

Risk-sharing in pension plans: Multiple options

Nicholas Barr¹

Abstract

A response to pressures on pension finance caused by population ageing and economic turbulence has been a substantial move from traditional defined-benefit plans in which, at least in principle, all risk falls on the contributions side, to defined-contribution plans in which risk during accumulation all falls on the benefits side. This paper argues that both designs are ‘corner solutions’ and hence generally suboptimal, and goes on to set out a range of designs that offer different ways of sharing risk among workers, employers, future pensioners and current pensioners.

Keywords: defined-contribution; defined-benefit; risk-sharing; population ageing

¹ Professor of Public Economics, European Institute, London School of Economics, Houghton Street, London WC2A 2AE, UK. Email: N.Barr@lse.ac.uk; URL: <https://www.lse.ac.uk/european-institute/people/barr-nicholas>

1 What's the problem?

Michael Otsuka's (2023) book gives some important answers about pension design. Even more important, it asks the right question – how should risks be shared?

Economists are genetically engineered to abhor 'corner solutions.' A person with a choice between food and toys will typically buy some of each. As discussed more fully below, defined-contribution (DC) plans (risk all on the benefits side) and defined-benefit (DB) plans (all risk on the contributions side) are corner solutions.

Paying insufficient attention to risk sharing has important ill-effects. People face major uncertainties over their life course, including over family structure, earning opportunities, asset returns and health outcomes. Since many people are risk averse, a pension design that faces them with excessive risk foregoes the potential welfare gains from risk sharing.

Insufficient risk-sharing can also have important macroeconomic effects. It is argued, for example, that limited social benefits in China underpinned the high savings rate which was one of the ingredients in the global financial imbalances that were part of the 2008 economic crisis (Yang 2012; '[China is the key to unwinding global imbalances](#)', *Financial Times*, 20 April 2010).

Risk sharing is relevant also for plan sponsors. Traditional defined-benefit plans faced a series of financing problems as a result of economic crises and the failure to adjust pension age to reflect longer lives. The main response to those pressures was a Gadarene rush to defined-contribution plans (Figure 1), i.e. from one corner solution to another. It does not have to be this way. Otsuka's book suggests a different approach to sharing risk among workers, employers, pensioners. The rest of this paper discusses the two polar cases and then considers his proposal and some other designs for sharing risk. Throughout, I avoid theological debates about terminology, concentrating on bringing out the strategic differences between the designs.

INSERT FIGURE 1 ABOUT HERE

2 Risk sharing in the two polar cases

2.1 Defined-benefit plans

In a defined-benefit plan, a worker's pension is generally related to (a) their length of service and (b) a measure of their wages over a longer or shorter period. In a traditional plan, resources adjust to pay promised benefits, so adjustment to a projected deficit is through higher contributions, but not a change in benefits. Thus in principle benefits are guaranteed. Defined-benefit plans need not be fully funded, and national plans vary widely in their funding, and thus have more degrees of freedom than private plans in sharing the contribution risk across cohorts.

In some countries including the UK, financing problems are accentuated by accounting rules that require a projected deficit to be treated for accounting purposes as analogous to a current year trading loss (see Barr 2009). One result has been a 'yo-yo' from defined-benefit to defined-contribution when asset values declined and a move back – partially or in full – when asset values return to earlier levels. A graphic example – a prime motivation for Otsuka's book – is the Universities Superannuation Scheme in the UK, whose story is summarised in Box 1.

Box 1 The 'yo yo' reform of the UK Universities Superannuation Scheme (USS)

The text below is a bare summary to bring out the main pressures (for fuller discussion, see Otsuka 2023, Ch. 2)

- Till 2011, USS was a final-salary plan with annuitised benefits fully indexed to changes in the consumer price index.
- 2011: to address a projected deficit, alongside other changes including an increase in employee contributions, the final-salary plan was closed to new members and replaced with a career-average plan.
- 2016: faced by a continuing projected deficit, employee contributions were further increased, and the final-salary plan closed, with previously accrued benefits frozen at their March 2016 real level, with future benefits accruing on a career-average basis. In

addition, defined-benefits accrued only for earnings up to £55,000, with a defined-contribution plan for earnings above that.

- 2019: to address a continuing projected deficit, contributions increased substantially.
- 2022: faced by an increasing projected deficit (aggravated because the evaluation took place at a time when asset values were low in the wake of the Covid-19 pandemic), benefits were substantially cut and the indexation of benefits in payment made less complete.
- 2024: as a joint result of strike action and an improvement in government bond yields many of the previous changes were reversed.

As summarised by [Times Higher Education](#) (13 May 2024),

‘While issues around USS have become much calmer since the cuts dispute was resolved, it remains the case that the volatility of the scheme, which [swung from a deficit of £14 billion to a £7 billion surplus](#) in three years, may prompt more attempts at further changes in future.’

2.2 Individual defined-contribution (IDC) plans

At the other pole are defined-contribution plans, in which each worker has a portfolio chosen from multiple competing providers. The benefits a worker receives depend on (a) the timing and size of their contributions, (b) the rate of return on their savings, and (c) their remaining life expectancy at the time they start to draw benefits. which together determine the size of their annuity or, if they do not annuitise, the quantum of resources to finance drawdown. At its simplest, benefits adjust to available resources, so that the entire asset return risk during accumulation falls on the individual worker. During drawdown, an individual who does not annuitise faces both the asset-market and longevity risk. If the worker annuitises, depending on annuity design risk can be shared with the insurer, or with the individual’s birth cohort, or shared across multiple cohorts.

3 Other ways of sharing risk

3.1 Collective individual defined contribution (CIDC) plans

In this design, in contrast with individual defined-contribution plans, workers do not choose portfolios from competing providers; instead, investment is centralised. Examples include the US [Thrift Savings Plan](#) and the National Employment Savings Trust ([NEST](#)) in the UK (Box 2).

In this design, each worker receives the average return across asset classes for the asset class composition of their cohort. The risk-sharing properties of drawdown, as above, will vary with the extent of annuitisation and the type of annuity. A group annuity provides additional risk sharing across individuals within a cohort.

Box 2 The UK National Employment Savings Trust (NEST) pensions

The plan (<http://www.nestpensions.org.uk/>) is built round five elements.

- Automatic enrolment: employers are required to enroll workers in a qualifying pension plan, either NEST or some other approved plan.
- A default: the NEST default is a target-date fund for each birth cohort, the balance moving from more to less risky as the cohort approaches pension age.
- Limited choice: a worker can choose from five funds – higher risk, lower risk, ethical, Sharia or a pre-retirement fund – and can choose a target date different from the default.
- Centralized account administration: NEST maintains all individual records.
- Wholesale fund management: NEST managers decide on the overall composition of the portfolio. (e.g. what fraction of workers' savings are held in UK government bonds, corporate bonds, UK equities, global equities, etc.), and outsource investment choices within each asset class to one or more private fund managers.

3.2 Collective defined-contribution (CDC) plans

This design is like CIDC, but with the crucial difference that the collective investment is for multiple cohorts, along the lines Otsuka suggests. This was the design for a limited period of industry plans in the Netherlands. Each worker receives the average return across asset classes *and* across cohorts.

The risk-sharing properties of this design are more complicated than with CIDC, as exemplified by experience in the Netherlands, summarised in Box 3.

Box 3 Conditional defined-contributions in the Netherlands

Faced by a growing deficit in fully-funded industry defined-benefit plans, reforms in 2015 (a) introduced a cap on employer contributions (the defined-contribution element) and (b) made explicit that benefits were conditional on the performance of the pension fund. This move to a conditional defined-contribution design caused dissatisfaction.

No age-related differences in risk. With a single fund, workers of all ages face the same degree of risk creating tension between younger workers who generally prefer to take more investment risk in pursuit of higher returns, while older workers and retirees generally prefer a portfolio with low-risk assets, creating the potential for conflict between age groups (see [‘No smoke, no mirrors: The Dutch pension plan’](#), *New York Times*, 11 October 2014).

Back-loading of benefits. The design has a uniform contribution rate and uniform accrual rate across age groups. Thus what a worker pays to buy a Euro of benefit is the same whether the contribution was made early or late in a career. As a result, early contributions earn a less-than-actuarially neutral benefit and *vice versa*. The design implicitly assumed that (a) most workers would be in the system for a full career, hence the effects of higher- and lower-than actuarial contributions at least partly balance out; and (b) that as younger cohorts age, new cohorts will enter the plan.

Inequity. The design also raises distributional concerns.

- The fact that late-career earnings carry the same weight as earlier earnings favours workers with rising late-career earnings, who tend to be among the better paid.

- Workers who contribute during the first half of their career but then leave the labor force or move to self-employment, receive a pension less-than-actuarially related to their contributions (see Pew 2017).

These problems, combined with less lifelong attachment to a single firm, prompted suggestions that for younger workers the accrual rate should be higher or the contribution rate lower, and conversely for older workers. In addition, it was pointed out that if an industry declines there will be fewer younger workers entering the plan.

3.3 Conditional defined-benefit plans

The central difference between this design (also called a target benefit plan, or a defined-ambition plan, or a conditionally indexed defined-benefit plan) and CDC is that it is not only benefits and worker contributions that can change but also the employer contribution. An example at a national level is Canada, and at sub-national level New Brunswick. Box 4 outlines the latter.

Box 4 Conditional career-average pensions in New Brunswick

Legislation to facilitate risk-sharing plans in several Canadian provinces is illustrated here by the New Brunswick Public Service Pension Plan (NBPSPP) (see Munnell and Sass (2013), UK Pensions Policy Institute (2014) and [New Brunswick Public Service Pension Plan](#)), a plan that has the support of employers, trade unions and the provincial government.

The plan is based round three central elements:

- A division of benefits into base benefits and ancillary benefits.
- Risk management through an annual stress test of the plan's financial health using a robust risk-management methodology already applied to banks and insurance companies.¹
- A fully-specified set of rules that establish pre-determined actions in the face of a projected deficit, including how worker contributions, employer contributions, accrual rates and indexation of benefits in payment adjust to a projected deficit, and –

¹ On guidelines for stress testing of financial institutions in Canada, see Canada Office of the Superintendent of Financial Institutions (2011).

crucially – a catch-up provision that reverses those adjustments if the funding position improves.

The design allows risk to be shared in different proportions among employers (higher contributions), workers (higher contributions), future pensioners (a lower accrual rate) and current pensioners (less-than-full indexation of benefits in payment). Thus, for example, less reliance on increased employer contributions in the face of a deficit reduces the risk sponsors face; and greater reliance on lower accrual rates places more risk on future pensioners, though with the possibility of subsequent catch up.

Converting accrued defined-benefit rights. Uniquely among Canadian provinces, the legislation in New Brunswick allows accrued defined-benefit rights to be converted into benefits under the Shared Risk plan. Though controversial, the idea was to provide an incentive for employers to move to a shared-risk defined-benefit arrangement rather than to a defined-contribution plan.

Accounting issues. A traditional defined-benefit plan is presented as a liability of the sponsor; a traditional defined-contribution plan is not. The authorities in New Brunswick agreed that the Shared Risk Pension Plan could be presented as defined-contribution, but the broader issue has yet to be addressed fully by the International Accounting Standards Board.

Political support for the plan was broadly based, from the sponsor, who no longer had to face the entire risk, and from trade unions because the plan offered significant protection against large benefit cuts and against the higher risks workers would face from a move to defined-contribution arrangements.

Completing the circle, a traditional defined-benefit plan (section 2.1, above) differs from conditional defined benefit because in principle benefits are guaranteed.

4 Risk sharing: A wider perspective

It can be useful to distinguish between ‘pension systems’ and the different elements of pension systems, referred to as pension plans. For example, in a country with a non-contributory basic pension and fully-funded individual accounts, a worker faces less risk if the system has a generous non-contributory pension and relatively small individual accounts, and more risk if the system comprises large individual accounts and parsimonious poverty relief. Risk sharing at system level also depends on the wider picture, including whether the

pension system is accompanied by good medical insurance and good insurance covering long-term care.

ACKNOWLEDGEMENTS

From 2014 - 2022 I had the pleasure of working with Mike Otsuka as fellow members of the Pensions Advisory Group at the London School of Economics, with many illuminating conversations along the way. I am grateful to Peter Diamond for helpful comments on an earlier version. Parts of this paper draw on Barr and Diamond (2010; forthcoming). Remaining errors are my responsibility.

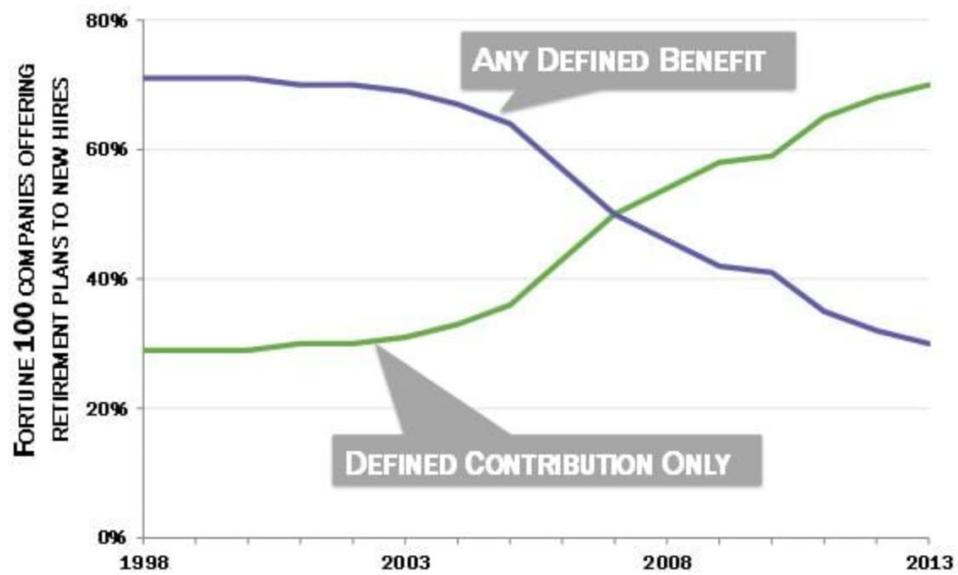
References

- Barr, N. 2009. International trends in pension provision. *Accounting and Business Research*, 30:3, 211-225.
- Barr, N. 2020. *The Economics of the Welfare State* (6th edn). Oxford and New York: Oxford University Press.
- Barr, N. and P. Diamond. 2010. *Pension reform: A Short Guide*. New York and Oxford: OUP
- Barr, N. and P. Diamond, P. forthcoming., *Better Pension Design*, New York: OUP.
- Canada Office of the Superintendent of Financial Institutions. 2011. [Stress Testing Guideline for Plans with Defined Benefit Provisions](#)
- Munnell, A. and S. Sass. 2013. '[New Brunswick's New Shared Risk Pension Plan](#)', Issue brief No. 33, August, Chestnut Hill, MA: Center for Retirement at Boston College,
- New Brunswick Public Service Pension Plan. [Annual Report 2022](#)
- Otsuka, M. 2023. *How to Pool Risks Across Generations: The Case for Collective Pensions*, OUP.
- Pew. 2017, [An Outsider's Summary of the Dutch Pension System](#), Pew Charitable Trusts.
- UK Pensions Policy Institute. 2014. [Risk Sharing Pension Plans: The Canadian Experience](#), Briefing Note 69.
- Yang, D. 2012. Aggregate Savings and External Imbalances in China, *Journal of Economic Perspectives*, 26:4, 125–146.

BIOGRAPHICAL INFORMATION

Nicholas Barr is Professor of Public Economics at the London School of Economics, the author of numerous articles, and author or editor of over twenty books, including [The Economics of the Welfare State](#) (6th edition, 2020), and [Pension Reform: A Short Guide](#) (with Peter Diamond) (2010). The heart of his work is an exploration of how market failures both explain and justify the existence of welfare states. Alongside academic writing is wide-ranging policy work, including spells at the World Bank and IMF. A range of academic and policy writing can be found on <https://www.lse.ac.uk/european-institute/people/barr-nicholas>

Figure 1 A shift to defined-contribution plans



Source: *Defined Benefit Plans: Where'd They Go?*, Bipartisan Policy Center, 2014, [Defined Benefit Plans: Where'd They Go? | Bipartisan Policy Center](#)