

The Business Economist At Work: Ontario Teachers' Pension Plan Board

By Leo de Bever*

The Research and Economics group at the Ontario Teachers' Pension Plan Board deals with a wide range of risk and return issues. It monitors how well the global asset portfolio matches its Canadian liabilities, looks for better ways to use quantitative and written information to make investment decisions, and facilitates communication between investment professionals and investment administration. In addition to asset mix research, its activities include tactical asset allocation, risk management, performance measurement, and the testing of new products and investment approaches. Pension fund liabilities are growing rapidly, as people live longer and as the working population decreases relative to the number of the retirees. Helping to reduce these costs does provide considerable professional satisfaction.

FIVE YEARS AGO, I definitely did not see a pension fund in my future. Like most economists, I knew little about pension financing. Spending the past three years at the Ontario Teachers' Pension Plan Board (OTPPB, better known as "Teachers" to the Toronto financial community), has corrected that. A pension fund provides lots of scope for a quantitative economist with a strategic bent. Public and private pension management is a growth area, as retirement financing will likely replace deficits and debt as the main fiscal issue in OECD countries.

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Some of my Canadian colleagues consider that last notion a sure sign of compulsive obsession with my subject area. But is it? Most economic models did not even keep track of debt/GDP until its explosion threatened to turn fiscal policy into debt management. The usual GDP accounting framework used for economic analysis has little to say about wealth and its intergenerational distribution.

Yet, population over sixty-five is set to double to 25 percent of the total in two decades. People live longer, so it now takes private assets of more than ten times postretirement income to be self-sufficient after leaving the workforce. Because half the population has no significant net worth, their retirement will create big fiscal and health care pressures. Before we spend those impending fiscal surpluses, let's make sure we have factored in the demographic crunch that will hit around 2010-15.

BACKGROUND

None of this showed up on my own radar screen in late 1994, when I was helping Nomura's Canadian bond clients make sense of Canadian politics and the Canadian economy. I was coasting, albeit in comfort. Nomura gives its foreign experts respect and independence, but there was no logical next career step. One day, I was approached about an economist position at Teachers'. It did not sound all that interesting, but I was urged to take a look anyway.

Once we started talking, Teachers' indicated that it really needed someone to head up its research group, which among other things monitored how well its global asset portfolio matched its Canadian liabilities. It also wanted to find better ways to use quantitative and written information in making investment decisions. Finally, the Fund was looking to improve communications between investment professionals and investment administration.

All of this sounded like a summary of things I had done before. While working on my Ph.D. in econom-

ics at Wisconsin, I managed to keep body and soul together by working on computer systems. I was heavily involved in quantitative analysis at the Bank of Canada, and in private consulting at Chase Econometrics Canada. After moving on to Crown Life Insurance, I learned about asset-liability matching and was drafted to strengthen Crown's investment administration systems. At Nomura, I had racked up frequent flyer points visiting clients in Europe and the Far East. I could see the potential, Teachers' redefined the job, and I started 1995 as the Fund's Vice-President of Research and Economics (R&E).

The R&E group has expanded as we kept picking up new assignments. I currently work with a group of twelve great professionals, split about evenly between asset mix, risk management, and our electronic library. We have very eclectic backgrounds: a few doctorates, some CAs, CFAs, CPAs, MAs, MBAs, an "almost"-actuarial designation, library science degrees, conservatory training, and even a bartending certificate. My colleagues are mostly self-starters, although we do pair senior staff with junior colleagues to transfer skills. Our strength is our diversity: a group like this comes up with its best ideas by asking seemingly dumb questions about someone else's area of expertise.

OPERATION OF THE PENSION PLAN

Where does a group like R&E fit in? Like other funds, the OTPPB has departments that look after its main asset classes: fixed income, active equities, indexed Canadian equities, international equity derivatives, real estate, and merchant banking. R&E deals with "top-down" issues, connecting assets and liabilities. Our CEO also refers to us as his "Miscellaneous Department": if no one wants it, send it to R&E. Nothing is a solo effort, but many of our recommendations find their way into policy and have as much impact on surplus as any of the other departments. This can best be illustrated by describing the operation of the Fund, and by outlining key R&E activities of the past three years.

The OTPPB is representative of a growing trend towards professional pension management. Prior to 1990, the Plan was an extension of the Ontario Treasury. Employer and employee retirement contributions were noncash expenses. They were covered by provincial debentures, reducing the need to tap public markets in times of deficits. When the province was booming in the late 1980s, it concluded (quite erroneously) that provincial revenues would never again fall short of expenses. Meanwhile, teachers realized that provincial debentures did not provide the returns and inflation protection offered by other assets. Pension contribution rates were high, and inflation protection had been only partially funded.

In 1990, the Fund became a private corporation, run by an independent Board of Directors. After a few iterations, it is now a 50-50 partnership, i.e., the Ontario Government and the Ontario Teachers' Federation share funding surpluses and deficiencies. Initial 1990 assets of C\$16 billion in nonnegotiable Ontario debentures have grown to C\$55 billion. Pension obligations to over 200,000 clients (including 55,000 retirees) have gone from C\$24 billion to C\$50 billion. A large deficiency in 1990 has thus been turned into a surplus in 1998. Financial markets performed well over this period, but much of the credit goes to the better match between assets and liabilities

Pension management is not about assets and asset returns. In 1995, most North American pension funds proudly announced record asset growth. Few mentioned that their surplus (assets in excess of liabilities, both valued at market) grew even faster, as interest rates dropped. Managing pensions ultimately should be about creating a surplus (being solvent), increasing surplus (so contribution costs can be reduced), and containing the risk of losing surplus (to avoid a raise in contribution rates).

This is a classic economic optimization problem: given the characteristics of the liabilities, find the asset mix that maximizes expected surplus growth, subject to the constraint that surplus does not fall below a specific tolerance level, with a certain degree of confidence. Most pension funds have a group like R&E to help solve that problem by looking at the sensitivity of pension obligations to inflation and interest rates, and then selecting assets that have similar volatility, and at least as high a rate of return.

The Plan provides for benefits indexed to inflation. With contribution rates at 16 percent of payroll (split evenly between the province and the teachers), the Fund could hedge its liabilities almost perfectly with 4.5 percent real return bonds. Unfortunately, we cannot find enough of them, and they yield only about 4 percent. The next best thing turns out to be equities. Short-run volatility is much higher, but stocks have historically offered a much higher expected long-term real return. In the extreme, 100 percent equities would create enough excess growth of assets over liabilities to bring average long-term pension contributions to zero. Unfortunately, one year in ten, volatility around that average would generate a surplus decline equivalent to 15 percent of its assets.

ASSET MIX

That's as far as the numbers will take you. Deciding on surplus risk and return targets is up to our customers. The OTPPB is a 50-50 partnership, but risk tolerance is very asymmetric. Governments can absorb short-term volatility much easier than individuals. So, what do teachers prefer: stable but high contribu-

tion rates, or low but volatile ones. Before my arrival, the precursor to R&E had helped get approval for a gradual shift of assets from 100 percent fixed income to 66 percent equities. When I arrived, most of that group had been lured away by outside organizations and departments within the Fund. After restaffing, we took another look at all the issues, and ultimately got Board agreement that 75 percent equities provided enough long-term growth in surplus to make the associated short-term surplus volatility acceptable.

The asset mix shift from 100 percent in nonnegotiable debentures in 1990 to 75 percent equities in 1996 involved massive financial engineering. Total equity exposure is split evenly between Canada and foreign markets. Because the Fund could not sell the debentures, it used derivatives to change its economic exposure synthetically without physically selling the assets. Teachers' entered into a series of swaps that had the effect of selling the total return on the debentures and buying total index returns on S&P and EAFE. Investment income and other cash flows were used to obtain Canadian equity exposure

Asset mix will never be static. Over the next ten years, the ratio of retired to total members will roughly double. Contribution rate hikes are ultimately borne by the working teachers. R&E has argued that this strengthens the case for immunizing a larger percentage of liabilities with real return bonds. The province of Ontario should find it attractive to issue such bonds. It would save on current finance charges. Besides, it already carries half of the inflation risk through its 50 percent share in the pension liabilities. Moreover, it has natural protection against the risk of inflation in its nominal tax base. So far, I have not found any takers.

TACTICAL ASSET ALLOCATION

As an extension of our asset mix work we have been given responsibility for Tactical Asset Allocation (TAA). TAA involves short-term opportunistic deviations from long-term country allocations to assets and currencies to improve returns. Historically, about a third of our active management returns (value added over passive policy returns) have come from TAA. Engaging in TAA takes a strong stomach, because there are fewer opportunities to diversify short-term risk. A stock portfolio manager can pick 30 out of 300 or 500 stocks. In TAA, one is restricted to a about a dozen countries and currencies.

Having a lot of equities in the 1990s has so far been spectacularly successful. We worry that mean reversion will eventually give us a period of poor returns. So we periodically ask ourselves how much damage our asset-liability configuration could suffer if we saw a repeat of history after previous turning points. It turns out that our worst nightmare is not 1929, but the aftermath of 1973, because a slump in equity markets

coincided with a sharp increase in liabilities due to lower real interest rates.

CURRENCY RISK

With one-third foreign exposure, currency risk is sizable. The Fund was unhedged until 1995, which was profitable while the Canadian dollar was falling. Currencies do not fall indefinitely. In early 1995, we reviewed plausible hedging strategies and recommended hedging half of our U.S. and Japanese exposure. This one decision resulted in a very large gain. At about the same time we did extensive work confirming that terrific managers are still likely to be wrong more than 40 percent of the time. That was very sobering. We had just experienced how reducing a big risk could result in a big payoff. That felt great, but we realized that if we were lucky, we would still have four losing decisions for every six winners. With those odds, I sleep better knowing that the Fund accepted our recommendation to move to a neutral currency hedge of 50 percent.

NEW PRODUCTS AND APPROACHES

One of our roles is to test new products or investment approaches, and to help set up the implementation structure. Sometimes R&E develops the case for having an asset, e.g., indexed commodities, gets a proposal approved by the Board, and then hands it over to the appropriate department. In other cases, we engineer planned R&E turnover, as the person who develops a program moves to the department that will administer it. Several analysts have moved to our quantitative Canadian equities group with their models. That was also the case when a recently approved new venture capital program found a home in Merchant Banking.

In one of our early projects, we set up our electronic library to give us quick access to any textual information on investment issues, organizations, or people we do business with. We started with CD-ROM-based systems, but with the increase in Internet and dial-up bandwidth, most of our information is now on line. A lot of our archives are now scanned and converted to PDF format. We also built a quantitative data warehouse, using a product called FAME located on a UNIX server. As our databases grow, we are able to get more ambitious in what we can analyze. Our biggest project to date has been the implementation of a Value at Risk (VaR) system.

Some high profile international derivative problems created a push among banks and other financial institutions for better risk management. The preferred methodology is VaR, which aims to summarize portfolio risk in one number. VaR measures come in many flavors, but any one is likely to improve risk measurement dramatically. We built our VaR program around

Reuter's Sailfish system. The basic idea is simple: rank the daily returns from holding a certain position or portfolio from lowest to highest, over the eleven years for which we have history. Next, find the 1 percent worst case and use that as a measure of how bad things can get. Review how much you expect to earn from taking that risk, and make up your mind whether that's enough.

We have developed a number of variations on the VaR theme to help us measure and limit active management risk and the risk of losing surplus. As a by-product of our risk measurement activities, we find errors faster, and have become far more sensitive to the return/risk ratio available in various activities. In economic terms, this is creating an optimization mentality that tries to extract maximum marginal value added from optimal allocation of a limited risk budget.

Assessing which markets have the best prospects for active management will always be a bit of an art. Generally speaking, the evidence suggests the obvious: efficient markets like the S&P offer less opportunity than inefficient markets like Canada's TSE. Fixed-income markets are less attractive than equity markets. Areas that play to our strengths of liquidity and patience (merchant banking, real estate) make more sense than competing in local markets where our size makes us too conspicuous.

A surprising amount of R&E time has gone into what I would call the economics of investing: making sure that *ex ante* returns on assets are still attractive, after considering unintended risks and the full cost of investment administration. We have been able to help improve rapport with investment administration by simplifying how we do business, and how we measure performance. This may seem trivial, but we manage 92 percent of our assets with seventy-five professionals, so we want to minimize transactions as well as arguments over performance measurement.

CONVENTIONAL FORECASTING

So far, I have not mentioned the economist's usual assignment: forecasting GDP, and writing on the direction of interest rates. I do produce forecasts, but, as I told our Board not completely tongue-in-cheek, I keep finding more important things to do. In many organizations, the economist's forecast is a starting point, to be criticized freely as naïve or simplistic. Economics never strays far from making inferences about the most sensitive of issues: people's pocket books. As a result, many people consider themselves to be pretty good economists. They believe that their economic judgment is seasoned by practical experience, whereas our profession is seen as slightly esoteric and impractical. In some instances, that is even true, although recall is often selective.

Yet, the next few years may prove to be a period

where having a good forecast will add considerable value. Assuming you think you have one, it must be sold like an impressionistic painting, conveying the essence of an idea without being photographically correct. Polishing forecast numbers to the last decimal point may make them marginally better, but that may not matter to the employer's objectives. My goal is to get a handle on the big economic risks and opportunities, and then to build the strongest possible case for how we should respond.

That assessment may have more to do with overall risk than with a directional call on GDP or interest rates. When this fund was reorganized in 1990, its first priority was to get quick exposure to equities. During this period, duration of its fixed-income portfolio was relatively low, based on the view that increases in interest rates would be damaging to asset values. A year after I joined, I recommended that we lengthen duration, not because I foresaw the size of the subsequent drop in interest rates, but because the fund's bigger risk was in having short duration assets and long duration liabilities.

CONCLUSION

The fund has no shortage of investment advice and comment on specific investment decisions, both from politicians and various groups of clients. Yet, it also has a fiduciary obligation to act in the best financial interests of all current and future pensioners, i.e., to treat all plan participants equally. Senior management is on the hot seat when investment decisions clash with some political or economic pressure groups. R&E tries to keep management abreast of some of the longer-term problems. It assists in maintaining lines of communications to regulators, policy makers, and client organizations.

Governments on occasion are tempted to suggest how pension funds should invest their money. For example, it has been suggested that pension funds fund more small hi-tech companies to reduce unemployment. Sounds plausible. Small and hi-tech do indeed present long-term economic opportunity, which is why my department helped establish a \$100 million Venture Capital program. However, hi-tech draws on a super-heated labor market segment of high-skill workers. Most unemployed workers have less than high school education. Whatever the merits of channeling money to hi-tech, it does not solve the short-term jobless problem.

Pension fund liabilities have been and will be growing rapidly. Large liabilities require large assets, to lower the odds that taxpayers will have to help seniors maintain a reasonable standard of living. As an economist and an inveterate puzzle solver, I am attracted by the variety of issues involved in this process.