Measuring Pension Funding

Peter Diamond
April 17, 2018
Pension plan types

Traditional contributory plans
• Defined contribution (DC)
• Defined benefit (DB)

Hybrid contributory plans
• Notional defined contribution (NDC)
• Collective defined contribution (CDC)
  – Contributions
  – Accrual of benefits
  – Benefits in payment
Pension plans

UK
Canada: New Brunswick public employees
Netherlands: industry plans
Sweden: Premium Pension
Sweden: Inkomstpension
Canada Pension Plan
US Social Security
The Case for Collective DC
November 2013
A new opportunity for UK pensions
An Aon Hewitt White Paper

Prepared by:
Kevin Westbroom
David Hardeman
Matthew Alford
Andy Harding

Aon Hewitt
Historic DC outcomes: The chart shows vividly the extreme range of outcomes a member might have experienced - ranging between 6% and 60% of final pay.

Collective Advantages (Aon Hewitt, 2013)

In our view the two strongest advantages of CDC plans over the best of DC solutions found in the market at present are:

• The fact that pensions are paid from the plan rather than being purchased by way of annuities in the open market means that greater amounts can be held in return seeking assets, thereby leading to superior expected outcomes. In addition, avoiding an annuity purchase means that the profit margin and cost of capital for an insurer are avoided, and more of the assets are applied to improving members' benefits.

• The mixture of risk that can be taken on behalf of plan members allows optimisation of investment returns over time and avoids decisions being driven by short-term issues.
Equivalent rates of return

- DC: Only safe asset 2% real return
- DC: Also risky asset iid risk \( Er = 5.9\% \) ann risk of SP500
  Equivalent to safe return of 3.33%
- DB: max chosen for zero expected growth of fund under optimal policy
  Equivalent to safe return of 4.39%
- DB with participation constraint as in Netherlands:
  Equivalent to safe return of 3.83%

New Brunswick Public Service Pension Plan

- The purpose is to provide secure pension benefits without an absolute guarantee, but with a risk focused management approach delivering a high degree of certainty that base benefits can be met in the vast majority of potential future economic scenarios.

- The intention is that additional benefits may be provided depending on the financial performance of the NBPSPP.

- The Funding Policy is the tool used by the Board of Trustees to manage the risks inherent in a shared risk plan. The Funding Policy provides guidance and rules regarding decisions that must, or may be made by the Board of Trustees around funding levels, contributions and benefits.
New Brunswick PSPP

• The 15 year open group funding ratio compares the fair market value of the Plan’s assets, plus the present value of excess contributions over the next 15 years, to the Plan’s liabilities.

• The Plan’s liabilities are based on the benefits earned as at January 1, 2017.

• This ratio is used to determine the actions, such as granting indexing, to be taken by the Board of Trustees under the Plan’s Funding Policy.
Annual risk management tests

An annual calculation of at least 1,000 20-year simulations of a range of plausible parameter values. The results of these tests may cause the need for short-term adjustments in any one year to help preserve long-term financial health.

• Primary Risk Management Goal: Achieve at least 97.5% probability that benefits earned would not be reduced over the next 20 years.

• Secondary Risk Management Goal #1: members and retirees will receive 75% of the Consumer Price Index (CPI) over the next 20 years.

• Secondary Risk Management Goal #2: 75% of ancillary benefits (e.g., early retirement subsidy) will be provided over the next 20 years.
New Brunswick Public Service Pension Plan

• A contribution increase of up to 3% of earnings (1.5% each for employee and employer contributions) is to be triggered by the Board of Trustees if the open group funded ratio of the NBPSPP falls below 100% for two successive year ends until such time as the open group funded ratio reaches 110% without considering the effect of the contribution increase and the funding goal under regulation is met.

• Future and present benefits can be reduced
New Brunswick Public Service Pension Plan

- A reduction in contributions can be triggered by the Board of Trustees if the conditions set forth in the funding excess utilization plan are met, and the open group funded ratio is at least 140%.

- If, at any time, there is an increase or a decrease in employees employed by the employer of more than 5% in a given year, the initial contribution rates shall be re-calculated.

- Effective 15 years after the conversion, the employee and employer contributions shall be set such that the total initial contributions remitted are shared equally between the employees and employers.
## Netherlands

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of Pension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupational Pension Schemes</td>
<td>Fully funded defined benefit</td>
</tr>
<tr>
<td></td>
<td>Defined contribution</td>
</tr>
<tr>
<td></td>
<td>Collective defined contribution</td>
</tr>
<tr>
<td>General Old Age Pensions Act (AOW)</td>
<td>Noncontributory pension</td>
</tr>
</tbody>
</table>
Netherlands
Collective defined contribution pensions

- A single pooled fund for investment purposes (normally at the industry level).
- Benefits are price-indexed or wage-indexed lifetime payments beginning at retirement, based on a “career average” benefit formula.
- Benefits in payment and future benefits are both adjusted based on asset returns and mortality experience.
## Sweden

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of pension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inkomstpension (16%)</td>
<td>Notional defined contribution</td>
</tr>
<tr>
<td>Premium pension (2.5%)</td>
<td>Funded defined contribution</td>
</tr>
<tr>
<td>Guaranteed pension</td>
<td>Minimum pension guarantee</td>
</tr>
</tbody>
</table>
Sweden: Premium Pension in 2016

• 843 private funds administered by 108 management companies
  – 573 equity funds
  – 97 mixed funds
  – 41 generation funds
  – 132 interest funds

• 3 government funds administered by 1 management company (AP7 SÅFA)
  – 1 equity fund
  – 1 fixed income fund
  – Life cycle
Sweden: Premium Pension Annuity

Mandatory annuitization (unisex rules) with the government providing two options

- Traditional insurance-with-profit annuity: a nominal guaranteed monthly amount with possible monthly supplement, which may vary from year to year.

- Retain accumulated balance in the fund. The pension amount depends on the rate of return of the funds chosen by the saver and realized mortality.
Notional Defined Contribution

To date, five European OECD countries have implemented a full NDC reform:

- Sweden (legislated 1994, implemented gradually, beginning in 1996, with full implementation 1999),
- Italy (legislated as of 1995 and implemented as of 1996, with reform measures and accelerated implementation as of 2012),
- Latvia (legislated 1995, implemented as of 1996),
- Poland (legislated 1998, implemented as of 1999),
- Norway (legislated 2009, implemented as of 2011).
Assets
The value of assets of the National Pension Funds plus the contribution asset, equal to the pension liability that the contribution revenue for the accounting year could finance if the conditions prevailing at the time of valuation remained constant.

Liabilities
Pension balances of insured persons who have not begun to draw an old-age pension plus annual amounts to retirees multiplied by the expected number of years for which the amount will be disbursed. The number of years is discounted in order to reflect the indexation.
Sweden: Inkomstpension balancing

- Balance ratio is assets/liabilities, lagged for data availability. Damped balance ratio is equal to 1 plus one-third of the difference between the balance ratio and the number 1.

- If the balance ratio is less than 1.0, the balance index is used instead of the income index, $B_t = I_t \cdot BT^*$, so indexation of pensions and pension balances is reduced.

- After balancing, later surpluses are used to increase indexation and thus to restore the value of pensions.
Public PAYGO Plans
Parametric changes between 1995 and 2005

• 57 countries increased the contribution rate in their PAYGO programs

• 18 increased the retirement age, and

• 28 adjusted the parameters of the benefits formula and cut back or froze old-age pension amounts in order to reduce fiscal costs.

• Source: FIAP – International Federation of Pension Funds Administrators.
Public PAYGO Plans
Parametric changes between 2009 and 2017

• 19 countries increased the contribution rates in their PAYGO programs

• 37 increased the retirement age, and

• 32 adjusted the parameters of the benefits formula and cut back or froze old-age pension amounts in order to reduce fiscal costs.

• Source: FIAP – International Federation of Pension Funds Administrators.
Funding the Canada Pension Plan

• Employer and employee contributions are projected to cover 75–80% of future CPP benefits, with investment returns covering 20–25%.

• Every three years, the Chief Actuary of Canada reviews the contribution rate required to sustain the CPP over the next 75 years.
CPP Actuarial Report

If the system is not financially sustainable there is a semi-automatic adjustment that freezes benefits and increases the contribution rate until the next triennial evaluation.
OASDI Income, Cost, and Expenditures as Percentages of Taxable Payroll

[Under Intermediate Assumptions]

Source: Figure II.D2. The 2017 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. 2017. Social Security Administration.
The 95-percent confidence interval for the trust fund depletion year ranges from 2030 to 2043.

Percentage of Simulations That Show the Combined Social Security Trust Funds’ Exhaustion by a Particular Year

Table VI.F1.-Unfunded OASDI Obligations Through the Infinite Horizon, Based on Intermediate Assumptions
[Present values as of January 1, 2017; dollar amounts in trillions]

<table>
<thead>
<tr>
<th></th>
<th>Present value</th>
<th>Taxable payroll</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfunded obligations through the infinite horizon</td>
<td>$34.2</td>
<td>4.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Unfunded obligations through 2091</td>
<td>12.5</td>
<td>2.7</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Overall, the market value of accrued benefits is only 4/5 of that implied by the actuarial approach. Ignoring retirees ..., market value is only 70% as large as that implied by the actuarial approach.

Johnson and Larson Show Two Very Different Paths to Solvency

Source: Social Security Administration
Proposed amendments, 1983

J.J. Pickle (D-TX)

• Increase the age for full benefits to 66 by 2009 and to 67 by 2027.
• Early retirement stays at 62.

  – Approved:
    228 (152-R, 76-D)
    to
    202 (14-R, 188-D)

C. Pepper (D-FL)

• Increase the tax rate from 12.40 percent to 13.46 in 2010.

  – Rejected:
    296 (165-R, 131-D)
    to
    132 (1-R, 131-D)
Collective Advantage Questions

• How important is accommodating different risk aversions during accumulation?
• How well does asset accumulation risk sharing across cohorts during working life work in the presence of limits on funding shortfalls?
• How well do asset and mortality risk sharing across retirement cohorts work with limits on funding shortfalls?
• How large is the low labor supply risk?
• How fair is shifting risk to much younger people?
• How can pension plans better address the shortcomings in the capital market
it [is] necessary for man with his limited powers to go step by step; breaking up a complex question, studying one bit at a time, and at last combining his partial solutions into a more or less complete solution of the whole riddle. ... The more the issue is thus narrowed, the more exactly can it be handled: but also the less closely does it correspond to real life. Each exact and firm handling of a narrow issue, however, helps towards treating broader issues, in which that narrow issue is contained, more exactly than would otherwise have been possible. With each step ... exact discussions can be made less abstract, realistic discussions can be made less inexact than was possible at an earlier stage.