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AN ACTUARIAL BALANCE SHEET APPROACH TO ASSESSING SUSTAINABILITY OF TARGET BENEFIT PLANS

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Outline

- Highlights of paper
- Pension environment in Canada
- Critique of current funding framework for target benefit plans
- Assessing financial sustainability of target benefit plans
- Illustrative example

Highlights of Paper

- Motivation
- Reveal shortcomings of funding framework for target benefit plans (TBPs) in Canada
- Introduce an actuarial balance sheet approach
- Provide a numerical illustration

Pension Environment in Canada

- Shift away in workplace pension coverage from DB to DC
- Decline in DB plan coverage is likely to continue
- DC members face significant retirement risk challenges

Pension Environment in Canada

- *Canada is exploring innovative plan design solutions to address pension challenges*
- Canadian pension regulators organized two pension review panels in 2008, and endorsed the target benefit plan (TBP) concept
- Three jurisdictions (New Brunswick, Alberta & British Columbia) have enacted legislation and regulations governing TBPs (as of February 2016)

What is a TBP?

"*A TBP is a collective, pre-funded pension plan pooling both economic and demographic risks, with a predefined retirement income goal (the "target benefit"), where the employer's financial liability is limited to predefined contributions while members' benefits may periodically be adjusted upwards or downwards relative to the original target.*"

CIA Task Force on Target Benefit Plans, June 2015

What is a TBP?

TBP has features of both a DB plan and a DC plan:

- Target retirement benefit is defined by DB formula
- Contribution rate is set according to target benefit and is fixed
- Employer not responsible for funding deficit
- Remedies of funding shortfall fall to members

TBP Funding Framework in Canada

Alberta Employment Pension Plans Regulation

- Valuation basis
  - *closed group* unit credit cost method
  - discount rate prescribed
- Must determine a provision for adverse deviations (PfAD)
- Require amortization of unfunded liability
- Annual contributions must not be less than:
  - *Normal cost + amortization + PfAD + admin expenses*
- Benefits may be reduced

TBP Funding Framework in Canada

New Brunswick Shared Risk Plans (SRP) Regulation

- Valuation method
  - *Open group* unit credit cost method
  - Discount rate not prescribed
- *Open group funded ratio* is defined as (i) over (ii):

  (i) market value of plan assets plus excess of future contributions over normal costs on an "open group" basis over next 15 years

  (ii) present value of accrued target benefits
- If open group funded ratio falls below 1.0 in two successive actuarial valuations:
  - Implement funding deficit recovery plan
  - Demonstrate target benefit can be delivered with a high degree of confidence

Risk Management of TBP

- Use three policy levers to manage risk: *investment, benefit & funding*
- Investment policy affects costs and risks of target benefit
- Funding policy assesses funding adequacy
- Benefit policy specifies methods of varying benefits relative to target if funding level falls below a certain threshold
- Risks can also be managed through *intergenerational risk sharing*

Critique of Funding Framework

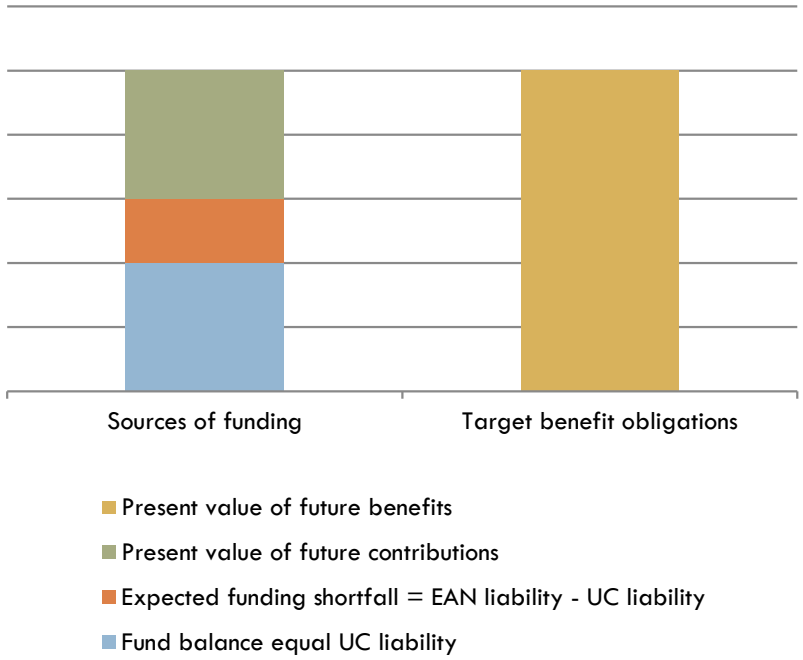
- *UC liability is an ill-defined funding target for TBPs*
- Assets (= UC liability) plus expected future contributions could fall short of the amount required to meet target benefits
- Unintended consequence: *implicit transfer of shortfall risk from current members to future members*
- Consider a TBP with the following features:
  - Target benefit is a final salary pension
  - No ancillary benefits
  - All employees join the plan at the same age
  - Plan's contribution rate is set as normal cost rate determined under entry age normal cost method

TBP Example

TBP with Fixed Contribution Rate Determined According To *EAN* Method

- Proper funding target is EAN liability
- EAN liability > UC liability
- Expected funding shortfall = EAN liability – UC liability

UC Liability is an Ill-defined Funding Target



Defining Sustainability of a TBP

- A TBP is "sustainable" if:
  - Assets plus future contributions are able to support target benefits over long term
- Seek to develop a true and fair view of long-term sustainability of TBPs
  - Adapting the actuarial balance sheet methodology used for some social security systems

Actuarial Balance Sheet for Social Security Systems

- Actuarial balance sheet (ABS) of a social security system:

Table 1: Main Entries on the Actuarial Balance Sheet of a Society Security System

Assets	**Liabilities**
Financial and real assets	Liability to pensioners
Contribution asset	Liability to contributors
Accumulated deficit (surplus)	
Total assets	**Total liabilities**

- "Contribution asset" - a call on future contributions to finance accrued liability in the system

ABS for Swedish Social Security System

- Sweden's social security system is a notional defined contribution (NDC) pension system
- Its ABS contains a contribution asset defined as:
  - *Contribution asset* = *TD* x *C*, where *TD* is the turnover duration and C is the contribution revenue in current year
- Turnover duration indicates the size of liability to be financed by present contribution flow

ABS for TBPs

Similar to the structure of ABS for social security systems:

Table 2: Main Entries on the Actuarial Balance Sheet of a TBP

Assets	**Liabilities**
Financial and real assets ($\boldsymbol{F_t}$)	Liability for pensioners and other inactive members (AL_t^r)
Contribution asset ($\boldsymbol{CA_t}$)	Past service liability for active members (PSL_t^a)
Accumulated deficit (surplus) ($\boldsymbol{D_t}$)	Future service liability for active members (FSL_t^a)
Total assets	**Total liabilities**

ABS: Liabilities

Liabilities to:

- Pensioners: $$AL_t^r = \sum_{j \in R_t} P_z^j \, \ddot{a}_z^{(12)}$$

- Active members: $$AL_t^a = \sum_{j \in A_t} \left(PVFB_t^j - PVFC_t^j \right)$$

Active member liabilities can be decomposed into two parts:

- The *past service liability*, PSL_t^a, being the present value of accrued benefits for active members, and
- The *future service liability*, FSL_t^a, being the difference between the present value of benefits expected to accrue for service after time t and the present value of future expected contributions.

ABS: Assets

Assets:

- Financial and real assets held in the plan
- Based on the plan's risk-sharing policy, a "contribution asset" is defined as:

$$CA_t = \sum_{n=1}^{N} \left[\sum_{j \in G_{t+n}} \left(PVFC_{t+n}^{j} - PVFB_{t+n}^{j} \right) \right] \cdot (1+i)^{-n} ,$$

where:

$n = 1,2, \ldots, N$,
G_{t+n} is the generation of plan members who enter the plan at time $t+n$,
$PVFC_{t+n}^{j}$ is the present value at time $t+n$ of planned future contributions for member j in G_{t+n},
$PVFB_{t+n}^{j}$ is the present value at time $t+n$ of future projected benefits for member j in G_{t+n}, and
i is the discount rate used to calculate present values at time t

ABS: Balance Ratio

- *Balance ratio* of a plan at time *t*:

$$BR_t \equiv \frac{F_t + CA_t}{AL_t^r + PSL_t^a + FSL_t^a}$$

- If balance ratio >= 1, the plan is expected to be *financially sustainable*
- If balance ratio <1, the plan is unsustainable.
- Benefits of current and future members can be adjusted to restore balance ratio

Other Financial Indicators

- *Current Funded Ratio*:

$$CFR_t = \frac{F_t}{AL_t^r + PSL_t^a}, \qquad \text{for any time } t$$

- *Termination Funded Ratio* : calculated using the same formula, except that past service liability is based on members' actual earnings

Application of ABS: An Illustrative Example

Predecessor DB plan:

- Benefit Formula: 1.5% of final year salary per year of service
- Employee contributions: none
- Normal retirement date: attainment of age 65
- Normal form of pension: lifetime pension payable monthly
- Indexation: none

Financial Status Before and After Conversion

Before conversion

- **Going concern financial status of DB plan**

	($ Million)
Assets	
Market value of assets	4,379
Liabilities	
• Active members	2,930
• Pensioners	1,449
Total liabilities	4,379
Funding excess (shortfall)	Nil
Going concern funded ratio (assets ÷ liabilities)	1.0

- **Annual normal cost:** $152 million or 11.6% of pay
- **Valuation method:** Unit credit

After conversion

- **ABS upon conversion to a TBP**

Assets	*$ Million*	**Liabilities**	*$ Million*
Market value of fund assets	4,379	Liability for pensioners	1,449
Contribution asset	52	Past service liability for active members	2,930
Accumulated deficit (surplus)	120	Future service liability for active members	172
Total assets	***4,551***	***Total liabilities***	***4,551***

- **Balance ratio:** 0.974
- **Current funded ratio:** 1.000
- **Risk-sharing policy:** Allow risk-sharing between current members and future members who join the plan over next 15 years

Redesign of TBP to Achieve Financial Balance

- Target benefit formula:
  - Service prior to plan conversion : 1.50% of final year salary per year of service
  - Service subsequent to plan conversion : 1.40% of final year salary per year of service
- Fixed rate of employer contributions: 11.5% of member salary

ABS of Redesigned TBP

- **ABS of redesigned TBP**

Assets	*$ Million*	**Liabilities**	*$ Million*
Market value of fund assets	4,379	Liability for pensioners	1,449
Contribution asset	90	Past service liability for active members	2,930
Accumulated deficit (surplus)	(42)	Future service liability for active members	48
Total assets	***4,427***	***Total liabilities***	***4,427***

- Balance ratio: 1.009
- Current funded ratio: 1.000
- Contribution asset equals approximately 2.0% of liabilities for current members.

Effect Due to Mortality Improvement Scale

- **Revised ABS due to mortality improvement**

Assets	*$ Million*	**Liabilities**	*$ Million*
Market value of fund assets	4,379	Liability for pensioners	1,479
Contribution asset	13	Past service liability for active members	3,078
Accumulated deficit (surplus)	359	Future service liability for active members	194
Total assets	***4,751***	***Total liabilities***	***4,751***

- Balance ratio: 0.925
- Current funded ratio: 0.961

Alternative Balancing Options

- Measures to address financial imbalance:

Balancing Option	Description	Past benefit accrual rate	Future benefit accrual rate	Reduction of Pensioners' benefits (%)
1	• Adjust accrued benefits only • Restore current funded ratio to 1.0	1.44%	1.40%	3.9%
2	• Proportionate benefit adjustments reflecting impacts of mortality assumption change • Restore balance ratio to 1.0	1.43%	1.31%	2.0%
3	• Preserve accrued benefits for current pensioners only • Restore balance ratio to 1.0	1.43%	1.30%	Nil
4	• Preserve accrued benefits for both current pensioners and active members • Restore balance ratio to 1.0	1.50%	1.23%	Nil

Comments on Balancing Options

- Option 1 is not an effective balancing measure
- Options 2, 3 and 4 are effective measures:
  - Option 2 is most equitable
  - Option 4 requires current active and future members to bear the entire cost of expected future mortality improvements

ABS After Implementation of Balancing Options

All assets & liabilities in $million	*Balancing Option*			
	1	*2*	*3*	*4*
Assets				
• Market value of fund assets	4,379	4,379	4,379	4,379
• Contribution asset	13	58	65	101
• Accumulated deficit (surplus)	181	0	0	0
Total assets	4,573	4,437	4,444	4,481*
Liabilities				
• Liability for pensioners	1,421	1,449	1,479	1,479
• Past service liability for active members	2,958	2,930	2,930	3,078
• Future service liability for active members	194	58	35	(76)
Total liabilities	4,573	4,437	4,444	4,481
Financial risk indicators				
Balance ratio	0.960	1.000	1.000	1.000
Current funded ratio	1.000	1.000	0.993	0.961
Contribution asset ÷ Total liabilities (%)	0.3%	1.3%	1.5%	2.3%

Author's calculation

** rounding difference*

Conclusion

- TBP funding frameworks in New Brunswick and Alberta are not properly designed
- Funded ratio based on unit credit cost method hides deficit or surplus in the plan
- Our actuarial balance sheet reflects future contributions and benefit accruals of current and future members in an *actuarially appropriate* manner
- *Balance ratio* provides an indication of financial sustainability and serves as a trigger for activation of balancing mechanism
- High level of transparency as regards intergenerational risk sharing

Thank you!