




SOCIETY OF ACTUARIES

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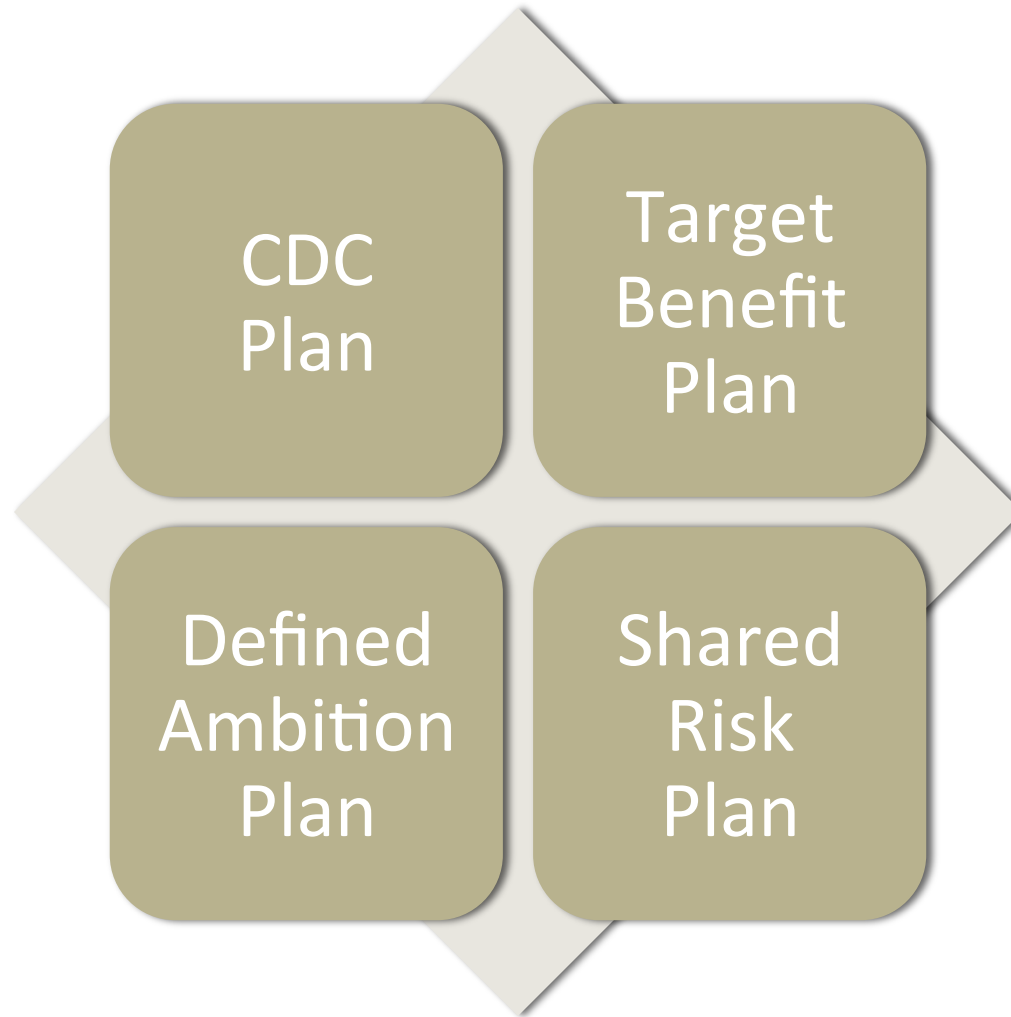


Intergenerational equity and sustainability in a collective defined contribution plan

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ARC 2013, Philadelphia

What's in a name?



Defining characteristics

- Hybrid plan
- Fixed contributions
- Collective scheme: assets are commingled and plan experience is shared among plan members
- Target level of retirement benefit expressed in terms of annual accrual
 - E.g. \$1000 annual pension for each year of service
- Soft guarantee only
 - Past and future accruals subject to adjustments based on the experience of the plan

New developments



New
Brunswick
Shared
Risk Plans



Defined
Ambition
Plans

(Ponds,
Kortleve, and
many others)



Defined
Ambition
(CDC)

(DWP,
Khorasane)



Multi-
employer
Plans

Main questions

- Industry:
 - ~~Should we do this?~~
 - How do we do this in a way that is fair and sustainable?
- My current research:
 - How do some typical design options affect fairness and sustainability?

The model

- 5 different designs
- Simple demographic structure
 - Stationary population
 - No pre-retirement decrements ($e=25$, $r=65$)
 - Past service is recognized at plan inception
- Asset model
 - 10,000 simulation paths (100 years each) from a commercial ESG calibrated to January 1, 2013
 - Equity model is SVJD
 - Also has yield curves for a variety of fixed income instruments as well as total returns

Plan design 1

US variable benefit plan

- Elements:
 - Target benefit accrual
 - Fixed contribution rate
 - Hurdle rate (<EROA)
- Actual return relative to hurdle rate determines adjustment to accrued pensions
- Contribution rate and hurdle rate define the target
- All accrued benefits are affected, **including pensions in pay**

Plan design 2

Canadian approach – base case

- No separate hurdle rate
- Valuation rate is based on EROA
- Adjust accrued benefits up (down) at end of each year to immediately eliminate surplus (deficit)
- Higher target than under Plan design 1, but more likely to face reductions in future

Plan design 3

Canadian approach – buffer put in place at inception

- Countercyclical buffer:
 - In bad times, draw it down before reducing benefits
 - In good times, replenish it before increasing benefit
- Setting up buffer at inception comes at a cost
 - Extra infusion of cash
 - Reduction in accrued benefits at $t=0$
- Note: target (future) accrual rate does not change

Plan design 4

Buffer built from experience only

- Start with a buffer of size 0 at inception
- Positive experience builds buffer
- In early years, benefit cuts more likely
- No (visible) impact on starting benefit structure

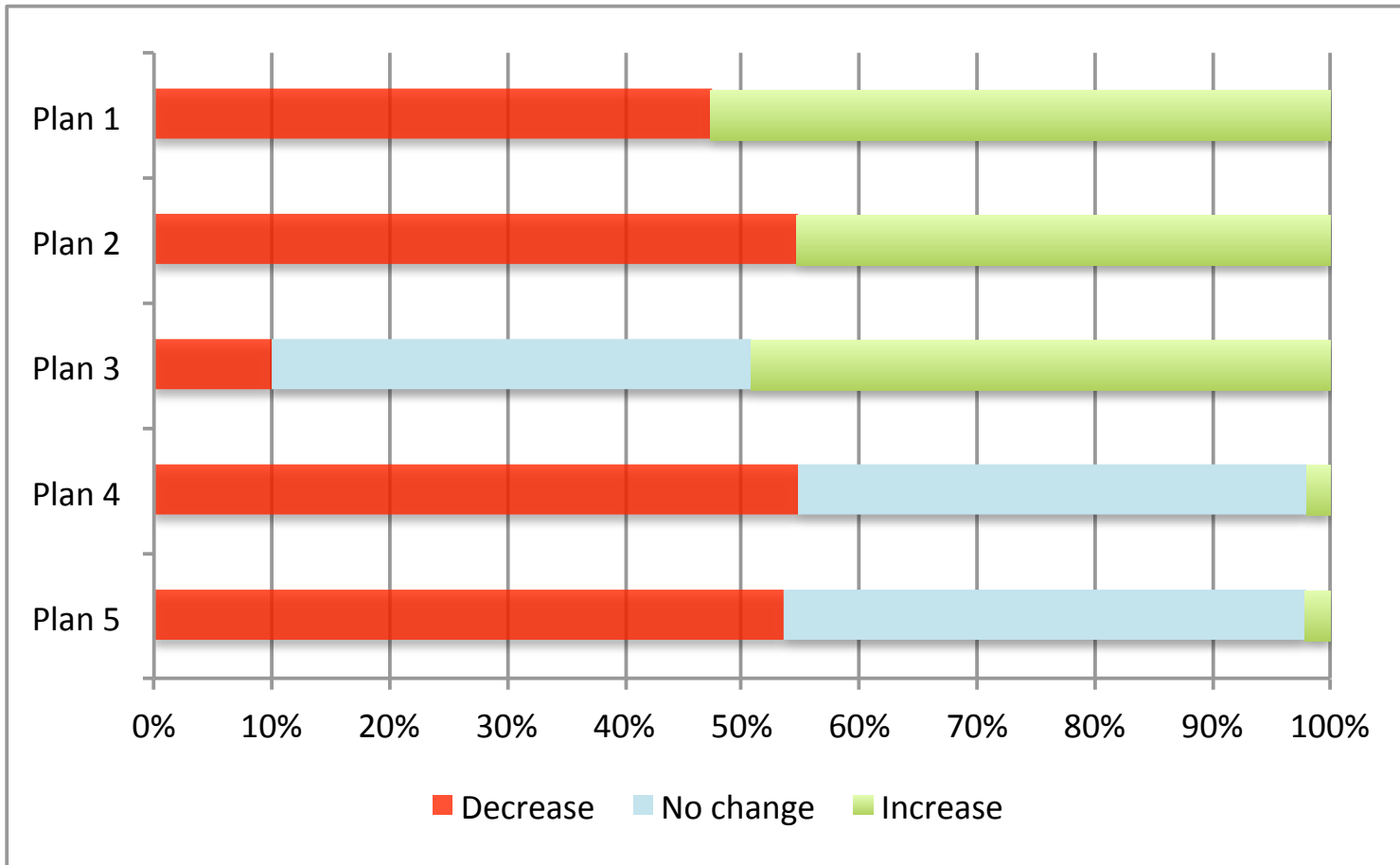
Plan design 5

Buffer built from experience and excess contributions

- Start with a buffer of size 0 at inception
- Positive experience builds buffer
- Also include a margin in the annual contributions, earmarked for the buffer
- If contribution amount is constant, target accrual rate must be lower under Plan design 5

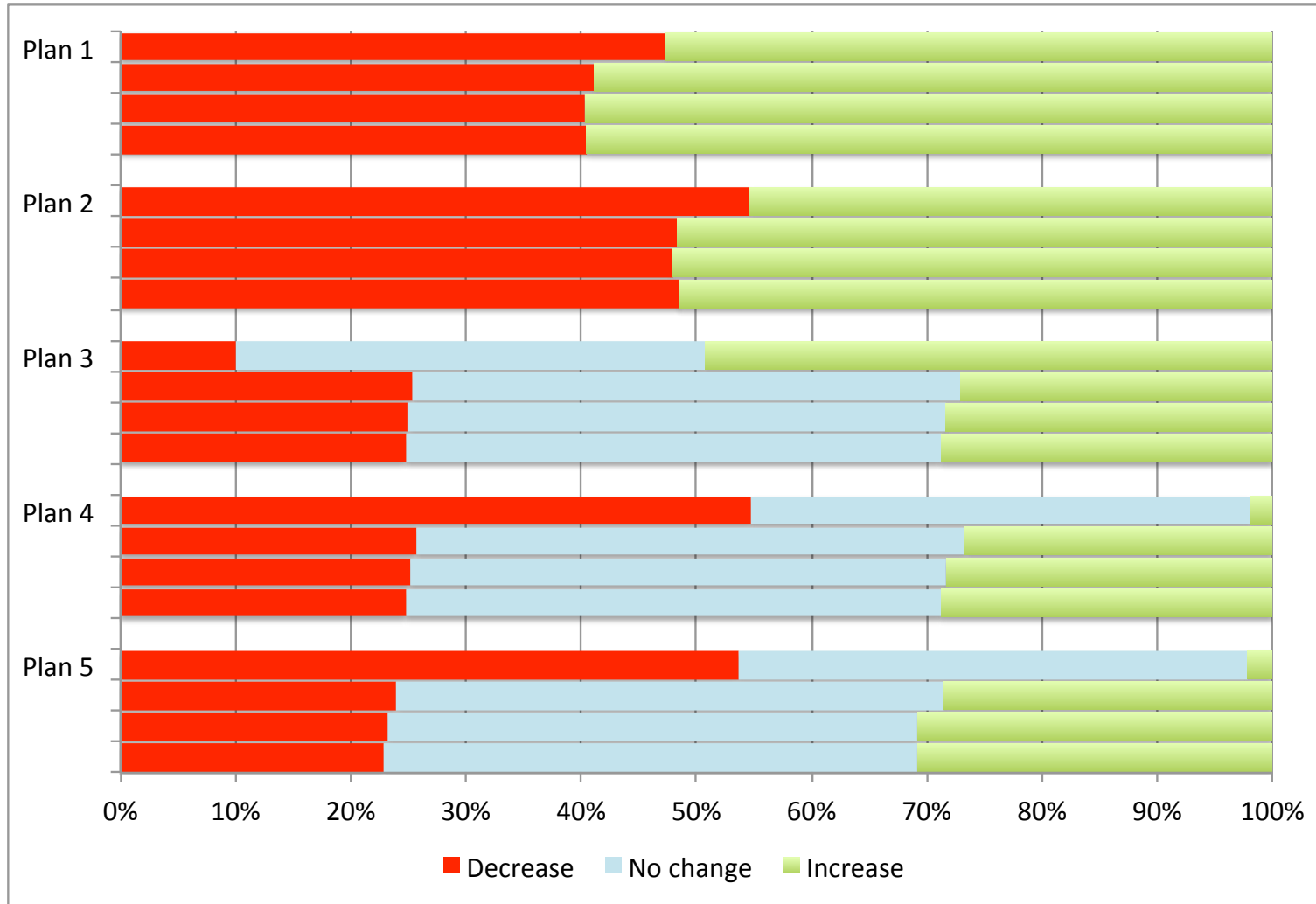
Simulation results

Probability of changes in benefits (t=1)



Simulation results

Probability of changes in benefits, as time progresses



Simulation results

Present value of actual retirement benefits by cohort

Plan	Target PV	Median PV (as % of target) for cohort retiring in			
		Year 1	Year 10	Year 25	Year 50
1	298,526	163%	177%	198%	209%
2	570,556	83%	78%	71%	76%
3	570,556	78%	79%	84%	96%
4	560,556	79%	75%	81%	96%
5	438,889	108%	102%	105%	114%

** For Plan 1, PV of target shown above does not include value of bonus potential, which increases with time elapsed*

My questions

- How much of this can we do analytically?
- What impact does investment mix have (Gollier)?
- What about different demographic profiles and assumptions?
Different transition assumptions?
- What are some good ways of measuring/communicating intergenerational transfers inherent in a particular design?

Your questions



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