

THE BALANCE BETWEEN DEFINED BENEFIT, DEFINED CONTRIBUTION, AND STATE PROVISION

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Abstract

We examine the possible consequences of the increasing shift from Defined Benefit to Defined Contribution arrangements for private pensions. Whilst much analysis has focused on the possible distribution of investment and job tenure risk, we point out the additional role for issues relating to adverse selection and to retirement incentives. These issues are illustrated using empirical evidence from the United Kingdom, where the fact that private pensions are an alternative, as opposed to a supplement, to earnings-related state pension provision makes the effects particularly salient. (JEL: I38, J32, D91)

1. Introduction

Traditionally, employer pension plans have been Defined Benefit (DB) in nature—where the pension received depends on years of service and a measure of earnings often closely related to final salary. More recently there has been a growth in DC plans in which the size of pension depends directly on contributions made to a fund, the investment return achieved, and the annuity rate at retirement. Much of the analysis of these trends has focused on the United States where the rise of 401(k) Defined Contribution (DC) plans has brought the issue to the fore, yet the move towards DC is happening elsewhere. When considering the implications and drivers of these changes the balance of state and private provision also matters, since it determines the overall importance of the changing nature of private pension arrangements. And it is here where, we argue, the United Kingdom makes an important country for study.

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2. The UK Pensions Landscape

Successive reforms have reduced the value of U.K. state pensions for future cohorts. The flat rate Basic State Pension and the State Earnings-Related Pension Scheme (SERPS) have been cut through reforms to benefit formulae, indexation, and an increase in the state pension age for women. While the generosity of the Basic State Pension peaked in the late 1970s, entitlement including SERPS for an individual on male average earnings was highest for those reaching the state pension age in 1998 at 37% of average earnings. State pension income for an individual on male average earnings is forecast to decline to 21% of average earnings in 2060 (Government Actuary's Department 2003). Hence if future pensioners are not to be worse off relative to the working age population, then sources of pensioner incomes other than state pensions will need to make up for the declining relative generosity of state pensions.

More importantly for this paper the balance between state and private pensions in the United Kingdom is even more heavily favored towards private pensions since most of those with private pensions can be “contracted out” of the earnings-related part of the state pension—their SERPS contributions are redirected to their private plan and they forego the rights to future benefits. Hence an individual who has been contracted out for their entire working life will only receive the Basic State Pension from the state, which will be as low as 10% of average earnings by the year 2025.¹

Private pension provision is extensive in the United Kingdom. The vast majority with private pensions are contracted out of SERPS and the extent of private provision has been growing along with the increase in DC arrangements. By 2002 over two-thirds of employees had private as opposed to state second tier pension provision, representing around 90% of those with any private pensions (the remainder being third tier “contracted in” plans).

Looking at the population approaching retirement age, the English Longitudinal Study of Ageing (ELSA) collects detailed information on, amongst other things, pension arrangements (see Marmot et al. 2003). Table 1 uses the 2002 ELSA data to show that the percentage of individuals who have never contributed to a private pension is very low, particularly for men. Strong cohort effects can also be seen—the fraction who have never had any private pension amongst 50–54-year-olds is two-thirds the equivalent value for the group two years older.

1. Note that the regulation of contracted-out DB plans means that they should deliver as much as SERPS. In addition the means-tested Pension Credit Guarantee provides an income floor below which pensioners should not fall—currently worth 20% of average male full-time earnings. Although the level of this floor into the future has not been set, the current ‘aspiration’ is that it will be raised in line with average earnings.

TABLE 1. Current and past private pension status, by age and gender.

	% currently contributing to:			% ever contributed to:			
	None	DB	DC	None	DB	DC	Both
Men 50–54	32.69	30.21	37.09	8.68	44.53	28.30	18.49
Men 55–59	45.54	20.44	34.03	11.51	45.44	25.69	17.36
Men 60–64	68.09	9.80	22.11	13.94	50.88	22.86	12.31
Women 50–54	53.38	25.81	20.81	36.08	37.10	19.06	7.77
Women 55–59	65.43	19.36	15.21	39.15	38.55	16.34	5.96

Source: Banks and Casanova (2003) calculations from 2002 ELSA microdata.

Taken together, this analysis shows that, in practice, the potential effects of any move from DB to DC provision are particularly important in the United Kingdom since private pension benefits will make up a large fraction of retirement income.² As successive cohorts move into retirement with increasing private provision this will get stronger. Consequently, if we are expecting to see effects on individual's expectations or behaviour from the shift from DB to DC, then these should also be more prominent in the United Kingdom, making it a particularly good country for study.

3. The Effects of Moving from DB to DC Pension Arrangements

When it comes to the fundamental economic characteristic of pension arrangements—the sharing of risks and returns—a DB plan could, in principle, be set up to mimic the fundamental characteristics of a DC plan (see Bodie, Marcus, and Merton (1988) or Diamond (2002)). In this sense, drawing the distinction between DB and DC is somewhat of an artificial characterisation of the situation. In practice, however, there are key differences in the incentives and risks that are faced by individuals that are strongly associated with whether the plan is DB or DC in nature. In what follows we examine the key differences between a typical employer DB plan and an individual DC plan such as a personal pension—and highlight their potential importance in the UK context. Where possible, we bring some new evidence to bear on the resulting implications of a switch from DB to DC arrangements in the United Kingdom.

3.1. Investment Risk

Perhaps the most commonly discussed implication of the shift from DB to DC provision is the transfer of investment risk from the employer (or pension fund)

2. Figure 4.1 of Attanasio et al. (2004) shows that these effects on the composition of retirement incomes are already apparent when looking at the period 1979 to 2002, particularly amongst the richer groups where income from the state now represents less than one-third of retirement income.

to the employee. The benefits tend to be seen in terms of individual control over portfolio allocations and the risk return trade-off, which are greater for those in company plans with heterogeneous members. On the other hand, there may be costs arising if the resulting portfolios are not well managed. These costs can be particularly high if individuals invest in stock in single companies or even in their own company or industry (Poterba 2004). It should be remembered that DB plans still carry investment risk that will be presumably be ultimately incident on either pension members (perhaps from different cohorts, depending on the degree to which contribution and benefit formulae are adjusted), workers, or company stockholders.

When considering the transfer of risk, and the possible costs associated with this movement, this is one case where the balance between state and private provision is particularly important. In the extreme example of an individual losing their entire fund value in a DC plan, in the United States this individual would fall back on social security which will still give some substantial (earnings-related) benefits. In a U.K. contracted-out plan this is not the case—the same individual would end up on means-tested support currently worth around 20% of average earnings. For individuals with, for example, CRRA utility functions the utility consequences of such a difference are substantial. As a result the regulation of risks and risk management in private pensions is considerably more important as the amount of state provision decreases. In a recent symposium on public provision, Shiller (2003) and Burtless (2003) look at related issues regarding the mix between DB and DC in the context of the optimal distribution of investment risks across the population of current and future cohorts.

3.2. Longevity Risk and Annuity Market Selection Issues

Less discussed are issues surrounding the insurance of longevity risks. One of the crucial differences between typical DB and DC plans relevant here is the point in the lifecycle at which these risks are insured under the two types of arrangements. This in turn will determine the amount of any adverse selection and the associated costs of insuring the risk itself.

A DB plan essentially sets the annuity rate at the point when members join the plan, which, for the sake of argument, we can assume to be around age 30. In contrast, an individual in the United Kingdom with a DC plan will annuities their fund between the ages of 50 and 75, by which time some uncertainty about length of life may have been resolved. This is a point explored in a theoretical context by Brugiavini (1993) who constructs a three-period model to show that such a scenario could be thought of as one rationale for employer DB plans.

Fundamentally this is an extension of the issues arising with the delivery of insurance arrangements when individuals have private information on their type,

and to this extent it is directly related to pioneering analyses such as Diamond and Mirrlees (1978), who allowed individuals to have private information on their health. These ideas, originally developed for the analysis of public social insurance programmes are now increasingly relevant for private provision, and are also being returned to in the applied macroeconomic literature—in recent papers Kocherlakota (2004) and Albanesi and Sleet (2004) look at building the allocation of risks and incentive compatibility constraints into dynamic public finance analysis when individuals have private information on skills. The extra twist, when it comes to the DB versus DC debate, is that the potential difference in timing of the annuity contract may affect the size and distribution of the private information, and hence the economic costs of the adverse selection.

The argument that the United Kingdom's mandatory annuitisation arrangements negate adverse selection issues is not particularly strong since individuals have considerable choice over when they annuities, and the level of indexation. Since it is not hard to imagine that private information over longevity risk may well increase with age there exists the possibility of adverse selection effects that increase with age. Indeed, Finklestein and Poterba (2002, 2005) show increasing costs of selection at later ages in the U.K. annuities market.

To investigate the potential magnitude of these effects we need to know about individual's expectations of their own longevity. Unusually the British Household Panel Survey wave 11, fielded in 2001, asks individuals younger than 65 the chances that they will live to age 75, with a response scale of "very likely", "likely", "unlikely", "very unlikely", or "don't know". Analysis of these data (available from the authors) shows that the fraction reporting that they are "very likely" to survive until age 75 increases with age. However, those responding "don't know" to this question also increases with age.

To interpret these responses correctly one must account for the fact that these are age effects observed in a cross-section. Whilst it is true that, in 2001, the distribution of potential annuity buyers of each age would have had some distribution of longevity uncertainty, what matters for pension design is how this longevity uncertainty evolves over individuals' lifecycles. As with any cohort-age decomposition there are omitted cohort effects (successive cohorts are more likely to live to later ages than their predecessors) and selection effects (the set of individuals observed at any age is a healthier subset of the same (cohort) group that would have been observed at an earlier age) that obscure the true age effects. Such omitted effects go in different directions according to whether one is considering the group that are very likely to survive to age 75 or very unlikely to survive to age 75, but their effect on the age profile for the "don't know" group is even less clear.

Evidence from ageing studies on individuals ages 50 and over, indicates that survival probabilities are correlated with previous health conditions in the expected way (Hurd and McGarry 2002; Banks, Emmerson, and Oldfield 2004)

and that such subjective survival probabilities are revised in the light of incident health events (Hurd and McGarry 2002). This suggests that uncertainty does begin to resolve itself when such events begin to occur (or not occur) as individuals go through their mid-50s and -60s and we might therefore expect similar effects at younger ages.³ The question of the order of magnitude of such effects at earlier ages remains an open one. Such effects could still be substantial as a result of early life health behaviors or, alternatively, parental morbidity or mortality outcomes occurring when individuals are at younger ages.

One additional potential advantage of DB pensions is that of some groups of workers may be able to receive a better annuity rate than that available on the open annuity market. This is because DB pension plans implicitly control for factors such as industry, which may be correlated with health (albeit imperfectly), whereas open market annuities tend to be priced solely by age and gender (apart from impaired life annuities that are currently only available for those with certain observable health problems).

So there are potential advantages of committing to an annuity rate early among a group of relatively similar individuals. These have to be offset against the potential additional costs to pension funds or employers offering insurance against unexpected increases in life expectancy of cohorts that may well be larger the earlier the annuity rate is offered. These will depend on the cost to the private sector of hedging aggregate mortality risk. It has been suggested in the United Kingdom that the Government could issue bonds that are indexed to longevity changes to reduce these costs.⁴ In part, the pros and cons of doing so will depend on the extent to which suitable hedging opportunities already exist (and at what price). For example, employers or pension funds may already be investing in assets with prices that are correlated with longevity in order to hedge this risk, one obvious example being housing.

3.3. Mobility

The shift from DB to DC pension plans seen in recent years in the United Kingdom will have reduced some of the formal risks faced by employees, since the final salary nature of typical U.K. DB pension plans tended to redistribute towards those with longer pension tenures and those who experience stronger real wage growth (Disney and Whitehouse 1996). This means that in a final salary DB plan

3. Note that not all changes in subjective survival probabilities represent “bad news” for annuity providers. If an individual, previously certain of living to age 75, reduces their assessment of survival to, say 80%, then the functioning of markets could increase, since it is individuals with (private) subjective assessments that they lie above (or below) the mean that cause the market to separate.

4. See speech by the Conservative opposition spokesman on Work and Pensions David Willetts MP to Politeia, 5th July 2004. A similar proposal is made in Blake and Burrows (2001).

employees are (formally) exposed to greater risks over their pension tenures and future wage growth.

Increases in labor market mobility of men will have reduced the value of DB pension plans.⁵ This could be one of the key driving forces behind the move towards DC pension plans in the United Kingdom (Attanasio et al., 2004). But it is not expected job tenures but expected pension tenures that ultimately matter when considering the expected value of a different pension arrangement to an individual. Some employees will be able to change job without moving pension plan—obvious examples include public sector workers such as teachers, nurses, and academics.

Although there is not much empirical evidence on private pension tenures, we can compare the 2002 ELSA data to the 1988–1989 U.K. Retirement Survey. Comparing current private pension coverage and tenure for 55–59-year-olds in paid work between 1988–1989 and 2002, private pension coverage is found to be higher in 2002 than in 1988–1989 (66.2% compared to 47.1%). Among members average pension tenures were 14.4 years in 2002 compared to 10.8 years in 1988–1989. Among those in DB plans in 2002 average tenures are found to have been even higher.⁶

These increases in pension tenures could have arisen for a number of reasons. One possibility is that individuals who were compelled to join their employers' private pension prior to 1988 would often have had to change pension plan when they changed jobs, whereas after 1988 employees who knew that they were likely to move employer could instead have taken out an individual DC pension arrangement so that moving job would not necessitate a change in pension provider (and indeed the costs of moving pension would be lower due to the DC nature of the plan).⁷ Future work comparing differences in pension tenures between, for example, private and public sector workers should shed more light on this issue.

3.4. Labour Supply Incentives

The issue of pension incentives and early retirement has been one that has dominated economic research on pensions. Most developed countries are characterised by lower levels of labor market activity for older working age groups, and in the United Kingdom a pronounced U-shaped pattern in labour market inactivity by

5. For women there have been lengthening job tenures on average, this trend is driven by women with children and possibly reflects changing arrangements for maternity leave (Gregg and Wadsworth 2002).

6. Authors' calculations from the 1988–1989 *British Retirement Survey* (Department for Work and Pensions 2004) and the 2002 *English Longitudinal Study of Ageing* (Marmot et al., 2003).

7. Disney and Emmerson (2002) show that individuals who choose not to join their employer's pension scheme are subsequently more likely to move job.

TABLE 2. Wealth effects and pension plan effects on subjective probability of working five years before the state pension age; ELSA sample ages 50–54.

Parameter	Coefficient	Std. error
Renter	−6.84	2.84
“Wealth” quintile 2	−4.83	3.04
“Wealth” quintile 3	−1.30	2.82
“Wealth” quintile 4	−7.06	3.03
“Wealth” quintile 5	−8.24	2.88
Employer DB plan	−3.54	2.13
Employer DC plan	4.33	2.48
Employer DC plan	7.62	2.25

Notes: Others controls include age dummies, gender, marital status, health, and education. Standard errors estimated by bootstrapping with 500 repetitions.

wealth is apparent—broadly speaking, low wealth groups leave paid employment early through poor health and move onto disability benefits, while high wealth groups leave through early retirement and move onto private pension income (see Banks and Casanova 2003).

The labour supply literature has focused on pension arrangements and their inherent retirement incentives. The analysis of institutional arrangements (including early retirement “windows” and “spikes” in accrual rates) that have been modelled are more pertinent to DB plans or to social security type arrangements than to DC plans (see Gruber and Wise (2004) for example, or Blundell, Meghir, and Smith (2002) for a U.K. analysis). Indeed, one can argue that not only are labour market incentives smooth across ages in a DC plan but that accrual rates are higher at later ages than pensions based on either final salary or average earnings. Therefore the movement towards DC should lead to later retirements (subject to both labour demand constraints and, as discussed in Section 3.2, the extent to which adverse selection affects the functioning of the annuity market).

To investigate the effect of plan design on future retirement outcomes we use the ELSA retirement expectations question relating to the subjective chances of being in employment five years before the state pension age (i.e., 55 for women and 60 for men). In order to control for lifetime resources (and to avoid using problematic measures of pension wealth that will be related to the variables of interest) we use gross house value as a proxy for the level of consumption, which in turn can be thought of as a proxy for lifetime wealth.⁸ These controls are then added into a model for the self-reported chances of working five years before the state pension age, along with controls for age, gender, marital status, education, and health status. Results from this simple OLS descriptive analysis are presented in Table 2.

8. More specifically, we adjust the gross house value for regional and family size effects and then form five quintiles of owners for which dummy variables are added to the regression analysis, along with a variable to capture whether the individual is an owner occupier.

The effects of plan design on future employment expectations appear to be quite strong. The base group are those in SERPS, which is essentially an average earnings-based DB plan. As one might expect, those in (predominantly final salary) employer DB plans report on average 3.5 percentage points lower chances of still being in work five years before the state pension age than those in SERPS. Those with individual DC arrangements report on average probabilities 7.6 percentage points higher than those in SERPS.

Finally, the analysis of retirement incentives is another case where the overall balance of private versus state provision is key. Public pensions and retirement or disability benefits are not without labour supply incentive effects and the overall proportion of retirement income potentially accounted for by state versus private provision will determine the importance of the relevant labour supply incentives in determining the labour market outcomes.

4. Conclusion

Unexpected increases in longevity put pressure on all pension systems. Even though these pressures were evident during the 1980s, the exceptional rise in equity prices over the 1990s managed to cloud this problem. The recent fall in equity prices has brought it home in a rather dramatic fashion.

The unique form of pension arrangements in Britain have meant that these upward revisions in longevity play out in a relatively complex way and highlight the distinction between final salary DB pensions and DC arrangements. In Britain over 70% of pension plan members are contracted out of the earnings-related state plan. In contrast in the United States and in continental Europe, the majority of pension saving is in “pay as you go” government social security plans. Until 1988 this private pension saving in Britain was mainly held in employer-based final-salary plans. Since 1988 individuals have been able to contract out into private DC plans and more than one-third of this group have done so.

What does this mean for pension incomes and retirement decisions? One key distinction between final salary DB pensions and DC plans is the point in the lifecycle at which the annuity decision is taken. Adverse selection may affect the economic costs of the risk and we presented some evidence that individuals revise probabilities of survival with age.

Turning to retirement incentives the results we have reported from ELSA are consistent with a much stronger incentive to work longer in DC plans. We have shown that those ages 50–54 in (predominantly final salary) employer DB plans report, on average, 10 percentage points lower chances of still being in work five years before they reach the state pension age than those with DC arrangements.

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