words, the additional returns expected from equity investments should first be earned.

Certainly, as actuaries, we concern ourselves with intergenerational equity in establishing funding targets for pension plans. And if pension liabilities were tradable in the marketplace, then the market would indeed dictate what the discount rate would be. But pension liabilities are not tradable, and we are therefore left with the balancing act of choosing an appropriate discount rate that meets the long-term objectives of the plan.

A very common long-term objective is contribution stability. Let’s consider a jointly sponsored pension plan, for example, with assets invested in a diversified portfolio of stocks and bonds. Is it fair to have the current active membership and its employers pay high contribution rates, just because bond rates are historically low, so that future generations can enjoy contribution holidays as the surplus emerges? Establishing an appropriate risk-adjusted rate of return in setting contribution rates and establishing funding targets should not necessarily mean a zero equity-risk premium.

The financial economist’s focus on current values and earning the excess equity returns before spending them raises another question: When is surplus “real surplus” to be spent?

An active pension plan is a long-term endeavor. One should, therefore, not be unduly influenced by the short-term interest rate environment, nor should one be blinded into thinking that the surplus generated by a 30 percent windfall return one year is real surplus to be spent. This is precisely why actuaries have used asset smoothing techniques and set long-term rates of return (usually with a built-in margin) when establishing funding targets for pension plans.

### Fixing the Traditional Actuarial Model

So what’s really wrong with the traditional pension actuarial model? The following example will illustrate, in my opinion, some serious flaws in our current approach.

Consider two hypothetical pension plans whose membership and future expected pension payouts are identical. On a market value basis, Plan A has assets of \$58 million and Plan B has assets of \$50 million. Each plan is 100 percent invested in units of the pooled balanced fund of XYZ Investment Counsel.

Actuary A decides to value the pension plan liabilities using a discount rate of 6 percent. Actuary B decides to use 7 percent. All other assumptions are the same. The respective balance sheets of each plan are as follows:

	PLAN A	PLAN B
Discount Rate	6%	7%
Assets	\$58M	\$50M
Liabilities	\$58M	\$50M
Surplus (Unfunded Liability)	\$0	\$0
Funded Ratio	100%	100%
Current Service Cost	\$2M	\$1.6M

In the lexicon of accepted actuarial practice, both Plans A and B are 100 percent funded on a going-concern basis. But calling both of these plans “100 percent funded” obscures the fact that Plan A is in a stronger financial position than Plan B. (If Plan B were valued using a discount rate of 6 percent—the same discount rate used to value Plan A—Plan B’s balance sheet would show a deficit of \$8 million.)

Let’s take my example a little further. Plan Sponsor A is in a bit of a cash crunch and asks the actuary if there is any room to reduce his pension plan contribution requirement. Actuary A decides that she can ease up on the discount rate a little while still maintaining a bit of a margin for conservatism and revalues the liabilities of Plan A using a 6.5 percent discount rate. The new actuarial balance sheet and funding requirement for Plan A looks like this:

PLAN A	
Discount Rate	6.5%
Assets	\$58M
Liabilities	\$58M
Surplus (Unfunded Liability)	\$4M
Funded Ratio	107%
Current Service Cost	\$1.8M

Suddenly, with simple wave of the magic actuarial wand, Plan A has \$4 million of surplus, and its sponsor is able to take a two-year contribution holiday, which is permitted under the current regulatory environment (if the plan terms also allow it).

It’s not that any of these answers are wrong, it’s just that the rationale behind the discount rate chosen is hidden inside the black box of actuarial judgment and is very often established without any reference to a formal funding policy.

What is also absent in the above examples is any assessment of or attempt to measure the risk inherent in the interest rates chosen. What the current pension actuarial model fails to do is assist plan sponsors in managing the risk inherent in the mismatch of assets and liabilities.

At the end of the past decade, the 10-year average rate of return on pension funds was about 11 percent per year, in nominal terms. When compared with a typical discount rate of 7 percent used to value pension plan liabilities, one would expect most plans to be in a healthy financial position today. Unfortunately for many pension plans, much of this surplus was spent on contribution holidays (the Income Tax Act is partly to blame for this) or on benefit improvements.

Then came the perfect storm. And like the levees of New Orleans in Katrina’s path, the traditional actuarial model wasn’t strong enough to stop the devastating financial effects of falling interest rates and equity markets on pension plans.

In an environment of increased corporate governance and media scrutiny of the large unfunded liabilities of major pension plans, this state of affairs can’t continue. Public confidence in our profession is eroding.

The weaknesses in the traditional pension actuarial model must therefore be addressed. The principles of financial economics offer an important tool in addressing some of the weaknesses and developing a more robust actuarial model for the valuation

of pension plans.

The new model, to survive the next few decades, must shift the focus from calculating expected values to assessing the risk of underfunding, and must strive to be more transparent. Economic values and risk-minimizing portfolios will be important reference points in this new model.

With the recent publication of the CIA *Statement of Principles on Revised Standards of Practice for Reporting on Pension Plan Funding*, significant developments are underway to increase disclosure of the basis for the interest rate assumption used and develop techniques for establishing provisions for adverse deviations and quantifying margins for conservatism, among other things.

### Equity Investments and the Future of Pension Plans

And what about equity investments? Financial economists contend that they don't belong in pension plans. Well, our governor of the Bank of Canada begs to differ on that one. David Dodge gave a very poignant speech last November on the role pension plans play in financial efficiency.

Canadian pension plans, with assets of more than \$500 billion, are a significant source of capital for both business and government. As such, they play a major role in generating sustained economic growth and prosperity. Defined benefit plans in particular contribute to financial efficiency because they're better able to bear the investment risk and the longevity risk than individuals are.

By transferring these risks from individuals to collectives, defined benefit pension plans help achieve a more efficient allocation of savings. Because of their long-term investment horizon, they're a prime source of long-term investment capital for large projects that can be used to support Canada's future production capacity.

Given the importance that defined benefit plans play in achieving financial efficiency in the Canadian economy, Mr. Dodge expressed understandable concern for the decline of these plans. His speech was, in part, an appeal to policy-makers to stop the decline of defined benefit pension plans. He urged them to make appropriate adjustments to their pension laws, including redressing the current imbalance in the surplus ownership rules, so that those responsible for funding deficits also have ownership of the surplus.

Mr. Dodge also advocated a relaxing of current restrictions under the Income Tax Act with respect to the accumulation of surplus in a pension fund. Currently, for the typical mature pension plan, employer contributions to a defined benefit pension plan are not permitted where assets are greater than 110 percent of the plan liabilities.

As a major source of capital to both business and government, defined benefit pension plans play a key role in the health of the economy. And a healthy employer-sponsored retirement system plays a key role in ensuring that Canadians can afford to retire. The solution is not to dispose of all the equity investments in a pension fund portfolio in favor of bonds. The solution, I believe, involves a combination of funding pension plans and managing pension plan investments responsibly, and creating a more favorable regulatory environment. I see three major groups playing key roles in the future health of Canada's private pension system:

Policy-makers must be brave enough to change the laws that

encourage underfunding and the windup of defined benefit pension plans.

Company boards of directors must become better educated in the matters of pension plan funding and investments, and pension plan governance must become an integral part of corporate governance. This means establishing and following a funding policy with guiding principles for setting assumptions and appropriate margins. Large unfunded liabilities place severe constraints on the ability of companies to run their businesses. And boards will increasingly be held to a higher standard of care in their fiduciary responsibility to the beneficiaries of the pension plans they sponsor.

And finally, pension actuaries must build actuarial models that will weather financial storms more effectively. Financial economics principles, including the use of economic values and reference portfolios, must be given due consideration and respect in building these models. These models must be transparent so that stakeholders can make informed decisions about appropriate investments, funding levels, and risk.

Then perhaps we can put this debate to bed and start strutting in our magnificent actuarial regalia.

CHARLENE MORIARTY is a consulting actuary in the Toronto retirement practice of Buck Consultants, an ACS company. The opinions expressed here are her own and do not reflect those of her employer or the Canadian Institute of Actuaries.

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