It is becoming increasingly difficult for workers to achieve financial security in their retirement. There are several reasons for this. First, many employers have backed away from sponsoring workplace defined benefit (DB) pension plans. They find that with increased longevity, low rates of investment return, and accounting for liabilities on a mark-to-market basis, these plans have become extremely costly. They are also worried about the volatility of these costs as the returns on investments have become ever more volatile over the past two decades and mark-to-market accounting exacerbates the problem.

In response, employers have followed one of three paths:

- Substituting formal defined contribution (DC) plans for their now defunct DB plans;
- Setting up administrative systems that allow workers to participate in savings schemes through payroll deductions, sometimes with incentive employer contributions, and with lower costs than available to an individual in the open market (e.g., group Registered Retirement Savings Plans (RRSPs)); or
- Leaving the provision of retirement income to the individual worker with no sponsorship of any kind.

At the same time, DC systems (including RRSPs) have faced two crises. First, individual life expectancy is rising. Thus, more money is needed to provide the same monthly benefit over a longer life. Second, rates of investment return are down (and volatile), meaning that less money is accumulated in one’s capital accumulation account unless contributions are increased.

Many (most) individual account holders lost 20 to 30 percent of their equity investment values between the summer of 2008 and the spring of 2009. Work by the Organization for Economic Cooperation and Development (OECD) indicated that the market crash of 2008 could have led to a drop in replacement ratios of almost 10 percentage points. For example, an individual in the U.S. lucky enough to have reached retirement age 65 in 2007 would have enjoyed a replacement ratio equal to 24 percent, while the unlucky individual reaching age 65 at the end of 2008 would have enjoyed a replacement ratio of only 15 percent (assuming defined contributions of 5 percent over 40 years and a fixed portfolio of 40 percent domestic government bonds and 60 percent domestic equities).

Workers will be encouraged by the financial sector to hire a financial planner to increase their rates of return. In a way, however, this simply shifts the investment risk over to the expense risk. Individuals

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1. This article depends extensively on work done and published in Brown, R. and C. McInnes (2014). Shifting Public Sector DB Plans to DC: The experience so far and implications for Canada.
can easily lose 3 percent of their gross rate of return to the investment advisor or fund manager (referred to as the management expense ratio or MER). If funds earn in the neighborhood of 5 percent per annum and inflation runs close to 2 percent (not unusual assumptions for today), then such a worker is actually receiving no real rate of return. Fees have a significant effect on how much an individual will have at retirement. An additional 100 basis points over a 40-year period reduces final assets by about one fifth. In total, the individual account, DC option, seems to create more problems than solutions. You cannot guarantee retirement income security just by saving for retirement.

**DB PLANS ACHIEVE GREATER EFFICIENCY**

More importantly, DB plans, when professionally managed, achieve greater efficiency and effectiveness as compared to DC plans that are made up of individual accounts, and can thus deliver any given level of benefit at a lower cost. DB plans squeeze the most benefits from a given level of contributions. Clearly, the harder the money works, the easier it is for everyone involved.

A **2011 Texas study** that looked at converting DB plans to DC found that in any DC plan with a self-directed component, just 8 percent of members would do better than under the existing DB plan and 92 percent would do worse. Two-thirds would do significantly worse, receiving 60 percent or less of the current DB benefit.

In Canada, approximately 75 percent of every DB pension dollar of benefit comes from investment returns—a testament to the sound funding and best-in-class investing of the pension funds (i.e., only 25 percent of benefits come directly from contributions).

More specifically, one study broke the costs savings inherent in a DB plan into its component parts:

- **Longevity risk pooling (knowing the average longevity)** in a DB plan saves 15 percent;  
- **Maintenance of a balanced, highly diversified portfolio** in a DB plan saves 5 percent; and  
- **A DB plan’s superior investment returns, given much lower expenses,** save 26 percent as compared with a typical individual account DC plan.

Brown and McInnes looked at the impact of these 46 percent savings on a model DB plan. Starting with an assumption that the plan earns 6.5 percent gross, they modelled an individual account DC plan as earning 3.5 percent (46 percent less). The DB plan used in the analysis was a fairly typical public sector plan with employer (taxpayer) contributions of 12.5 percent matched by 12.5 percent contributions from the worker/participants. If investment returns dropped by 46 percent from 6.5 percent to 3.5 percent, these matched contribution rates would have to rise to 22.5 percent (a 77 percent increase) to provide equal benefits. Instead of investment returns paying 75 percent of the benefits, they would pay only 55 percent of the benefits.

A **large, best-practices pooled DC plan** (an example being the U.S. Thrift Savings Plan for federal civil servants and uniformed services) would lie somewhere in between. If the motivation for a conversion to DC is to reduce costs, then note that shifting to DC actually increases the cost of delivering a comparable pension benefit.

**DC OR DB: HOW MUCH MONEY WILL I ACTUALLY HAVE WHEN I RETIRE?**

But even if a DC plan could achieve large pooled-asset size, there are still residual advantages to the DB plan model. First, DB plans provide a benefit to workers that has true meaning—that the plan participant can understand. Workers are told that their plan will provide them with a given percentage of their final average or career average salary or that they will receive so many dollars per year of service once they retire.

For example, one plan might pay 1.5 percent of the average salary of your final five years of employment...
Actuaries are professional business people who are skilled in the application of mathematics to financial problems. They help people plan better for the future by controlling or reducing financial risks.

for each year of service. So you know that if you work there for 30 years, you replace 45 percent of your salary in retirement. Another plan might pay $1,000 per year of service. So, again, if you work with that employer for 30 years, you know that you will get $30,000 a year in retirement. Some DB plans guarantee to adjust these payments in line with the Consumer Price Index (CPI) through cost-of-living adjustments (COLAs), although the number of plans with a guaranteed COLA is declining.

Contrast this to being told that your employer will deposit $2 per hour of work on your behalf into a capital accumulation plan (this is how a DC plan works). So, if you work a 52-week year at 40 hours a week for 30 years and if your fund can earn five percent per annum after fees (a very important assumption) you will have $283,000 in a bank account on the day you retire.

But what does that tell you? Will that provide you with retirement income security throughout the remainder of your life? Knowing what their DB plan will provide in real terms allows workers to decide legitimately how much more they need to save to guarantee retirement income security.

Canadian society at large should lament the demise of many very good DB pension plans. They are the most effective and efficient means of delivering retirement income.

Is there a way that we could control the costs of DB plans, both as to amount and volatility and yet retain all of the economic efficiencies of the DB model? The answer is a resounding “yes”.

THE PENSION SOLUTION: POOLED TARGET BENEFIT PENSION PLANS

The DC model is growing in popularity because it takes the financing risk of a DB plan away from the plan employer-sponsor but then places it on the shoulders of individual workers. Is it possible to find a new pension model that mitigates the risks so substantially that both sides of the pension contract end up with most of the advantages of both a DB and a DC pension world?

In a classic DB plan, almost all of the pension risks are carried by the plan employer-sponsor. These risks include the following:

- Investment risk (discussed earlier);
- Expense risk;
- Inflation risk (if the benefit is indexed);
- Interest rate risk (if the payout is annuitized); and
- Longevity risk (if the payout is not annuitized).

Under a classic DC plan, the worker carries all of these pension risks, which the individual worker is clearly not capable of managing.

LONGEVITY RISK

A second major risk for a DC individual account participant is longevity. If the worker does not buy an annuity, effectively, they must self-annuitize. That is, they must determine a program of income withdrawal that is optimal by taking out the maximum income possible without outliving their assets. That is a lot to ask. Who knows his/her life expectancy? To be sure that they will not outlive their assets, workers may make conservative withdrawals and live at a lower standard of living than is necessary. If they take more aggressive withdrawals, then they increase the probability of outliving their assets and thus becoming dependent on friends and family, or on government programs, for their continued consumption. This should be a concern to taxpayers who will pay those welfare benefits. This also creates intergenerational inequities as government welfare schemes are pay as you go.

ANNUITIES

The worker can mitigate the longevity risk by buying a life annuity. However, this again raises the expense risk as insurance companies’ operations are for-profit. Further, many workers cannot get a true market-value annuity today. That is because insurers assume that if a worker voluntarily applies to purchase an annuity then that worker must be in five-star health and the annuity is priced accordingly. Very few workers have five-star life expectancy, but they get painted with the “one-size-fits-all” brush.
Annuities can be a cost-effective method for protecting benefits, but not necessarily for all workers. Finally, it is very difficult to get an annuity that provides true inflation protection. One can buy variable annuities whose payouts move with market values, but market values do not correlate well with inflation. Or one can buy an annuity where the annual payout increases according to a set (constant) inflation factor, but this is far from true inflation protection (and, of course, this feature greatly decreases the initial monthly payout).

**POOLED TARGET BENEFIT PENSION PLAN**

The solution proposed here is a new pooled target benefit pension plan (PTBPP). One important aspect of PTBPPs is that they pool their assets into large funds (e.g., $10 billion or more). Size matters. Larger plans can run at lower expense ratios, and can also achieve entry into a wider variety of investment products (e.g., private placements). Larger funds also benefit from the **law of large numbers** to mitigate volatility. This can be especially important if the fund is responsible for paying out retirement benefits and must assume the longevity risk.

Smaller plans (and even individual accounts) would commingle their assets to achieve size. Investment management would be at arm’s length from the plan. It could be government facilitated (but not government administered) or be managed totally by the private sector.

<table>
<thead>
<tr>
<th>Size of Pension Fund</th>
<th>Investment Fees for Large-Cap Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Account</td>
<td>250–300 basis points</td>
</tr>
<tr>
<td>$10 million</td>
<td>60 basis points</td>
</tr>
<tr>
<td>$1 billion</td>
<td>42 basis points</td>
</tr>
<tr>
<td>$10 billion</td>
<td>28–35 basis points</td>
</tr>
</tbody>
</table>

Table 1: Investment Fees by Size of Pension Fund

[Table 2: Impact of Investment Expense Ratios on Pension Adequacy (assuming an annual return before fees of 3%)]

<table>
<thead>
<tr>
<th>Expense Ratio</th>
<th>0%</th>
<th>0.4%</th>
<th>1.5%</th>
<th>3%</th>
<th>5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulated Value (after 40 years)</td>
<td>$777,000</td>
<td>$707,000</td>
<td>$551,000</td>
<td>$400,000</td>
<td>$272,000</td>
</tr>
<tr>
<td>Annual Pension Payout</td>
<td>$45,000</td>
<td>$41,000</td>
<td>$32,000</td>
<td>$23,000</td>
<td>$16,000</td>
</tr>
<tr>
<td>Replacement Ratio</td>
<td>90%</td>
<td>82%</td>
<td>64%</td>
<td>46%</td>
<td>32%</td>
</tr>
</tbody>
</table>

(Ambachtsheer, 2007)

In recent years, government legislation and regulations have made increasing reference to the work and responsibilities of the actuary. In most of these documents, the term “actuary” is defined as a Fellow of the Canadian Institute of Actuaries.
increase to 100 percent by the expected retirement date (however, the annuities would never all be purchased on one day). Group annuity markets are highly competitive and provide good value.

Or, the plan can manage the payout of benefits and carry the longevity risk in a collective manner similar to the systems used in the U.S. by the Teachers Insurance and Annuity Association – College Retirement Equities Fund (TIAA-CREF).

The administrative pension board will make this decision to annuitize or manage the longevity risk depending on market realities (e.g., are annuities a “good deal”?).

**DC PLAN FOR EMPLOYER-SPONSOR, DB PLAN FOR WORKER**

For the plan employer-sponsor, a PTBPP is a DC plan. The employer-sponsor’s responsibilities end when the stipulated contribution is made. For the worker, the plan is a defined benefit plan, but the benefit is not guaranteed.

Work by the OECD indicates that for such a plan a contribution rate of 5 percent would provide a replacement ratio of 25.3 percent, while a contribution rate of 10 percent would double that to 50.7 percent. Equivalently, a one percent increase in the contribution rate would raise the replacement rate 5 percentage points, all other things being equal. (This assumes 40 years of contributions and a fixed portfolio of 40 percent domestic government bonds and 60 percent domestic equities.)

PTBPPs would have many features in common with today’s multi-employer pension plans (MEPPs), the Canada/Quebec Pension Plans (C/QPP), and others.

Plan participants will receive regular updates on their expected retirement benefits. With this information, members can better place their pension benefits in the context of their overall retirement plan, and determine what, if any, need exists for supplementary personal savings. These updates will also remind participants that benefits are not guaranteed.

In conclusion, we believe that the PTBPP minimizes risks for both plan sponsors and participants more effectively than either the DB or DC models. Because of its pooled nature, many of the pension risks can be mitigated to the extent that they become manageable. We submit the PTBPP model is one worth further analysis and debate.

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Robert L. Brown, FCIA, FSA, ACAS, retired from the University of Waterloo program in actuarial science in 2010 after 39 years of teaching and research. His research focus, which includes seven books and over 50 refereed papers, is the design of financial security programs in times of rapidly shifting demographics.

Mr. Brown was President of the CIA in 1990–91, President of the Society of Actuaries in 2000–01, and President of the International Actuarial Association in 2014. He was also Research Chair for the Ontario Expert Commission on Pensions in 2007–08. Further, Rob served on three CPP actuarial valuation review panels (in 2005, 2011, and 2014), twice as panel chair.