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Credit Crisis and Pensions

International Scope

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Credit Crisis and Pensions: International Scope[1]

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Abstract

The financial crisis made the risks faced by all pension systems appallingly clear. This paper discusses systemic risk. It sets out the main objectives of pension schemes (consumption smoothing, poverty relief and insurance), and discusses the ability of different types of pension schemes (defined benefit, defined contribution and notional defined contribution) to meet those objectives in the face of different types of risk (longevity and fertility risks, financial market risks and productivity risks). The analysis is based on lessons from economic theory and international experience, and includes more recent insights from information economics and behavioural economics. The paper also discusses the current economic crisis and how it affected different types of pension arrangement. It ends with lessons for pension design in general, and more specifically for the Netherlands.

[1] This paper draws heavily on joint work with Peter Diamond (Barr and Diamond, 2008, 2009, 2010*a*, *b*, forthcoming), and on comments on an earlier version of this paper. I am grateful to Axel Börsch-Supan for help in disentangling the intricacies of the German pension system, and to the editors for very helpful comments on earlier versions.

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Introduction

All pension systems face risks. That has always been known, but is sometimes forgotten.

> 'The headline figures are frightening. The financial crisis has meant that private pension funds lost 23% of their investment's value, or some USD 5.4 trillion on aggregate in the OECD, in 2008…. Across the OECD, economic output is expected to fall by 4.3% in 2009 and growth is not expected to return until 2011' (OECD 2009, p. 9).

The financial crisis provided a stress test of pension systems. It did not reveal any new risks, but makes appallingly clear the magnitude of the risks we already knew about, and thus provides a firm reminder to policy makers of two lessons:

- Any discussion of pension design should pay considerable attention to risk-sharing;
- Sharing risks more broadly can reduce the risk that each individual faces.

One of the effects of the crisis is to force policy makers to accelerate adjustments to longer-term pressures. Pension systems with contributions, benefits, and retirement ages established in earlier decades are incompatible with the longer retirements implied by the long-run trends of increasing life expectancy, earlier average retirement and the additional rise in dependency rates arising from declining fertility. These trends would not cause problems for the finance of the system if benefits adjusted fully actuarially to longer retirements; the problem arises because (a) people are living longer *and* (b) the design of pension systems contains insufficient automatic adjustment. Thus some adjustment is necessary, and would be necessary even without the baby boom, as illustrated by strikingly similar age pyramids projected for 2050 for China (which has a one-child policy), the United States, which had a baby boom, and India, which had neither (Barr and Diamond 2008, Fig. 1.5).

Thus a paper written in 2006 would attribute financing problems to long-term sources connected with demographic change, medium-term sources such as the baby boom and the post-war expansion of pension systems, and the failure of governments in most countries to come to grips with those issues. To these pressures are now added the effects of the economic crisis.

This paper discusses systemic risk. The opening section sets out the multidimensional nature of the issues. Section 2 discusses pension design to address systemic risk in a first-best context. Section 3 extends the discussion to a second-best context. Section 4 considers some of the main responses to the economic crisis. Section 5 outlines some policy directions. The concluding section draws out some key lessons.

1 A multi-dimensional set of problems

Pension systems show multiplicity of risks that they face, of objectives, of types of organisation, and of ways of adjusting.

MULTIPLE RISKS. It is helpful to distinguish different elements.

- Individual (or idiosyncratic) risk concerns the distribution of a given average risk across individuals, for example the risk that an airline will lose a person's luggage.
- Systemic risk (or common shocks) arise when the average risk changes; such risks affect all or many individuals. Inflation, for example, affects everyone.[3]

Some risks have both elements: someone aged 65 faces a probability distribution of remaining life expectancy (individual risk); but the average remaining life expectancy of successive cohorts can rise over time (systemic risk).

Box 1 summarises the range of risks – individual and systemic – which pension systems may face. This paper focuses on the systemic risks and the ways that different pension designs can share them. It is important to remember that though systemic reform may be able to reduce aggregate risk (e.g. making the use of seat belts mandatory reduces the risk of serious injury from an automobile accident) it is generally not possible to make aggregate risk disappear, merely to share it in different ways

- Within a generation, protecting one group (e.g. retirees) more fully from shocks implies that other current and/or future participants, such as workers, consumers and taxpayers, have to bear more shock.

[3] There are no ill effects from fully-anticipated inflation in a world with complete markets. As a practical matter, neither condition holds.

- Or it is possible to offer current workers and retirees some protection by sharing risk with future cohorts. That option, however, depends on the ability of the pension system (or government more generally) to draw on accumulated assets or to borrow.

Box 1: Multiple risks and uncertainties facing individuals

An individual may experience poor pension outcomes for reasons that can loosely be divided into systemic risks, market risks, and risks connected with individual behaviour.

Systemic risks:

- Macroeconomic risk affects output, prices (including asset prices) or both.
- Demographic risk arises mainly through longer life expectancy and lower fertility.
- Political risk.

Market risks arise from systemic shocks, but also have idiosyncratic elements:

- Earnings risk: a worker's earnings profile has both deterministic elements (e.g. the decision to invest in human capital) and stochastic elements, relating to labour markets and health risks.
- Investment risk: accumulations held in the stock market are vulnerable to market fluctuations. Accumulations in nominal bonds face inflation risk. At its extreme, if a person with a fully-funded individual account is obliged to retire on her sixty-fifth birthday, there is a lottery element in the value of her pension accumulation.
- Annuities market risk: an individual faces the risk of outliving his or her savings and for that reason many systems make it compulsory to convert pension savings at least partly into an annuity. For a given accumulation, a person's annuity at a given age will be affected by the life expectancy of his birth cohort and by the discount rate used by the annuity provider. And annuity providers can fail.

Risks connected with individual behaviour:

- Principal risk arises through bad decisions by participants, for example about when to retire. Poor choices can arise from imperfect information, e.g. investing too heavily in equities too close to retirement, or failing to understand the importance of administrative charges. Poor choices can arise also for reasons which behavioural economics explains. For fuller discussion, see Barr and Diamond (2009, Boxes 2 and 3).
- Agency risk can arise through incompetent or fraudulent fund management. More importantly, as the financial crisis has shown with stark clarity, managers in private systems may have different incentives from plan participants (see, for example, Woolley 2010).

Many of these elements face policy makers not only with risk (where the probability distribution of outcomes is known or can be estimated with a small variance), but also with uncertainty, where the probability distribution of outcomes is not well known. Actuarial insurance can in principle deal with risk, but faces problems with uncertainty.[4]

MULTIPLE OBJECTIVES. Pension systems have multiple objectives and have to address multiple risks. It is helpful to start by considering a rational individual in a world of certainty, where nobody is poor on a lifetime basis.

Consumption smoothing: in a world of certainty, a rational individual will borrow and save so as to maximise her lifetime utility, for example, saving during productive middle years to finance consumption in retirement. In this simple case, the purpose of pensions is to transfer consumption from ones younger to ones older self. If nobody is poor on a lifetime basis, no additional action by the state is necessary.

Poverty relief: relaxing the assumption that nobody is lifetime poor opens a role for the state in supporting consumption in old age of people who are lifetime poor. In practice action is needed also to address also transient poverty.

Insurance: relaxing the assumption of certainty means that we have to consider at a minimum the longevity risk – people generally do not know how long they will live after retirement. Actuarial insurance, for example, annuities, can address this type of risk. But, as just discussed the problem is much more widespread, embracing uncertainty as well as risk, and systemic as well as idiosyncratic risk.

The choice of boundaries between the main objectives is to some extent terminological. In this paper, consumption smoothing refers to intertemporal redistribution by an individual over his or her life cycle. However, insurance can be thought of as consumption smoothing across different contingencies (e.g. the risks and uncertainties in Box 1). Thus some writers take a broader view of consumption smoothing. Similarly, formulae

[4] This distinction goes back to Frank Knight (1921). See also Bronk (2009, pp. 214-6). It can be argued that no economic risks represent the type of risk present in games of chance or physics so to that extent all important risks are uncertain. If one takes that view, the question becomes that of the degree of confidence one draws around a projection.

that subsidise the pensions of lower-paid workers can be thought of as part of poverty relief, or as insurance against contingencies like adverse labour-market outcomes.

More broadly, social policy has well-known equity objectives and less-widely-known efficiency purposes (Barr 2001). Risk, which in important respects lies at the heart of social policy, has elements of both. Providing the least well-off with some protection in the face of risk has a clear equity dimension. But optimal risk sharing across the contingencies in Box 1 also has important efficiency aspects. If individuals face too little risk, as in the communist economic system, growth stagnates; but if they face too much risk, as in countries with limited social safety nets, they are less likely to take risks like starting a business, again to the detriment of growth. In the other direction, they might take the very big risk of illegal migration, e.g. from Mexico to the USA.

DIFFERENT TYPES OF PENSION ARRANGEMENT. Pensions can be Pay-As-You-Go (PAYG), partially funded or fully funded. Separately they can be defined-contribution or defined-benefit. Once more, it is necessary to define terms. It assists discussion to start with the two polar cases.

Defined-contribution plans. In the simplest defined-contribution plan, each worker saves a fixed percentage of his or her earnings to purchase assets, which are accumulated in the worker's account, as are the returns earned by those assets. The size of the worker's pension is determined by the value of assets accumulated in his account over his career. The benefit may take the form of a lump sum, or a series of payments, or an annuity, but in all cases is determined only by the size of the worker's lifetime pension accumulation. Thus in the polar case, the individual bears the full risk. The simple arrangement can be modified: the contribution rate can be allowed to vary; and there can be redistribution across workers' accounts or between general revenues and the accounts.

For some purposes it is useful to distinguish two cases, with separate terminology (used where relevant throughout the paper) to describe them.

- In a defined-contribution scheme (a) the individual bears the full risk and (b) the contribution rate is fixed. Thus risk manifests itself through its effects on the individual's consumption in retirement.

- With an individual account, the individual in principle bears the full risk but can vary the contribution rate.[5] Thus the individual can at least partly offset low asset returns by saving more. In this case, preserving the individual character of a person's lifetime budget constraint, risk manifests itself on lifetime consumption, but gives the individual some choice over how any fall in consumption is divided between consumption in working years and in retirement.[6]

Defined-benefit plans. In the simplest defined-benefit plan, the size of a worker's pension is determined as a function of his history of pensionable earnings. The formula may be based on the worker's final wage and length of service or on wages over a longer period, for example, his full career. The sponsor's contribution is conceptually the endogenous variable ensuring that the system remains in financial balance; thus risk falls on the employer, or on the insurance company if the employer buys annuities for retiring workers on a rolling basis. A defined-benefit scheme can be fully funded, but in principle need not be.

Again, the simple arrangement can be modified.

- Some risk can be transferred from contributions to benefits, by adjusting the rules for accrual or the indexation rules for benefits in payment.
- Some risk can be transferred to future participants if the plan is less-than-fully funded.
- There can be government guarantees, government bailouts, or mandatory insurance of pension funds.

In sum, in the polar cases, in a defined-contribution plan, benefits adjust to available finances; in a defined-benefit arrangement, finances adjust to maintain benefits.

Notional defined-contribution (NDC) plans are conceptually similar to defined-contribution plans in that contributions are notionally accumulated to determine a balance which is converted into an annuity at retirement, but NDC plans are different in that that they

[5] With complete capital markets the individual can in principle transfer all risk. In practice, capital markets are incomplete, so the individual can protect himself only partially, for example, through the capital market (for example, by life-cycle investing) or insurance (e.g. buying an annuity).

[6] The choice of terminology is purely for convenience. It is equally possible to share risks between consumption during working years and in retirement through defined-contribution plans with fixed contributions combined with supplementary voluntary accounts.

are not fully funded and may be PAYG. Thus the accumulation in each participant's account follows a rule rather than necessarily equalling the actual returns on the assets held.

MULTIPLE WAYS OF ADJUSTING PENSIONS. Box 2 summarises multiple ways of adjusting pensions. In some ways the task of this paper is to map these multiple forms of adjustment onto the risks – particularly the systemic risks – in Box 1.

Box 2: Mechanisms for adjusting pensions

At a strategic level pension systems can adjust on the contributions side, on the benefit side, or both. Thus the elements discussed below are not mutually exclusive.

Increasing the income of the pension system: pensions can adjust through:

- Higher savings by today's plan participants (fully-funded individual accounts) or higher contributions by today's workers (a less-than-fully-funded defined-benefit social insurance system). Thus the extra revenue comes from today's working participants.
- Higher contributions by the plan sponsor (a defined-benefit plan). As discussed below, depending on elasticities in labour, capital and product markets, the extra revenue comes from some or all workers and shareholders in the firm or industry concerned, from taxpayers, from customers, and/or perhaps tomorrow's workers.
- Higher contributions by insurance companies where retirees or plan sponsors have bought annuities. In that case, again depending on the relevant elasticities, the extra revenue comes from the insurance company's workers or shareholders or future customers.
- Higher contributions by today's taxpayers (a public pension). Thus the extra income comes from today's taxpayers and hence also, if desired, tomorrow's taxpayers, thus allowing intergenerational risk sharing.

Reducing pension spending. Total pension spending is the product of (a) the level of the average pension and (b) the number of pensioners. The main determinant of the latter is earliest eligibility age. Policies to reduce pension spending can operate on either or both.

- Policies to reduce the monthly pension at a given eligibility age:
    - During accumulation:: a lower rate of accrual during working life through (a) a lower return to financial assets (a fully-funded defined-contribution pension), or (b) a less generous legislated accrual rule (an NDC system or occupational pensions in the Netherlands);

    - Pensions in payment: less generous indexation of pensions in payment, or a reduction in pension, either by legislation or in the case of variable annuities.
- An increase in earliest eligibility age, hence shorter duration of retirement: this approach affects workers but not retirees.
    - With less-than-actuarial adjustment: total spending on pensions declines, e.g. a defined-benefit plan;
    - With actuarial adjustment: in this case there is no saving in total pension spending, but a given volume of spending can maintain a desired replacement rate (fully-funded defined-contribution pensions or an NDC system). In this case the purpose of an increase in eligibility age is to address adequacy rather than sustainability.

2 Setting the scene: Pension design and systemic risk in a first-best context

This section starts by with a brief summary of where risks falls under different pension arrangements, initially considering only the simple cases. Section 2.2. discusses how these cases can adjust to demographic and economic shocks in a first-best setting. Section 3 broadens the discussion of adjustment by modifying the simple cases in a second-best context.

Before taking discussion further, however, Box 3 establishes a fault line that divides approaches to pension design.

Box 3: How much discretion is optimal in the design of a pension system?

Consider the following statements:

- A major advantage of fully-funded defined-contribution pensions or individual accounts is that they are transparent ex ante about how risks are shared between the different stakeholders and, partly for that reason, less prone to interference.
- Partial funding in an NDC system or a public or occupational defined-benefit plan plays two important roles. One is to buffer shocks to the system so that short-run perturbations can be accommodated through long-run adjustments rather than large immediate changes. Second is to spread the costs and benefits of the pension system across cohorts. The combination of a sufficiently large fund together with automatic adjustments to projected long-run imbalances,

makes it possible for policy to focus on long-run sustainability rather than requiring sharp changes in the short term

The first statement argues against discretion; the price is that all risk falls on current participants. The second argues that less-than-full funding makes it possible to share risks more widely. In principle, that is possible without discretion if the system incorporates automatic adjustments but, as the discussion in sections 3 and 4 makes clear, it has not thus far proved practical to design a wholly automatic system that works in a satisfactory way in all circumstances. Thus at some stage discretionary legislative action is likely.

The second statement is true if the process is one of long-run optimisation. The empirical question is whether, that model is a good description of the actual behaviour of government or other plan sponsors. If government is prone to government failure, policy may be driven more by short-term political considerations than by long-run optimisation. If so, the potential benefits of wider risk sharing may be offset by the costs arising from sub-optimal behaviour. Such costs could include excessive postponement of necessary adjustment; or growing deficits could lead to the sponsor reneging on past promises. In that case, the potential benefits of wider risk sharing could be illusory.

The choice between (a) a more stringent defence against government failure but less risk sharing and (b) wider risk sharing, necessitating somewhat less defence against government failure is fundamental. The right answer depends, inter alia, on the weight policy makers give wider risk sharing and an empirical view of the quality of government in the country in question. However, the answer is far from clear-cut. Fully-funded individual accounts are not immune from government interference such as changing their tax privileges, interfering with their investment decisions, or outright nationalisation (e.g. Argentina). Barr and Diamond (forthcoming) explore the potential gains in terms of wider risk sharing from allowing some discretion.

2.1 Pension design: the simple cases

DEFINED CONTRIBUTION PENSIONS. In a fully-funded defined-contribution plan, a person's pension, other things equal, is determined by the size of his or her lifetime pension accumulation. Thus individuals face many of the risks in Box 1, including systemic risk and market risks. They can, of course, shift some of those risks: they could buy indexed government bonds rather than equities, but at a cost of a lower, albeit safer, rate of return; or they could buy an annuity, or a deferred annuity, but again at a cost.

If the system allows individual choice, principal risk and agency risks are also relevant. If the contribution rate is fixed, these risks emerge through adjustments in the level

of the individual's monthly pension; if it is not fixed, the risks can affect consumption both during working years (if the individual saves more) and in retirement.

DEFINED-BENEFIT PENSIONS.

Private plans. Assume initially that the plan sponsor provides the pension (i.e. does not buy annuities from insurance companies), and that the sponsor survives. In that case, the risk of varying rates of return on pension assets falls on the sponsor. In a private plan, the risk falling on the employer can be spread over several groups – current workers (through effects on wage rates), the firm's shareholders and the taxpayer (through effects on profits), its customers (through effects on prices) and/or its future workers.

If the sponsor buys annuities for workers when they retire, the risk of poor asset performance falls on the sponsor during accumulation and on the firm providing the annuity, once benefits are in payment. If the sponsor goes bankrupt or defaults on its pensions promise in other ways, the risk falls both on current contributors and (in the absence of annuitisation) on retirees. If the firm providing the annuity goes bankrupt, the cost falls on retirees. All these risks can be modified, for example if the government provides or mandates insurance for occupational plans.

Where the sponsor of a defined-benefit plan can spread risk over future participants, it is in principle possible to share risks more widely than in a fully-funded defined-contribution plan, which can spread risks only among current participants. That argument, however, needs to be qualified, as discussed in Box 3.

- If defined-benefit occupational plans are required at all times to be fully funded, risks are borne by current participants, hence not shared more widely than in a defined-contribution plan.
- The flexibility of less-than-full funding is double-edged. On the one hand, it allows risks to be spread across generations. On the other, as noted, sponsors may go bankrupt or renege on pension promises (a cynical view is that in corporate plans the firm creams the surplus in good times and reneges on pension promises in bad times). At its worst, it can be argued that defined-benefit plans give participants a promise of security that is illusory, for example if a defined-benefit plan is converted to defined-

contribution. To that extent, a defined-contribution arrangement, where it is clear who bears the risk, is more transparent. The question for policy design is whether flexibility is more realistically regarded as a threat or a promise.

Public plans. In a public defined-benefit system, adjustment comes from changes in the contribution rate (generally a dedicated payroll tax), so that risk is shared with current workers. If there is a trust fund which can accumulate assets or borrow, risk can be shared also with future workers. If benefits are financed partly from general revenues, risk is shared with taxpayers, including pensioners and, through government borrowing, also with future taxpayers.

In a PAYG system, current benefits are financed from current contributions, precluding intergenerational risk sharing. The same is true of fully-funded systems. If a system is partially but not fully funded, it can be financed from past trust fund surpluses or trust fund borrowing, or from tax revenues, thus sharing risks with future cohorts. The conclusion, once more, depends on ones view of government. If government is regarded as responsible (or can be constrained by rules to act responsibly), the ability to share risks across generations is a major benefit, suggesting that it is generally optimal to have a PAYG element in a pension system. A view of government as prone to failure suggests that flexibility invites agency risk. Thus, as with private plans, the question is whether flexibility is regarded as beneficial.

NOTIONAL DEFINED-CONTRIBUTION (NDC) PENSIONS. In an NDC system that is PAYG, the individual faces only some of the risks in Box 1, notably the systemic risks, the earnings risk, and the longevity risk. In an NDC system that is partially funded, the individual also faces investment risk. Note that a partially-funded NDC system can in principle share risks widely, including across generations. Once more, there is the potential for agency risk. The purpose of well-designed rules and explicit procedures for legislative action offer at least partial protection. Yet again, the issue arises of whether flexibility is more likely to be used well or badly.

2.2 The effects of systemic risk in the simple cases in a first-best world

This section discusses adjustment to demographic risk (changed in mortality and in fertility) and economic risk for the simple cases discussed above, assuming a first-best world.

2.2.1 Responses to increasing life expectancy

There has been a long-run trend increase in life expectancy in many countries, with widespread agreement about the expected direction of change, though less about its speed.

The view of rising life expectancy as a problem is profoundly mistaken: people are living not only longer lives, but longer healthy lives, in important respects one of the greatest triumphs of the twentieth century. [7] The fact that longer lives increase the cost of a given pension at a given age should not obscure that fact. Much of this paper is about how pension systems should adjust.

A defined-contribution system – whether funded or notional – adjusts automatically to rising life expectancy by reducing benefits at a given retirement age. Individuals may choose to offset that reduction, at least in part, by retiring later (i.e. extending working years) or by saving more (i.e. consuming less during working years), or both. In a first-best world such decisions are voluntary. Later discussion considers why reliance on voluntarism on its own might be suboptimal.

In a defined-benefit system, without automatic adjustments the plan's income is adjusted so that it matches the cost of the plan's promises. Increased life expectancy raises the cost of the system. In a private plan, as noted, the extra resources come from the plan sponsor, hence from workers, shareholders, taxpayers, and/or customers, and/or future workers, or a mix. In a public pension in which contributions are required to cover benefits and where the system is not allowed to accumulate a surplus or to borrow, the extra resources come from workers through higher contributions. If the system is allowed to borrow, some or all of the extra resources can come from current or future taxpayers.

[7] I tell my students that they have as much academic freedom as I do, with one exception: the term 'ageing problem' is ideologically unsound, and terrible things will happen to anyone who uses it.

2.2.2 Responses to declining fertility

A declining trend in fertility has been widespread and long term. Initially, in many countries, declining child mortality more than offset the decline in fertility, leading to rapid growth of the population of working age. But in many countries child mortality rates have declined to the point where the scope for further decline is limited, and consequently growth of the labour force has slowed.

A slowdown in the rate of growth of the labour force has a direct impact on the financing of the pension system. If such a slowdown were the only change, it would be expected to lead to higher wages and lower rates of return on assets.

In a fully funded defined-contribution system, if interest rates fall, other things equal, a person's pension accumulation will grow more slowly and hence his total accumulation at a given age will be smaller. Individuals can offset that reduction, at least in part, by saving more or by retiring later. In a first-best world, these changes occur voluntarily. Behavioural economics explains why that is unlikely to happen, a topic discussed further below.

In an NDC system matters are more complex. If the notional interest rate is the rate of real wage growth, w, the notional accumulation of a given worker will grow faster; if the notional interest rate is the rate of growth of the total wage bill, wL, where L is the size of the workforce, the effect on a worker's accumulation will depend on whether the increase in w does or does not offset the decline in L.

In a defined-benefit system with partial funding, a decline in interest rates creates problems for the plan sponsor. If benefits promises are kept, contributions to the plan have to increase. In a private plan, those increases, once more, can come from some or all of workers, shareholders, taxpayers, and future workers. In a public pension, the extra resources come from workers through higher contributions, taxpayers and/or future taxpayers. In practice, as noted, benefits may also be adjusted.

2.2.3 Responses to economic turbulence

In an economic downturn, the return on assets declines, reducing the growth of pension accumulations; interest rates decline as savers shift from equities to safer assets, raising the

cost of annuities; and the wage base grows more slowly, or declines, hence so do contribution revenues. The effects of these changes emerge in different ways in different pension arrangements. As noted earlier, it is not possible to make aggregate risk disappear, but it is possible to share it in different ways.

In a fully-funded defined-contribution system, a decline in the value of assets reduces a worker's pension accumulation and also the rate of return on which his or her annuity is based. Younger workers can respond by doing relatively little, relying on later growth to rectify the situation; or they can choose to save more. Workers close to retirement cannot rely on later growth and have only limited scope to increase their saving sufficiently to offset any decline in asset values. If they have hedged risk earlier, e.g. by moving from equities into bonds as they age, the effect of economic turbulence is less acute. Otherwise, the main response for such workers is either to postpone retirement or to accept lower consumption in retirement.

Many commentators have advocated mandatory individual funded accounts,[8] not least because of the intuitive power of the argument that building up a pile of savings makes a person more independent of government. However, many of those arguments are incomplete or mistaken, as discussed in Box 4 as far as systemic risk is concerned.

Box 4: Analytical errors in the advocacy of mandatory individual funded accounts

The assertion that individual funded accounts are a dominant policy design is widespread and persistent, so that it is worth setting out the analytical errors that such arguments frequently make (for fuller discussion, see Barr and Diamond, 2008; 2009, and for a retreat from its former position, World Bank 2006).

- Tunnel vision: good policy design needs to take account of all the objectives of pension systems. The greater the focus on individual accounts, the greater the emphasis on consumption smoothing. Good analysis needs to take account also of poverty relief (which may be dealt with by another element in the pension system). Poverty relief becomes particularly salient during an economic crisis.

[8] One of the major historical examples is World Bank (1994); for a more nuanced restatement, see Holzmann and Hinz (2005).

- Improper use of first-best analysis: much of the adjustment to shocks assumes a first-best world in which people's voluntary decisions accord with simple economic theory, for example, responding to a decline the value of pension assets by voluntarily saving more and/or delaying retirement. Such theory ignores information problems, behavioural issues, and transactions costs; second-best analysis (section 3) takes account of such factors.
- Improper use of steady-state analysis: steady-state analysis is the correct approach if we compare states of the world A and B – for example comparing the USA today with a mainly PAYG system with the USA that would have resulted had it always had a funded system. Mostly, however, the issue is a different one, that of the move from steady state A (PAYG) to steady state B (funded). Such a move has transition costs, which are particularly problematical in the face of economic turbulence, Argentina being a sad example.
- Incomplete analysis of the effects of funding: it is frequently argued that funding is an appropriate response to demographic change. That is true where funding makes an independent contribution to output growth; funding may do that, but not necessarily or everywhere. If, for example, an increase in mandatory saving is offset by an equal decline in voluntary saving, the total volume of saving is unchanged. The error lies not in discussing the link, but in assuming that it always and necessarily holds.
- Ignoring distributional effects: a move towards funding that increases saving reduces the consumption of today's workers to the benefit of future workers and/or pensioners. Such redistribution is an inescapable companion of a decision to increase the extent of funding. Such a move may or may not be good policy; but it is mistaken analysis to ignore its intergenerational redistributive effects.

These errors are not arguments against individual funded accounts as part of a pension system, but against assertions that such accounts are necessarily superior.

In an NDC system, a decline in w or wL will reduce the notional interest rate attributed to notional accumulations but, in contrast with the previous case, the decline does not affect the value of notional accumulations made before the macroeconomic turbulence started, so that the effect on accumulations is less acute than in the fully funded case. To the extent that accumulations made before the start of turbulence are protected, it follows that adjustment has to fall on the future value of the accumulations of current workers and hence on their future benefits, and on benefits being paid to current retirees. As the discussion of the Swedish 'brake' mechanism in section 3.4.1 illustrates, the effect can be large. To the

extent that the pension of a worker close to retirement is adversely affected, the main response is to postpone retirement.

In a defined-benefit system which fulfils past promises a decline in the wage base will reduce contribution revenues. In a private plan, the sponsor will have to make up any shortfall; once more, the cost of doing so can fall on any or all of current workers, shareholders and taxpayers, or future workers. In a public plan, the cost of making up any shortfall will fall on workers, through higher contributions, taxpayers and/or future taxpayers.

If economic turbulence is severe, however, plan sponsors and taxpayers may be unwilling or unable to meet the full costs of past promises. Thus many private defined-benefit plans are closing to new members, and being replaced by defined-contribution arrangements. State systems in the short run have generally maintained their promises in OECD countries, but as the solvency of the public finances is threatened, governments in many countries are taking action in the medium term to increase retirement ages, or adjusting indexation to make it more parsimonious. On the face of it, as already discussed, defined-benefit plans share risk more widely than defined-contribution plans, thus offering participants greater protection. The empirical question is whether in practice that protection is real or illusory – is defined-benefit really defined-benefit, or under pressure does it become more like defined-contribution.

3 Pension design and systemic risk in a second-best context

A fully-funded defined-contribution system adjusts benefits to match available funds; the same is true of an NDC pension plan that is in financial balance; thus adjustment is all on the benefit side. A defined-benefit system adjusts funds to meet anticipated obligations; thus adjustment is all on the contributions side.

Two aspects of the discussion in section 2 require fuller analysis:

- None of the simple systems uses the full range of instruments for adjustment;
- A first-best approach relies mainly on voluntary adjustments.

This section discusses (a) how pension design should make use of the full range of adjustments, (b) lessons from behavioural economics about the limitations of relying on

voluntarism, and (c) lessons about the desirability, but also the limitations of automatic adjustment. We discuss in turn optimal risk sharing (section 3.1), adjustment mechanisms in practice (3.2), adjusting to demographic risk (3.3) and adjusting to economic risk (3.4).

3.1 Optimal risk sharing

Gollier argues that '[b]y using their reserves efficiently, pension funds can smooth shocks in their asset returns, and can thus facilitate intergenerational risk sharing' (2008, Abstract). He sets out an optimal path of benefit adjustments on a rolling basis for any realisation of random variables. As early work in risk sharing, his analysis does not include adjustments in contributions, nor fluctuations in earnings. Like optimal taxation, this approach offers a powerful framework for analysis rather than a blueprint for practical policy. The discussion below makes no pretence at such generality, but explores the characteristics of different approaches to risk sharing.

The analysis does, however, incorporate one strategic argument: that adjustment should respect differences in risk aversion. Even where there is no age-related difference in people's utility functions, retirees have more limited options for adjustment. Workers have their human capital and also have more time to cushion shocks, for example by increasing their voluntary pension savings, and hence are better able to accommodate large adjustments. Among current workers, those closer to retirement have more constrained options for adjustment than younger workers. Adjustment in the face of systemic risk should accommodate age-related differences in the ability to adjust.

3.2 Pragmatic adjustment mechanisms

The starting point is to observe that many plans deviate from the pure cases. In the case of defined-contributions, corporate plans may allow workers to increase their contributions if returns on their pension savings are below expectations. The outcomes of individual accounts can be altered by government transfers (e.g. to protect the pension rights of unemployed workers), or by government guarantees. In addition, if there is a large drop in asset values or a pension fund fails, a government will face pressure to protect participants close to retirement.

When a defined-benefit plan faces financial difficulties, firms and governments adjust not only contributions but also benefits; as already noted, this type of flexibility is double-edged, and may be used well or badly. While governments typically have the power to change both benefits in payment and future benefits, legal restrictions usually limit the ability of private providers, provided the sponsor does not go bankrupt, to change accrued benefits (but not prospective benefits). In addition, some countries provide guarantees for employer pensions, shifting some of the risk to other firms through mandatory insurance contributions, as in the US and UK, and perhaps also to taxpayers if the insurance arrangement requires public subsidy. Insurance generally covers less than 100 per cent of a worker's benefits, so that current and future beneficiaries also face some of the risk.

One element in adjustment is whether it affects contributions or benefits. In the latter case, adjustment can operate via changes in the accrual rate, via changes in the rule by which pensions in payment are indexed, or both. Reducing the accrual rate reduces a worker's entitlement to pension in the future. Or the number of years necessary to qualify for a full pension in a defined-benefit system can be increased. Indexation of pensions in payment can also be made less generous, for example by indexing by less than the rate of price inflation if a pension plan is running a deficit. Gradual adjustment of this sort has two potential advantages: if habit formation is important (see Bovenberg et al., 2007, especially section 6.3), individuals find it easier to adjust consumption more gradually rather than instantaneously; and the approach also helps with macro-economic stabilisation.

Such deviations from the simple cases have been largely pragmatic. The rest of this section explores how such adjustments can be analysed more systematically.

3.3 Adjusting to demographic risk

3.3.1 Reducing benefits

In a defined-contribution system, at a given retirement age and with a given pattern and duration of saving, rising life expectancy means that a person's accumulation on average has to be spread over more years, and declining fertility, if it reduces the return on savings, reduces the size of a person's accumulation. The result, in both cases, is to reduce benefits at a given retirement age.

An NDC system, similarly, reduces benefits at a given retirement age. If the system is still not in balance, there can be further automatic reduction in benefits in line with changes in contribution revenues; we discuss this further below in the context of the Swedish 'brake' mechanism.

In Germany a person's pension is determined by the number of pension points he has accumulated (which depend, inter alia, on his earnings history and number of years of service) and the value of each point. Under a 'sustainability factor' introduced in 2005, the system adjusts the value of each point based on a combination of changes in wages and the age dependency rate, the latter reflecting changes both in life expectancy and in fertility and other influences on the size of the labour force.[9] This arrangement automatically reduces pension benefits to keep the system in financial balance. A deterioration in the sustainability factor means that pensions in payment will not be fully indexed to earnings growth. Its application affects all current workers and pensioners equally, since accrued rights and future accruals are changed proportionately.

In all these cases individuals can at least partly offset a reduction in pension benefits (and hence a reduction in consumption in retirement) by retiring later, saving more, or both. In a first-best world such decisions would be voluntary.

3.3.2 Extension 1: Raising the earliest eligibility age

As the literature on behavioural economics seeks to explain, many people retire as soon as they are allowed even if that condemns them or their survivors to elderly poverty. In the limit, therefore, in the face of demographic pressures, progressively larger actuarial adjustments to the level of benefits at a given earliest eligibility age lead to a continuing decline in a person's monthly pension. If there is an adequate first-tier pension, the issue is less one of inadequate poverty relief that of inefficient consumption smoothing. This line of argument suggests that there should be adjustment both to the level of benefit at the earliest eligibility age and to the earliest eligibility age itself, which latter should bear some sensible relationship to rising life expectancy. Designing such adjustment, however, is not simple. There are theoretical issues, empirical issues, and implementation issues.

[9] The dependency rate is measured as the ratio of 'standardised' beneficiaries to the number of contributors. The dependency ratio is 'equivalised', taking into account the fact that high-earning contributors pay more into the system than low earners.

THEORETICAL ISSUES. The choice of earliest eligibility age needs to balance a series of factors.

- People are living longer healthy lives, so that it makes sense to work longer rather than to consume less in retirement. This factor points to a higher eligibility age;
- Rising incomes make leisure in later life more affordable, and leisure is a superior good. This factor points to a lower eligibility age;
- The productivity of older workers, which is influenced by the speed of technological change and the availability of retraining, affects both the demand and supply of labour. The effects of this factor go in both directions: higher productivity raises the opportunity cost of leisure, but makes it more affordable;
- The operation of labour markets for older workers including, for example, EU legislation banning mandatory retirement, influences the likelihood that older workers will be able to find a job.

Thus the factors that determine how many workers gain and how many lose from raising the earliest eligibility age vary not only with increases in average life expectancy and the average level of earnings, but also with individual circumstances and decisions. The theory of what is optimal in the face of these factors has yet to be developed, though the argument for somewhat later retirement is strong. A simple rule making the earliest eligibility age proportional to life expectancy has advantages in terms of transparency but may be suboptimal in theoretical terms given the factors outlined above, and also because improvements in life expectancy tend to vary across income classes. These considerations suggest that eligibility age should rise by less than the increase in life expectancy.

A number of rules are possible.

- The UK Pensions Commission (2005) adopted as a rule of thumb that the increase in the state pension age should broadly maintain the current ratio of one year of retirement for every two years of work, so that pension age should rise by 8 months for every increase in life expectancy of one year. The problem with this approach is that it takes no account of the effect of rising incomes on desirable retirement age.

- A variant of this rule would relate to healthy life expectancy rather than total life expectancy.
- A different approach would raise eligibility age by enough to keep the contribution rate constant. This approach imposes all the adjustment on the benefits side.

EMPIRICAL ISSUES. There are also empirical problems, notably the accuracy of projections of life expectancy. Even if such projections are on average accurate in the long run, history suggests that significant deviations from trend are likely in the short- and medium term. In 1981, official UK projections suggested that male life expectancy at 65 in 2004 would be 14.8 years; the outcome was 19 years, a 28 per cent error. Thus there is a widening funnel of doubt about future outcomes. If legislation includes adjustment factors, they will generally not match actual outcomes. It is, of course, always possible to change the adjustment factors. But legislating change may be difficult, especially during a crisis, so there are advantages if a system is able, at least up to a point, to respond to uncertain outcomes as they happen.

Once more, there is no perfect arrangement.

- One approach is a system that adjusts benefits on the basis of actual changes in mortality. In Sweden this is done by using historic mortality data in calculating pensions, with no adjustment for anticipated improvements after a cohort has retired. With rising life expectancy, this arrangement imposes the cost of adjustment on workers.
- Another approach is through year-by-year adjustments based on year-by-year changes in mortality. With rising life expectancy, this arrangements shifts the cost of adjustment onto retirees.
- A third approach is to base benefits on projections of life expectancy. This approach works best where projections are – and are widely perceived to be – analytically sound and politically unbiased. If life expectancy rises more rapidly than projected, this arrangement shifts the cost of adjustment onto taxpayers, workers and/or retirees depending on how the resulting deficit is made up.

IMPLEMENTATION ISSUES. Should eligibility age be increased by an automatic mechanism or not? Given the theoretical and empirical issues just discussed, an automatic rule on its own

will not be enough. Thus, for example, the system in Canada includes automatic changes, delayed for a period to allow a legislative alternative. Or variation from the default rule should be on the basis of recommendations from a non-partisan commission. The procedure of such a commission, including the process of choosing its members and the criteria against which it makes its decisions, should be set out in advance.

Once a government has decided to adjust pension benefits and eligibility rules regularly, the adjustment should be phased in carefully, as explained in Box 5.

Box 5 Principles for adjusting pensionable age

If benefits and eligibility are to be adjusted for mortality changes, automatic adjustment should be based on three principles.

- The rules should relate to date of birth, not to the date of retirement; otherwise there will be a wave of retirements just before any reduction in the generosity of benefits goes into effect.
- Changes should be made annually, to avoid large changes in benefit levels across nearby cohorts. Large changes are inequitable and politically difficult, since benefits could differ significantly between people born in successive years, sometimes only days apart. The combination of large changes and rules determined by date of retirement would exacerbate the inefficient incentive to early retirement.
- As far as is sensible, rules for changing benefits should be explicit. Automatic adjustment with explicit rules leads to greater predictability and decreased political pressure. Automatic adjustments may function better if based on actual mortality outcomes rather than projections. Nevertheless, as with the indexation of income tax brackets, there always remains the option of legislation to change whatever the automatic rules produce.

The legislated increase in women's pensionable age in the United Kingdom, announced in 1991, illustrates all three of these principles. The key date is April 6, 1950. For women born before that date, the state pensionable age will continue to be 60. The pensionable age for a woman born on May 6, 1950 (one month after the key date) was 60 years and one month, which occurred in 2010, 19 years after the legislation, for a woman born on June 6, 1950, 60 years and two months, and so on. For women born on or after April 6, 1955, the pensionable age will be 65.

Source: Barr and Diamond (2010*a*, Box 5.4)

3.3.3 Extension 2: Adjusting both benefits and contributions

Thus far adjustment to demographic risk reduces a worker's pension and hence his consumption in old age or, if he responds by saving more, his consumption during working life. In all these cases, the cost of demographic change falls on the individual. A mechanism that shares the cost of increasing life expectancy more broadly (Diamond and Orszag, 2005, Ch. 5) is a life expectancy adjustment: in each year calculate the increase in the cost of pensions caused by the increase in life expectancy; decrease future initial benefits to cover part of the cost, and raise contributions (i.e. the tax rate) to cover the remainder. The cost sharing could be 50:50, or some other division, depending, inter alia, on the existing level of contributions which, for a given level of benefits, depends not only on mortality but also on fertility rates. The optimal division between changes in contributions and changes in benefits will be influenced by the cause of financial pressure. With shocks in the rate of return, adjustment will fall both on contributions and benefits; with financial pressures from increased healthy life expectancy it is reasonable to expect more of the changes to be absorbed on the benefits side, for example through later retirement.

3.3.4 Extension 3: Intergenerational risk sharing

The adjustments to fully-funded systems share risks between current participants. A partially-funded system,. for example a partially-funded defined-benefit system, can share risks more broadly, with potential welfare gains. This line of argument suggests that if a plan has a shortfall from its desired level of funding, the speed with which the shortfall is addressed should be optimised, not maximised. The dilemma in a private defined-contribution plan is that the gains from a slower return to full funding need to be set against the risk that the plan may fail, for example if the sponsor goes out of business. In a state scheme, the risk is that of government failure. The speed of adjustment is one of the central topics in section 3.4

3.4 Adjusting to economic risk

Increasing life expectancy and declining fertility are generally long-run trends, making it possible to adjust gradually. In contrast, macroeconomic turbulence tends to arrive at short notice and the effects can be large. For both reasons, additional adjustment mechanisms are necessary.

3.4.1 Adjusting NDC pensions

It is helpful to start with discussion of automatic adjustment in Sweden before turning to broader discussion of ways of adjusting NDC pensions.

THE SWEDISH 'BRAKE' MECHANISM adjusts benefits in the Swedish NDC system when the system is not in financial balance. Box 6 describes the system.[10]

Box 6 The balance mechanism and brake in the Swedish NDC system

In Sweden's NDC pension system, a worker's notional accumulation is scheduled to increase each year by an interest rate of *w*, the rate of growth of average earnings. Pensions in payment are indexed each year by $w - 1.6\%$, where 1.6% is intended to represent the long-run growth of real wage rates. So long as real wages grow as projected, accumulations rise in line with the real wage rate, and pensions in payment in line with long-run average price change.

Solvency is tested by comparing the assets and liabilities of the system. The Balance Ratio, BR, is defined as

$$\frac{\text{Contribution asset + buffer funds}}{\text{Pension liabilities}}$$

where: The contribution asset, calculated as a 3-year moving average, is intended to capture the present value of projected contribution revenues, based on recent data; and

Pension liabilities, also calculated as a 3-year moving average, are a measure of the present value of the flow of pensions due to current retirees and current workers, also based on recent data.

The system is designed to adjust the default arrangement automatically if sustainability is projected to be a problem. As the definition of the ratio makes clear, key drivers of sustainability are the growth of employment, which affects contributions, and the performance of financial markets, which directly affects the value of the buffer fund. The methods of measuring contribution assets and pension liabilities in the balance ratio has a critical bearing on the operation of automatic adjustment.

When the balance ratio is less than one, a 'brake' is automatically applied, whereby the accrual rate of workers' accumulations and the indexation of pensions in payment are both reduced below the growth rate of earnings. Specifically, both accruals and the indexation of pensions in

[10] For a summary, see Sundén (2009) and Swedish Pensions Agency (2009), and for more detailed discussion, Könberg et al. (2006), Palmer (2002), Settergren (2001) and Bovenberg (forthcoming). On automatic balancing mechanisms more broadly, see Vidal-Melia, Boado-Penas, and Settergren (2009).

payment are based not on *w*, but on (1+*w*)BR-1, and these lower rates of indexation continue until financial balance is restored. If the balance ratio moves above one, there is catch-up for the period with a lower ratio. In contrast, the discount rate used to calculate a person's annuity at retirement does not change.[11] For fuller discussion, see Sundén 2009.

Though this is not the place for detailed discussion of the Swedish mechanism, some criticisms assist better design of automatic adjustment.

- Adjustment is all on the benefits side: the brake reduces benefits if contributions fall or the return to the buffer fund declines. In addition, there is no upward adjustment for higher contribution revenues later. Though there is no long-run effect on the average level of benefits, for some period benefits fall below their long-run trajectory.
- The adjustment can be large: the mechanism in Box 6 implies a reduction in real benefits in Sweden in 2010 of 4.6 per cent (Sundén, 2009, Table 2), rather than adjusting gradually. Not least for this reason, as discussed in section 4.2, the full adjustment was not applied.
- The reduction in benefit could last for a long time, although there is no long-term experience yet.
- The adjustment applies both to accruals and to benefits in payment. Thus the previous two factors are important, since a reduction of pension benefits occurs at a time when the individual has little or no time to adjust.

These problems suggest lessons for policy design, discussed further in section 6.

WAYS OF ADJUSTING NDC PENSIONS. There are in principle four sets of parameters which can be adjusted to keep an NDC system in long-run balance: the notional interest rate, which affects the accrual rate of current workers and hence their initial benefit; the indexation rule for benefits in payment; earliest eligibility age; and the contribution rate. The appropriate response depends on whether there is an immediate need for an improvement in net cash flows or whether the issue is one of long-run sustainability.

[11] Annuities are calculated using an annuity divisor determined by life expectancy and an interest rate of 1.6 per cent, as an estimate of long-run real wage growth.

Adjusting the interest rate: automatic adjustment of the notional interest rate is a sensible response to projected problems of long run sustainability. One way to make such adjustment is in terms of the balance ratio, as in Sweden, with both a reduction and a catch-up provision. The role of projections is important. The greater the independence of the actuarial office responsible for projections and the greater the public acceptance of those projections, the greater the space for discretionary policy. In contrast, the less the perceived independence and the less the public acceptance, the more important it is to have exact rules.

Adjusting benefits in payment: adjusting the interest rate addresses long-term sustainability in response both to demographic and economic outcomes. It is, however, not good policy to place sole reliance on this instrument. Benefits in payment require separate consideration since retirees have less time to adjust by working more or increasing other forms of pension saving and hence are less able to bear risk than younger workers. The fact that retirees have a more limited range of ways to adjust does not imply that they should necessarily always be fully protected, but does suggest that they should as far as possible be protected from sharp short-run shocks. One approach is to protect benefits in payment where the adjustment is to long-run trends, and to consider reducing benefits only where there is a severe short-run cash-flow problem. The latter will happen only in the face of serious turbulence to a system with only a small buffer stock. In that case it might be necessary to cut benefits, but with a limit to the size of any real decrease.

Increasing earliest eligibility age: automatic adjustment of the earliest eligibility age in an NDC system does not help to contain pension spending given quasi-actuarial adjustment, but increases the replacement rate at a given age, and hence may be an appropriate way of offsetting the effects of a medium-term reduction in the interest rate, for example as life expectancy rises.

Adjusting contribution rates: it may be appropriate to adjust contribution rates as well as benefit levels when adapting the system. As life expectancy increases, there will be a quasi-actuarial reduction in benefits. In a first-best world, a worker could fully offset the decline in benefits by choosing to retire later, depending, inter alia, on his or her health and productivity and labour markets for older workers. In practice, as noted earlier, for reasons that behavioural economics addresses, many people retire as soon as they are allowed even if it leads to poverty in old age. Thus it is unlikely that the quasi-actuarial reduction in benefits

will be fully offset by delayed retirement, so that the typical replacement rate will fall. In a system where contribution rates are not too large, a possible response is an automatic increase in contributions. For example, each year there could be a calculation of the increase in contribution rate needed to preserve the replacement rate of a new cohort of workers in the light of projected increased life expectancy, assuming that a fraction, say two-thirds, of the decline in the replacement rate is offset by longer careers.[12] Recall that higher contributions automatically result in higher benefits for those facing higher contributions. Thus on a rolling basis, contributor rates would rise over a person's working life to avoid the complexity of different contribution rates for workers of different ages.

3.4.2 Adjusting private defined-benefit plans: the case of the Netherlands

Alongside the citizen's pension in the Netherlands is a system of occupational pensions, which are required to be funded.[13] The system has evolved over the years in the face of financial pressures.

- In 1998 about one-quarter of workers were in career-average defined-benefit plans and about two-thirds in final-salary plans.
- In the early 2000s there was a move from final pay to career average, which reached three-quarters of the work force by 2004, and a smaller move to defined-contribution plans.
- As a response to stricter funding requirements and declining financial returns, there was a restructuring of pension plans, with automatic reduction in the generosity of indexation of benefits – both the accrual rate for workers and of benefits in payment – if funding fell below a threshold, and with some increase in contributions, the extent of adjustment depending on the solvency of each fund.

At the end of 2008, the main characteristics of the system were as follows (Kortleve and Ponds 2010).

- A uniform accrual rate across all workers in a plan;
- A uniform contribution rate for all workers in a plan;

[12] Diamond and Orszag (2005, Ch. 10) suggest a similar approach for adjusting the US social security system.

[13] For a summary, see Kortleve and Ponds (2010), and for fuller discussion, Kortleve and Ponds (2009) and Ponds and van Riel (2009).

- A uniform mix of assets;
- A uniform indexation rule for all participants in a plan: a typical plan indexes with the wage growth of the industry or company; some plans index pensions during build up in this way but pensions in payment in line with price inflation. Crucially, the actual indexation rate depends on the solvency of the plan.

Since funding helps to smooth adjustments by providing a financial buffer, Dutch pensions fell less during the economic crisis than pensions under the Swedish 'brake' mechanism. However, Kortleve and Ponds (2010) report that between September 2008 and February 2009 the fraction of plans with funding below 105 per cent (the threshold at which under-indexation began) rose from 12 per cent of plans to 85 per cent, calling into question the sufficiency of these adjustments. Because of the resulting doubts about the robustness of the system, the 2010 Spring Accord moved closer to a defined-contribution arrangement.

The Pension Accord of Spring 2010 identified two core problems, the absence of adjustment to rising life expectancy, and the fact that the system was insufficiently shockproof, and recommended a series of reforms to the citizen's pension and occupational plans.

- A ceiling on contributions.
- Strengthening the citizen's pension, at the same time increasing the eligibility age to 66 in 2020 and to about 67 in 2025, with actuarial adjustment for someone who starts benefit later than the eligibility age.
- Analogously, the earliest eligibility age of occupational pensions should rise in response to increasing life expectancy, together with flexible retirement and actuarial adjustment where a person delays taking benefit.
- A separate line of reform was to discuss how to change the indexation rules to reduce nominal guarantees, making pension rights more dependent on financial market outcomes, so as to make the system more resilient to macroeconomic shocks.

Thus there have been two waves of reform. In the middle of the decade, the Netherlands modified a defined-benefit system with all adjustment on the contributions side into one where adjustment takes place also on the benefits side. That arrangement shared

risks among workers, employers, and pensioners more broadly than in either a conventional defined-benefit system (where the risk in a simple plan falls on the employer) or a conventional defined-contribution plan (where the risk in a simple plan falls on the worker). In the second wave of reform proposals, almost all adjustment is on the benefits side. In that sense, the changes are starting to look like the move in other countries, for example, the UK, from defined-benefit to defined-contribution, with risks borne increasingly by current participants, and less by employers or future generations.

3.4.3 Adjusting public defined-benefit plans

In a defined-benefit system, for example, a system of social insurance which is not allowed to borrow, the effects of macroeconomic turbulence fall on workers, whose contributions have to rise to pay promised benefits. Depending on the pension formula (e.g. how pensions are indexed), some risk can fall also on pensioners. In either case, however, risk can be pooled only among current participants.

In contrast, if legislation permits the social insurance fund to accumulate a surplus or borrow to finance a deficit, it becomes possible to share risks more widely across cohorts. Where such activity is well done, there is a potential welfare gain from wider risk sharing, for example the Norwegian Government Petroleum Fund (Norway Central Bank 2009) uses some of the revenue from oil taxation to build up an accumulation as a buffer against demographic change, thus providing some tax smoothing. On the other hand, the political risks might be larger than in a system where contributions are required to cover benefits. Legislation can change the rules of the game, which is an advantage with good government but courts the risk of government failure, Thus – the fault line discussed in Box 3 – the question recurs whether, as an empirical matter, political discretion is an additional risk or an insurance mechanism against unanticipated shocks. Since outcomes can be influenced by political choices the distribution of risks is not clear.

4 The financial and economic crisis

Space, time and expertise preclude a systematic comparative overview of how different systems performed. The aim of this section is more modest – to offer a selection of relevant examples, first describing the effect of the financial and economic crises on different types of

pension system and then, in sections 4.2 and 4.3, setting out early responses and subsequent responses, respectively.[14]

4.1 What happened

OECD (2009; see also Pino and Yermo 2010) makes the distinction between the financial crisis, whose major effect was on public and private pension funds, and the economic crisis, whose major effect was a decline in output and hence a shrinking contributions base for PAYG pensions

PRIVATE PENSIONS. Private pension funds across the OECD countries experienced a nominal loss of 21.4 per cent in 2008, (in real terms a loss of 24.1 per cent) (Pino and Yermo, 2010, p. 17), partly compensated by rising equity prices in 2009. The stock market crash of 2008, on top of that at the start of the decade, meant that equity performance over the decade as a whole was poor. Defined-benefit plans faced a two-fold ill-effect: the decline in market valuations created or enlarged fund deficits; and the decline in interest rates, used as the risk-free discount rate, increased the measured size of those deficits.

Individual funded accounts. The most visible effect was on workers whose retirement income comes largely from individual accounts, as in the USA. Such pensions typically rely heavily on stocks, so that the large fall in stock values greatly reduced the retirement funds of many workers. For those near retirement the fall in asset values led to delays in planned retirement for many workers with the opportunity to continue working. Workers without such opportunities retired at a much lower income than anticipated. Some workers who had already retired returned to work, while others remained in retirement but with greatly reduced resources. See Sass, Monk and Haverstick (2010).

The impact on workers and retirees also depended on the extent to which they had public and private defined benefit pensions that were sustained. Munnell and Muldoon (2008), report that in the USA between 9 October 2007 and 9 October 2008,

> 'the value of equities in retirement accounts declined by almost $4.0 trillion. Individuals were sheltered from the immediate impact of the $1.9 trillion of losses in

[14] For detailed discussion of initial responses, see OECD (2009) or, more briefly, D'Addio and Whitehouse (2010).

> defined benefit plans [from $4.4 trillion in October 2007]. But they did experience a direct hit on the $2.0 trillion in losses that occurred in 401(k)s and IRAs [from $4.7 trillion in October 2007]. In all likelihood, many panicked amid the turmoil and sold assets at depressed prices. And these people may be late in getting back into the market to enjoy gains as the market recovers. Equally important, holders of 401(k)s/IRAs were left feeling vulnerable and impotent as their savings evaporated. The question this crisis raises is whether pension participants need to be protected from this type of gut-wrenching volatility' (p. 3).

Funded occupational plans. There was also a major impact on the funding of defined-benefit pensions that were meant to be fully funded, particularly in the USA and the Netherlands. As noted, Munnell and Muldoon report that defined-benefit plans in the USA lost $1.9 trillion of their value a year earlier of $4.4 trillion, about half of the loss arising in private plans and half in state and local government plans. Kortleve and Ponds (2009), report that in the Netherlands,

> 'from 2007 onward, the funding ratio fell dramatically, from a high of 150 percent in mid-2007 to less than 90 percent in the first quarter of 2009. The drop resulted from the combined effect of the worldwide fall in stock prices and the fall in nominal interest rates, which drove up the (market) value of the plan's nominal liabilities' (p. 2).

This decline in funding has led to widespread revisions of defined-benefit plans, which have reduced anticipated benefits.

PUBLIC PENSIONS. A major effect of the economic crisis for public pensions was to reduce contributions and increase the demand for income-tested benefits. In addition, public social security trust funds faced large losses in 2008. Among high-income countries with a diversified portfolio of assets in their trust fund, the largest loss was nearly 31 per cent of fund value in Ireland, the smallest 16.4 per cent in Finland. Pino and Yermo (2010, p.12) point to the exposure to equity risk in those countries. Some of the loss was made up during 2009. In contrast, the US social security system, whose Trust Fund is wholly invested in US government bonds, made no loss.

Naturally the stock decline had less of an impact on partially-funded systems, although the ensuing large recession affected such plans as well. For example, in Sweden,

> 'The balance ratio was close to 1.0 through 2007. In 2008, the balance ratio fell – for the first time – below 1.0 [to 0.9672, i.e. a drop of 3.28 per cent]. The main reason for the large deficit was the sharp decrease in equity prices during the fall of 2008. The buffer funds experienced a negative return of 21.3 percent' (Sundén, 2009, p. 2).

That is, a decline in the value of the buffer fund contributed to a 3.28 per cent drop in projected assets relative to projected benefits. Someone claiming benefits one year after the application of the brake faced a 3.28 per cent fall in benefits that year. In addition benefits in payment grow more slowly until the balance ratio is restored, after which benefit growth could speed up. In contrast, if a 21.3 per cent decline in the value of assets experienced in the Swedish system were to occur in an individual DC account for someone on the verge of retirement, the result would be a 21.3 per cent drop in benefits at retirement and in each later year.

Since US Social Security was fully invested in US Treasury bonds, the stock market decline had no effect on its financing, though the recession did. Comparing Trustee Reports, the actuarial deficit in the 75-year projection is 1.70 per cent of taxable payroll in the 2008 report (relative to the 12.4 per cent payroll tax), and 2.00 per cent in 2009. This measure indicates the change that would be needed over the 75-year period as a whole if financed by an immediate increase in the rate of payroll tax.

OUTCOMES. Given earlier discussion, the strategic conclusions in an OECD assessment (2009, Table 1.1) of early outcomes should not be surprising.

- Deleterious effects were stronger for older workers and pensioners than for younger workers.
- Deleterious effects were stronger in defined-contribution plans, especially where exposure to risky assets was greater and where annuitisation is compulsory. At least initially, effects were more moderate in private defined-benefit plans and public PAYG systems, which have wider options for addressing deficits. Later responses are discussed shortly.

- Deleterious effects in the short run were stronger in countries which had (a) greater reliance on defined-contribution pensions, (b) poorer investment performance and (c) less well-developed safety nets. Thus pensions were hit hard in a country like Mexico, which scored badly on all three elements. There was more protection in the short run in countries like the Netherlands, with a fairly high citizen's pension, discussed further in section 5.1, and a well-managed and substantial buffer fund, though – precisely because the system could limit short-run shocks, the long-run effects are likely to be substantial.

It should be remembered, however, that systems that gave relatively more protection to older workers and pensioners gave relatively less protection to other groups, including current and future workers. In terms of the Netherlands, van Ewijk writes (2009, p. 349) that:

> '… the distributional effects of … policies are highly skewed. The older generations, in particular the cohorts born just after World War II, are hurt excessively by the shock of the crisis, losing up to almost 15% of consumption during their remaining life time. This contrasts with the younger generations who lose hardly any pension wealth. Even if one takes into account that younger generations are hit in their human capital—here taken at 3% on a life time basis—this does not balance with the losses of the older generations.'

These findings illustrate the earlier argument that it is difficult to reduce aggregate risk; policy is mostly about choosing between different ways of sharing risk.

4.2 Early responses

In broad brush terms, public pensions responded in two phases.

- In the immediate aftermath of the crisis, there were three sets of responses: little change in the structure of state pensions; higher government spending on social protection; and higher government borrowing to finance the extra spending.
- A second phase saw more radical reform, given rising levels of government deficit and the resulting pressures from financial markets.

Early responses included:

HIGHER BENEFITS. Some countries increased the level of benefits or announced future increases. Australia, Belgium, France, Spain and the UK increased the minimum retirement income. Finland will introduce a new safety-net old age income in 2011, 23 per cent higher than the existing benefit.

NON-APPLICATION OF AUTOMATIC ADJUSTMENTS. Some countries introduced discretionary modifications to the automatic adjustment mechanism in their systems. In Sweden, the balance ratio fell below one for the first time in 2008, calling for automatic adjustment in 2010, reflecting the lags in both calculation and implementation. The brake mechanism described in Box 6 implied a reduction of pensions in payment by 1.3 per cent because of slow wage growth, amplified by application of the balancing mechanism, so that the full effect would have been a reduction of pensions in payment by 4.6 per cent (Sundén, 2009, Table 2).

> The policy response was rapid:
>
> 'The balance ratio was published in March 2009 and, almost immediately, the five political parties that stand behind the pension reform – known as the Pension Group – started to discuss whether to propose smoothing the adjustment of pension benefits (+4.5 in 2009 and -4.6 in 2010). In particular, the group discussed if it was reasonable that the stock market crash should affect NDC benefits so much. The Pension Group suggested that, instead of using the market value of the buffer funds, a three-year average should be used to value the funds' (Sundén, 2009, p. 3).

After some debate, the government, supported by the Pension Group, went ahead with the proposal, passing legislation in October 2009.

As discussed earlier, the system in Germany has a sustainability factor which automatically adjusts the value of a pension point for changes in wages and the dependency rate. The optimistic economic outlook at the time that the sustainability factor was introduced in 2005 led the government to legislate increases 0.6 to 0.7 percentage points greater than specified in the rules in 2008 and 2009. And in mid-2009 legislation established a pension guarantee ('*Rentengarantie*') which prevents reductions in nominal pensions in the face of declining wages (see Börsch-Supan, Gasche, and Wilke, 2010).

ONE-OFF PAYMENTS AS PART OF STIMULUS PACKAGES. Australia introduced a one-off payment of AUD 1,000. Greece, the UK and the USA had similar policies, which often extended beyond the elderly.

REDUCED SOCIAL INSURANCE CONTRIBUTIONS, for example in the Czech Republic, Germany, Japan and Spain, had two motives: to reduce employer costs in the hope of encouraging employment, and to increase the net earnings of workers.

ALLOWING EARLY ACCESS TO SOME RETIREMENT SAVINGS. Some countries (e.g. Denmark and Iceland) allowed individuals early access to their pension savings, an option already allowed in Australia in specific circumstances such as to prevent foreclosure of a family's mortgage. Though such a policy protects current family income and stimulates demand during recession, it increases the risk of future elderly poverty, particularly given the large losses in private pension funds.

Given the way that private pensions operate, most adjustment lagged the immediate impact of the crisis.

4.3 Subsequent responses

4.3.1 Public pensions

The initial response – no structural reform, but higher pension spending – was an understandable crisis response, but unsustainable given the effects of the recession on government revenues. In countries where doubts about government solvency were greatest, financial markets added pressure to accelerate reforms in public systems as a counterpoint to political reluctance to reduce spending sharply. Responses were various.

The OECD (2009, p. 79) support the view that 'one of the key motives for pension reform has been to improve the long-term financial sustainability of pension systems.' Thus many countries, though not all, reduced benefits.

Lower benefits in payment have been implemented in different ways.

ACROSS THE BOARD CUTS took place in Austria, Finland, Germany, Italy, Japan, Korea, Portugal and Turkey. 'Gross pension entitlements for people under the reformed rules will be an average of 22% lower for full-career workers than under the pre-reform rules in these countries. The largest cuts, of around 40% will be in Korea and Portugal, with more modest changes of 10-25% in the rest of this group' (*ibid*.)

CUTS THAT PROTECT LOW EARNERS. Cuts in France, Mexico and Sweden largely or wholly protected low earners from benefit cuts which affected others. In France and Sweden, the cuts are around 20 per cent for workers with average earnings, but only about 5 per cent for those with low earnings. This policy direction emphasises the poverty relief function of pensions.

STRENGTHENING THE RELATION BETWEEN CONTRIBUTIONS AND BENEFITS. This policy direction, in contrast, emphasises the consumption smoothing purpose of pensions. Reforms in Hungary, Poland and the Slovak Republic weaken the redistributive features of the system as well as reducing benefits. Low-earning workers in Poland and the Slovak Republic face benefit cuts of 25 per cent and 13 per cent, respectively; the comparable figures for workers on average earnings are less than 5 per cent.

Alongside lower benefits in payment were cuts in future benefits.

LESS GENEROUS INDEXATION. Some countries, made the rules about accrual rates more parsimonious, either explicitly or by increasing the number of years of contributions necessary for a full pension. Indexation of pensions in payment can also be made more parsimonious. For example, the UK is proposing to move indexation of the state pension from the retail price index to the consumer price index, the effect being to reduce the rate of increase of pensions.[15]

HIGHER ELIGIBILITY AGE. In many countries, retirement ages are being increased. As discussed in Box 5, under 1991 legislation, the UK is in the process of raising women's

[15] The Consumer Price Index (CPI) is based on the HCIP (Harmonised Consumer index prices), a measure which complies with standards throughout Europe. The Retail Price Index (RPI) differs in a number of ways: (a) The RPI includes mortgage interest payments. Thus if interest rates are cut, the RPI will fall but not the CPI. (b) The RPI also includes other housing costs not included in the RPI council tax and some other housing costs not included in CPI. (c) The CPI includes some financial services not included in the RPI. (d) The CPI is based on a wider sample of the population for working out weights.

retirement age from 60 to 65, to equalise that of men. Legislation in 2007 raised the state pension age from 65 to 66 in 2024, and to 67 in 2034. As a result of the crisis, the government has announced an accelerated timetable, whereby from December 2018 the state pension age for both men and women will start to increase, to reach 66 by April 2020. The government is also considering the timetable for future increases to the state pension age from 66 to 68.

In the Netherlands, an element in the Spring Accord of 2010 is to increase the earliest eligibility age for the citizen's pension to 66 in 2020 and to 67 in 2025, with a parallel increase for occupational pensions. Denmark and Germany have also passed legislation raising normal pension age gradually to 67 or 68, and the Czech Republic and Hungary are moving normal pension age to 65. Alongside increases in normal pension age, several countries, including Finland, are proposing to increase the age at which early retirement is allowed.

However, not all countries cut benefits. Higher pensions arise for a variety of different reasons. As discussed below, the state pension age is set to increase in the UK, which will allow people to build a larger entitlement. The same is true in the Czech Republic. In Australia and Norway benefits are set to increase because membership of private pensions has been made mandatory.

4.3.2 Private pensions

Under the Spring Accord of 2010 in the Netherlands, already discussed, the earliest eligibility age for occupational pensions would rise with that for the citizen's pension, together with flexible retirement and actuarial adjustment where a person takes benefits later. In addition, there will be consideration of adjusting the indexation rules so that pension rights are more dependent on financial markets, making the system more resilient in the face of shocks but exposing participants to more risk.

Private, funded defined-benefits plans in many countries, facing large deficits, have considered a range of responses. These include a move from defined-benefit to defined-contribution, for example by closing the defined-benefit arrangements to new entrants or, more stringently, preserving the acquired defined-benefit rights of current participants but

with future contributions by current participants being put onto a defined-contribution basis. In most countries such moves have been a response to longer-term trends, notably greater life expectancy, rather than to the economic crisis. However, the crisis may accentuate the trend.

Another approach has been to make indexation less generous. The replacement of the Retail Price Index by the Consumer Price Index as the basis of indexation for the UK state pension was noted earlier. It is proposed that occupational plans should also make that change.

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It is interesting to speculate on how to interpret what is happening. The optimist's view is that pension systems adjusted initially as a Keynesian response to the crisis, with subsequent adjustment to restore sustainability. A less rosy view is that over the medium-term the financial and economic shocks, coming on top of adjustment to demographic change that has been postponed for too long, will cause a long-term structural shift towards funded defined-contribution arrangements. This is exactly the fault line discussed in Box 3. The lessons from recent experience are taken up more fully in section 6.1.

5 Policy directions

In considering lessons for pension design, a starting point is to note that there is no single best pension system (Barr and Diamond, 2009, Box 5). Thus the discussion that follows is not – because it cannot be – a single optimum recipe, but a series of ingredients on which reforms may draw.

5.1 Addressing elderly poverty

Over the past half century people's relationship with the labour market has become more diverse, an implication being less complete contributions records. In addition, family structures have become more fluid, so that basing a woman's entitlement to pension on her husband's contributions (whether or not it was ever desirable) is no longer feasible.

These economic and social changes underpin the argument for a non-contributory, citizen's pension paid on the basis of age and residence rather than of contributions, as in the Netherlands, New Zealand, Australia, Canada and Chile. A citizen's pension strengthens poverty relief in terms of coverage and adequacy, with advantages in terms of gender

balance. Proposals to strengthen the citizen's pension in the Netherlands Spring Accord 2010 have already been noted.

The connection with systemic risk arises in several ways.

- Poor people have less of a cushion against downward shocks, particularly the elderly, who have fewer options and less time for adjustment than younger people. It is thus important to sustain the poverty relief element of pensions in the face of systemic risk.
- A larger first-tier pension reduces the relative importance of the second-tier pension.
- The citizen's pension can adjust to demographic change in parallel with changes to the second-tier pension, for example through a matching increase in the earliest age of eligibility, as proposed in the Netherlands.
- Being tax financed, the pension can share the risks of economic turbulence with future generations through government borrowing, though the ability to do so will depend on economic conditions.

5.2 Redefining retirement

We have already discussed why part of the response to demographic change is an increase in earliest eligibility age.

Alongside the argument for later retirement is the separate argument for more flexible retirement. Individuals have different tastes and face different constraints. Thus it is welfare-enhancing to offer choice and flexibility over the move from full time work to full retirement. Flexible retirement would be good policy even if there were no problem in paying for pensions. Separately, flexible retirement options, by giving workers another margin of adjustment, is another way of sharing risk.

5.3 Consumption smoothing: simple, low-cost savings plans

A third lesson, drawing on information economics and behavioural economics, is that reduced choice can be welfare enhancing.

LESSONS FROM INFORMATION ECONOMICS. Choice and competition are beneficial when consumers are well informed. In the case of pensions, there is considerable evidence that consumers are extraordinarily badly informed. A survey found that 50 per cent of Americans did not know the difference between a stock and a bond. Most people with a funded individual account do not understand the need to shift from equities to bonds as they age. Very few people realise the significance of administrative charges.

LESSONS FROM BEHAVIOURAL ECONOMICS. Simple economic theory predicts that people act rationally, and so will save voluntarily for their old age. What actually happens is very different.

- Procrastination: people delay saving, or do not save, or do not save enough.
- Inertia: with automatic enrolment many more people stay in the pension plan.
- Immobilisation: if a person has to make a choice, particularly one that he does not understand, a likely result is to do nothing.

Thus there is considerable divergence between what simple economic theory predicts and what actually happens. Behavioural economics helps to explain why (Barr and Diamond, 2008, Box 9.6).

IMPLICATIONS. The conclusion from these literatures is that there is good reason to be sceptical about the gains from individual choice in mandatory accounts, suggesting a number of lessons.

- It is useful to make membership mandatory or to use automatic enrolment.
- Constrained choice is welfare enhancing.
- A good default option is necessary for people who make no choice.
- It is desirable to decouple account management from the investment decision, and to centralise all record keeping to keep administrative costs down.

The US Thrift Savings Plan (www.tsp.gov) for federal civil servants is an example of this approach. Workers are auto-enrolled and choose from about five funds, e.g. an equities fund, a government bonds fund, etc. There is centralised account administration to keep costs low, and wholesale management of funds in the private sector, where the firm concerned has to manage an identical portfolio for its private clients, thus providing some insulation against

political interference. The arrangement simplifies the choice for workers, respecting information constraints, and keeps administrative costs low.

The UK is introducing a similar system, summarised in Box 7, from 2012, in essence a low-cost funded individual account similar to the Thrift Savings Plan.

Kiwisaver individual accounts in New Zealand, introduced in 2007, is a variant of this approach, and the first example of automatic enrolment on a national scale. Automatic enrolment is reinforced by a government match for contributions up to a ceiling plus a one-off payment when the account is first opened. The combined effect of these factors was considerable. In 2007, 13 per cent of workers belonged to an occupational plan and 5.5 per cent to a personal plan. KiwiSaver achieved coverage of 44 per cent within its first year of operation, about three-quarters of which were through occupational provision, the rest through personal plans. For further detail, see Rashbrooke 2009.

Box 7 The National Employment Savings Trust in the UK

A new pension arrangement, the National Employment Savings Trust (NEST), established under the UK Pensions Act 2008, will provide a low-costs savings vehicle, particularly for low-to-moderate earners (http://www.nestpensions.org.uk/).

- From 2012 all eligible workers will be automatically enrolled either in NEST or another qualifying occupational scheme.
- The reforms will be introduced in stages, starting with the largest employers.
- When fully phased in, the minimum contribution will be 8 per cent of earnings, comprising contributions of 4 per cent from the worker, 3 per cent from the employer and 1 per cent in tax relief, with a maximum total contribution of £3,600 per year (indexed to earnings).
- A participant's savings pot is portable. Thus there is no continuing administration for employers when a member leaves their employment. Where a worker changes job, contributions in the new job can be added to his/her existing retirement savings pot. And more than one employer can contribute to a member's savings pot.

The lessons from the economics of information and behavioural economics apply also to the decumulation phase, suggesting that mandatory annuitisation of at least part of a worker's accumulation becomes a relevant option. This is the case with the UK NEST pensions[16], but not with the Thrift Savings Plan.

5.4 Consumption smoothing: NDC

The Thrift Savings Plan approach is one way to organise consumption smoothing. Another is through an NDC system that is partially funded to provide a buffer. Such plans can have a range of advantages. They are simple from the viewpoint of workers, and centrally administered, so with low administrative costs. With a sufficiently large buffer of partial funding, they can smooth the volatility of capital markets.[17] Indeed, Peter Diamond and I have argued that in the context of China, individual accounts make a lot of sense, but do not have to be funded; instead, we argue for notional accounts (see Barr and Diamond 2010*b*).

NDC systems adjust to increasing life expectancy by actuarially reducing the pension at the earliest eligibility age. The brake mechanism in the Swedish system provides some automatic adjustment, but that adjustment (a) falls entirely on the benefits side, as in any defined-contribution system, (b) can be sharp and (c) of fairly long duration, (d) falls on benefits in payment as well as accruals, and (e) even so, may not bring the system back into financial balance. The next section discusses lessons for pension design.

6 Conclusions

6.1 Main lessons

Earlier discussion suggests lessons for designing pensions to respond to systemic shocks.

PENSION SYSTEMS SHOULD CONTAIN A WIDE RANGE OF AUTOMATIC ADJUSTMENT TO DEMOGRAPHIC CHANGE. Some such design is already in place. NDC pensions reduce pensions actuarially in respect of increased life expectancy. Demographic adjustment in the

[16] Very small accumulations can be taken in cash; otherwise it is obligatory to annuitise at least 75 per cent of the accumulation by the age of 75. At the time of writing, the government was consulting about a new arrangement, from April 2011, which would give investors the freedom to choose between taking their pension assets as a lump sum or as drawdown income. Under the proposals an individual who satisfies a minimum income level, will be able to draw down unlimited amounts from his or her pension pot.

[17] Note the requirement for a large buffer fund. Pensioners in the fully-funded system in the Netherlands were more protected in the immediate aftermath of the crisis than those in the Swedish NDC system.

German system reduces pensions in respect of rising life expectancy and the size of the labour force, the latter addressing changes in fertility. All such adjustment, however, falls on monthly benefits. What is needed in addition is some automatic adjustment of the earliest eligibility age to rising life expectancy. Policy makers might regard one year of retirement for each two years of work as a feasible and desirable long-run average; thus eligibility age could rise by 8 months for every one-year increase in life expectancy at that earliest eligibility age. Since the contributions base expands as people work longer, such an increase may be sufficient to keep contributions broadly constant.

Though such indexation may not be analytically optimal, it has several advantages: it is simple, hence transparent; it would transform political expectations, in particular so that retirement age is regarded as a variable rather than a parameter; and if anything, it errs on the side of parsimony – if economic conditions permit policy makers could apply a smaller increase in the eligibility age.

ADJUSTMENT SHOULD EMBRACE BOTH BENEFITS AND CONTRIBUTIONS. Where a plan is in deficit, reducing benefits imposes the risk on pensioners and higher contributions imposes it on workers. Unless there are good reasons for doing otherwise, adjustment to a current or prospective deficit should involve both benefits and contributions. In that sense, the system in the Netherlands during the economic crisis was like the Swedish brake, but with adjustment also on the contributions side[18]; as noted earlier, Diamond and Orszag (2005, Ch. 10) suggest this approach for adjusting the US social security system.

Where such adjustment takes place, there are gains if downward and upward adjustment are broadly symmetrical, so as to restore lost pension and/or reduce contributions when conditions allow.

DEFAULT INDEXATION SHOULD BE DESIGNED CAREFULLY. As the default, contributions during working life should generally be indexed to the rate of growth of real wages. Benefits in retirement should be indexed to prices (many countries), wages (many plans in the Netherlands, at least until recently), or a weighted average of price and wage inflation (for example, Finland). There may need to be temporary movement away from these defaults in

[18] As noted earlier, the 2010 Spring Accord moved away from this arrangement, since the proposed ceiling on contribution rates places adjustment on the benefits side.

the face of adverse economic conditions. In some countries, the Netherlands being one, indexation is conditional on financial performance.

There are many examples of faulty indexation (see Barr and Diamond, 2008 Boxes 5.6 and 5.8 for problems in the US and UK, respectively); and the Swedish approach to indexing pensions in payment also has problems (Barr and Diamond, 2008, p. 76).

ADJUSTMENTS SHOULD TAKE ACCOUNT OF THE LIFE CYCLE. Sharp downward adjustment in indexation may be appropriate for younger workers, but adjustment should avoid sudden large shocks, particularly for pensioners and workers close to retirement. This may imply a longer period before solvency is restored. This argument applies even if the underlying utility function of an older person is no more risk averse than that of a younger person; but with less time to adapt, the welfare loss from a given adjustment will be larger for an older person. The implication is not that pensioners should necessarily be protected from all risk, but that they should be exposed to less risk than younger participants. For example, if pensions in payment are indexed 20 per cent to wages and 80 per cent to prices, a fall in real wages will impact on pensions in payment, but with only 20 per cent of the effect on the rate of accrual of benefits of younger workers.

ADJUSTMENTS SHOULD REFLECT THE TIME HORIZON OF ANY SHOCK. In considering adjustment mechanisms, it is useful to distinguish two circumstances. One is a temporary problem, for example caused by a sharp fall in asset values. Responding promptly is important because it is not clear how long the problem will last, but with a catch-up provision as the economy recovers. In contrast, where there are concerns about the long-run sustainability of a system, a less generous system may be needed permanently, which will generally require legislation.

A central question is whether adjustment that is appropriate for a temporary shock is also appropriate for a sustained period of stringency, perhaps because the growth of the labour force is slower than anticipated when the system was being designed. The experience with automatic adjustment in Germany, the Netherlands and Sweden suggests that even the most carefully-designed automatic mechanisms face problems. This issue highlights one of the roles of periodic review:, the last of the lessons discussed here.

AN AUTOMATIC MECHANISM WILL NOT SUFFICE IN ALL CIRCUMSTANCES. The previous discussion suggests two reasons why automatic adjustment, though highly desirable, will not always be sufficient:

- Severe short-run turbulence may exceed the economically and politically acceptable tolerance of the automatic mechanism; or
- Long-run developments may cumulatively have the same effect, noting particularly that over the longer-term pension systems have to adjust not only to changing economic and demographic circumstances, but also to changing social needs.

For either reason, it is likely that a country will at some time need some discretionary action to supplement a rules-based system. It is therefore desirable to include a mechanism for discretionary action as part of legislative design, not as later crisis response.

A minimalist approach would incorporate automatic adjustment, but implemented with a lag to allow a legislative alternative. The system in Canada has this feature. This approach, however, has the disadvantage of being party political.

An alternative approach is through a periodic independent review which would consider adjustment to either short- or long-run developments. Its remit should include:

- Contributions and benefits: the review could recommend potential adjustments to the rules for the accruals rate, to the discount rate used to calculate a worker's initial benefit, to the indexation of benefits in payment, and to the contribution rate.
- Eligibility age: the remit should also include the option of deviating from the automatic adjustment of the earliest eligibility age, an issue of sustainability as far as the citizen's pension is concerned, and of desirable replacement rates in a defined-contribution or NDC pension.
- Changing social needs: a recent example in many countries is the ability of unmarried partners to share pension accumulations in the same way as married couples.

The review is intended to guard as much as possible against government failure in the form of postponing necessary adjustment, or of phasing it in on a slow timetable determined by short-run politics rather than prudent long-term management of the pension system. To

that end, two features are important. First, the review should meet at legislatively-specified times, say every five years. Secondly, it should be non-party-political and independent, for example with the status of a Presidential Commission or Royal Commission.

IN SUM. The strategic questions about adjustment are (a) for whom, (b) how fast, and (c) at which margins? Good design suggests that policy to accommodate demographic change and economic fluctuations should consider adjustments both of benefits and contributions, and should be phased to avoid abrupt changes, particularly for older workers and pensioners.

6.2 What implications for the Dutch pension system?

It is useful to discuss separately the implications of earlier discussion for the system in the Netherlands, and lessons from the Netherlands for other countries.

IMPLICATIONS FOR THE NETHERLANDS. It is clear that pension arrangements in the Netherlands already have many desirable elements of adjustment to systemic risk.

- The system is based on a citizen's pension which is high enough to provide effective poverty relief and for which eligibility is based on residence rather than contributions.
- The most recent agreement includes a formula for increasing the earliest eligibility age both for the citizen's pension and occupational pensions as life expectancy increases, with an actuarial increase for a delayed start to benefit.
- The system of occupational pensions used to be mainly defined-benefit, thus sharing risk more broadly than a system of individual accounts, though recent changes move the system more towards a collective defined-contributions system, and the 2010 Spring Accord almost completely so.
- The system has been able to protect pensioners and older workers from excessive sharp shocks.
- The system has adjusted to demographic change and macroeconomic turbulence, previously by adjusting both benefits and contributions, but in the latest agreement between social partners through adjustment on the benefits side. Policy makers have explicitly asked the right question – how should risk be shared?

Thus the system offers useful lessons in risk sharing. An additional desirable form of adjustment could easily be incorporated. Adjustment could (and should) be sensitive to the life cycle. As discussed, the cost of a given adjustment is more costly in welfare terms the less time there is to adjust. Thus, for example, there could be different funds for younger workers and older workers, the balance between equities and bonds shifting towards bonds for the older group. Or there could be an age-related indexation rule, with full, or almost full, price indexation of pensions in payment.[19]

IMPLICATIONS FOR OTHER COUNTRIES. The system in the Netherlands is highly sophisticated, both in a static context (e.g. the way that occupational pensions are the subject of agreement by the social partners), and in the way that it has adjusted to systemic risk, in particular the rather rapid evolution from final salary to career average defined-benefit, then to a hybrid in which adjustment falls not only on the contributions side but also on pensions in payment, and finally, through a ceiling on contributions, to a system that looks more like a collective defined-contribution arrangement, with retirement age linked to longevity.

Separately, defined-benefit plans create problems of labour mobility, at least across industries if not across firms. To the extent that the system moves closer to defined-contribution, the mobility problem becomes less acute, but at the price of less wide risk sharing.

But the fact that a system which uses 'soft' rights to maintain solvency works well in the Netherlands does not mean that it can be replicated in other countries. There are path dependencies. The Netherlands is a relatively homogeneous country; and the political culture allows effective dialogue between social partners. Neither of those necessarily apply to other countries, for whom the main lesson of the Netherlands is that in the face of systemic risk pension design should make use of the full range of adjustment mechanisms.

[19] See, for example, Kortleve and Ponds (2009).

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