9 Consumption smoothing: Old-age pensions

'You are old, Father William,' the young man said,
'And your pension has almost run out;
And yet you insist that funding is safe
It's no wonder you're all up the spout.'
'In my youth', Father William replied to his son,
'They told me my savings would grow;
But, now that I'm perfectly sure I have none,
I'd prefer you to Pay as I Go.'
(With apologies to Lewis Carroll)

1. Introduction and institutions

The previous chapter discussed benefits whose major purpose is to offer insurance. This chapter discusses old-age pensions, one of whose central roles is consumption smoothing, as analysed in the simple Fisher model in Chapter 4, Section 3.2.[1] Pensions also contribute to some of the other objectives in Chapter 1, Section 2.2. They can assist vertical redistribution. Like other contributory benefits, they can strengthen social solidarity. The relative terms on which men and women receive pensions (e.g. whether there is a common retirement age) raise important issues of horizontal equity.

Questions broadly parallel those of Chapter 8. Section 2 discusses different methods of organizing pensions, and their pros and cons. The efficiency and equity arguments for state intervention, and the effects of different types of intervention, are analysed in Sections 3 and 4. The state old-age pension and related benefits are assessed in Section 5.

THE STATE SCHEME. The 1975 Social Security Pensions Act (UK DHSS 1974) was one of the most important pieces of social-security legislation since the National Insurance Act 1946 (Chapter 2, Section 5), and, as subsequently amended, is the basis of the arrangements described here.

The contributions side was discussed in Chapter 7, Section 2.1. To qualify for a full pension, an individual must generally have contributed for at least forty-four years (men) or forty years (women). Where this requirement is not met, pension is awarded on a sliding scale. *Home-responsibilities protection* ensures that years spent by a parent at home

[1] Another element of consumption smoothing, student loans, is discussed in Chapter 14.

looking after children or a disabled dependant will not result in loss of pension. Thus a woman who drops out of the labour force for fifteen years to look after children has to work for only twenty-five years (i.e. 40–15) to qualify for a full pension.

On the benefits side, the major provisions of the 1975 Act may be summarized as follows, noting subsequent amendments, and in particular a number of important changes (motivated by cost containment) for people retiring after 2000.

1. The weekly pension comprises the flat-rate *basic component* and the *earnings-related* component, also referred to as the state earnings-related pension scheme (SERPS).
2. The basic component for a single person is about one-fifth of national average earnings.
3. For people retiring after 2010, the earnings-related component for someone with a full contributions record is calculated as 20 pence of pension per pound of pensionable earnings between the lower and upper earnings limits. The pension was formerly based on the individual's best twenty years, but for people retiring since 2000 is based on the person's entire contribution record.
4. The same pension formula applies to men and women. Pensionable age is 65 for men and 60 for women. An increase in women's pensionable age will be phased in from 2010, leading to a common pensionable age of 65 by 2020.[2]
5. A man receives an increase in his pension if he is married unless his wife has a pension in her own right, in which case she receives the full pension to which she is entitled on the basis of her earnings. Where a couple has two contribution records, the surviving spouse inherits half of his or her partner's earnings-related pension.
6. The basic pension is uprated in line with price increases. The earnings-related component is protected in two ways. First, the earnings on which the pension is calculated are revalued each year in line with the general movement of earnings, so that the earnings-related pension, when first awarded, reflects a person's *real* earnings record. Secondly, the earnings-related component, once in payment, is uprated each year in line with price increases.
7. The pensions of people who work beyond pensionable age are increased by 7.5 per cent (in real terms) for each year by which pension is deferred.
8. Membership of the flat-rate scheme is compulsory. It is possible to contract out of the earnings-related component by belonging to a private scheme—either an occupational pension or a personal pension. Since 1995 (another important change), approved occupational and personal pensions must offer *limited price indexation*—that is, must index pensions for annual rates of inflation up to 5 per cent. The central topic of pensions in the face of inflation emerges repeatedly in subsequent discussion.

[2] Under the reforms, the key date is 6 April 1950. For women born before that, pensionable age will continue to be 60. Pensionable age for a woman born on 6 May 1950 (i.e. one month after the key date) would be 60 years and one month, for a woman born of 6 June 1950, 60 years and two months, and so on. Thus for women born on or after 6 April 1955 pensionable age will be 65.

Many people receiving a national-insurance pension are also eligible for additional income-tested assistance, such as the pension credit and housing benefit (Chapter 10).

PRIVATE PENSION SCHEMES vary widely but are broadly of two sorts: *occupational schemes*, generally organized by employers, and *personal pensions*. Private pensions in industrialized countries share key features. Almost all are *funded*.[3] They are *supplemental*, in that they replace only part of the state pension. They are *constrained* in two ways: individual choice, particularly under occupational schemes, is generally limited; and pension companies are regulated to protect consumers. Virtually all private pension schemes are *subsidized* on a substantial scale through tax expenditures. Finally, though an increasing number of schemes offer *limited indexation*, virtually none offers complete protection against inflation.

The coverage of private pensions has grown substantially over the years. By 1991, half of all UK employees, including a growing number of women, belonged to an occupational scheme. Employers can choose whether or not to offer occupational pensions in place of the state earnings-related scheme; and, where an occupational scheme exists, employees can choose whether to join or, instead, to have their own personal pension, either run by a financial institution or, even more individually, self-managed.

2. Methods of organizing pensions

THE ECONOMICS OF PENSIONS can be confusing, because writers easily become bemused by their *financial* aspects (i.e. analysis of insurance companies' portfolios of financial assets). I shall try to simplify matters by concentrating on the essential *economic* issues (i.e. the production and consumption of goods and services).

From an individual viewpoint, the economic function of pensions is consumption smoothing. By contributing to a pension scheme, an individual consumes today less than she produces, so as to continue to consume when she has retired and is no longer producing. In principle, an individual can transfer consumption over time in two ways, and in *only* two ways: she can store current production; or she can acquire a claim to future production.

One way to ensure future consumption is to set aside part of current production for future use—for example, by digging a hole in one's back garden and adding to its contents each year tins of baked beans, shoelaces, and soap powder. Though this is the only way Robinson Crusoe could guarantee future consumption, the method has major inefficiencies. Storing current production is costly in terms of the potential return to savings forgone, and also because storage costs for many commodities are high. A second problem is uncertainty—for example, about what quantities to store, what new goods might become available, and how one's tastes might change. Thirdly, some services can be transferred over time by storing the physical wealth that generates them (e.g. it is possible to store housing services by being an owner-occupier); but it is not possible, even in principle, to store services deriving from human capital, medical services being a particularly important

[3] i.e. pay benefits out of a previously accumulated fund, as explained in detail in Section 2.

example. Organizing pensions by storing current production on a large scale is therefore a non-starter.

The alternative is for individuals to exchange current production for a claim on future output. There are two ways in which I might do this: by saving part of my wages each week I could build up a pile of *money* that I would exchange for goods produced by younger people after my retirement; or I could obtain a *promise* that I would be given goods produced by others after my retirement. The promise could be from my son ('Don't worry, dad, I'll look after you when you're old'), or from government. The two most common ways of organizing pensions broadly parallel these two sorts of claim on future production. So-called *funded* schemes follow the first; *Pay-As-You-Go* (PAYG) or unfunded schemes the second.[4]

FUNDED AND PAY-AS-YOU-GO SCHEMES. In a funded scheme, contributions are invested in financial assets, the return on which is credited to its members. When an individual retires, the pension fund will be holding all his past contributions, together with the interest and dividends earned on them. This usually amounts to a large lump sum that is converted into an annuity (Chapter 5, Section 2.3)—that is, a pension of £*X* per year. Funding, therefore, is simply a method of accumulating money, which is exchanged for goods at some later date. Most occupational schemes are of this type.

Funded schemes take many forms, of which two in particular should be distinguished. Under a *defined-contribution* scheme, the contribution rate is fixed, so that a person's pension is determined *only* by the size of the lump sum accumulated during working life. As discussed in Chapter 5, Section 2.3, insurance protects the individual against the risks associated with longevity, but leaves her facing those associated with varying real rates of return to pension assets, including:

- the risk that her pension portfolio will do better or worse, depending on (*a*) overall economic risk and (*b*) the potential for managerial slack; and
- the risk that unanticipated inflation after retirement will exceed whatever indexation provisions the pension offers.

Under a *defined-benefit* scheme, usually run at a firm or industry level, the firm promises to pay an annuity at retirement. In so-called final-salary schemes, the annuity depends on the employee's wage in her final year (or final few years) of work and upon length of service (a typical formula is one-eightieth of final salary per year of service, up to a maximum of forty years). In another form of defined benefit, the relevant wage is not final salary but an average over a longer period. Whatever the wage reference period, the annuity is, in effect, wage indexed until retirement. The employee contribution is generally a fraction of her salary. Thus, the employer's contribution becomes the endogenous variable. In a defined-benefit scheme, it is the firm or industry that bears the risk in the face of unanticipated changes in the real rate of return to pension assets.[5]

[4] There are other ways of organizing pensions. The so-called *book* method makes advance provision for pensions on the company's balance sheet in the same way as provision is made for other deferred liabilities (e.g. future tax payments). Money is not transferred out of the company (as with funded schemes) but is retained for use by the company. At the same time a reserve is set up in the balance sheet to reflect the estimated liability. In *cash* terms there is little difference between book reserving and Pay-As-You-Go.

[5] For comparison of defined-benefit and defined-contribution schemes, see Bodie et al. (1988).

Occupational schemes can be either defined benefit or defined contribution; individual pensions are all defined contribution. Funded schemes of both sorts have two major implications: in principle they always have sufficient reserves to pay all outstanding financial liabilities (since an individual's entitlement is simply his past contributions plus the interest earned on them); and a representative individual, or a generation as a whole, gets out of a funded scheme no more than he has put in—that is, with funding, a generation is constrained by its own past savings. Other implications emerge throughout the chapter.

Pay-As-You-Go (PAYG) schemes are usually run by the state. They are contractarian in nature, based on the fact that the state need not accumulate funds in anticipation of future pension claims, but can tax the working population to pay the pensions of the retired generation. Almost all state pension schemes are PAYG.

From an economic viewpoint, PAYG can be looked at in several ways. As an individual contributor, my claim to a pension is based on a promise from the state that, if I pay contributions now, I will be given a pension in the future. The terms of the promise are fairly precise; they are set out in each country's social-security legislation. From an aggregate viewpoint, the state is simply raising taxes from one group of individuals and transferring the revenues thereby derived to another. State-run PAYG schemes, from this perspective, appear little different from explicit income transfers.

The major implication of the PAYG system is that it relaxes the constraint that the benefits received by any generation must be matched by its own contributions. Samuelson (1958) showed that, with a PAYG scheme, it is possible in principle for *every* generation to receive more in pensions than it paid in contributions, provided that real income rises steadily; this is likely when there is technological progress and/or steady population growth.

PRELIMINARY COMPARISON. PAYG schemes have important advantages. First, they minimize impediments to labour mobility, since pension entitlement depends on earnings and years of service but not on how many jobs a person has had. Secondly, full pension rights can be built up quickly, since pensions are paid not by one's own previous contributions, but by those of the current workforce. Thirdly, PAYG schemes are generally able to protect pensions in payment against inflation and, fourthly, they can generally increase the real value of pensions in line with economic growth.

Table 9.1 illustrates the latter two points. In period 1 the total income of the workforce is £1,000, so that a contribution rate of 10 per cent yields £100. Suppose by period 2 prices and earnings have risen by 100 per cent (column 2). A contribution of 10 per cent now yields £200, which has a purchasing power of £100 at the old price level, and so maintains the real value of pensions in the face of inflation. Alternatively, suppose (column 3) that economic growth raises earnings to £2,000, while prices stay at their original level. In this case the 10 per cent contribution rate has a *real* yield of £200, and so it is possible to double the real value of pensions.

Against these undoubted advantages must be offset the problem that PAYG is sensitive to any change in the age structure of the population that reduces the workforce relative to the number of dependants. The key variable is the so-called age dependency ratio,

$$\frac{P}{W}, \tag{9.1}$$

Table 9.1. Financing a Pay-As-You-Go pension scheme in the presence of inflation and growth

Income, contributions, and real pensions	Period 1 (1)	Period 2 (inflation) (2)	Period 2 (growth) (3)
1. Total income of workforce	£1,000	£2,000	£2,000
2. Price index	100	200	100
3. Pension contribution rate	10%	10%	10%
4. Available for pensions	£100	£200	£200
5. Real value of pensions (=[row (4)/row (2)] × 100)	£100	£100	£200

where P is the number of pensioners and W the number of workers. Influences like increased longevity raise the number of pensioners, and longer education reduces the size of the workforce. Lowering the retirement age simultaneously reduces the workforce and increases the number of pensioners. Finally, as we shall see, any large 'bulge' in the birth rate can cause serious difficulties.

Another claimed disadvantage of PAYG finance is that it makes pensioners dependent on the future workforce. This is true. But, as we shall see in Section 3.2, the same is true of funded schemes. In both cases pensioners are dependent on future generations, since both schemes build pensions round claims on future production rather than by storing current production.

The disadvantages of funded schemes tend to mirror the advantages of PAYG. The formula of defined-benefit occupational schemes tends to favour long-serving workers. This is a deliberate feature of such schemes (see Hannah 1986) to encourage loyalty and help the management of internal labour markets, but it has the effect of impeding labour mobility. Secondly, it takes a long time to build up full pension rights, because it takes an individual many years to build up a lump sum sufficiently large to generate an annuity that will support him fully in retirement. Thirdly—and fundamental to any discussion of funded schemes—there is the issue of inflation, discussed shortly.

Against these disadvantages, it is often claimed that funding has the major advantage of being insensitive to changes in the dependency ratio. The argument is that a funded scheme always has sufficient resources to pay the pensions of its members, since the present value of a representative pension stream exactly equals past contributions plus interest. It is true that a funded scheme will have sufficient resources to pay all *money* claims against it; but it does *not* follow that funding, on that account, offers pensioners better protection against demographic change. This controversial topic is addressed in detail in Sections 3.2 and 5.1.

PENSIONS AND INFLATION. Inflation is particularly relevant to defined-contribution schemes. It is important to distinguish (*a*) pensions in build-up, when contributions are still being paid, and (*b*) pensions in payment. Defined-contribution schemes can generally cope with inflation during the build-up of pension rights, and with a given rate of *anticipated*

inflation once the pension is in payment. But they do not cope well with unanticipated post-retirement inflation. The reason is straightforward. A pensioner under a funded scheme builds up over his working life a lump sum, which he exchanges upon retirement for an annuity. The present value of an actuarial annuity equals the lump sum. From equation (5.11) the annuity thus depends on the lump sum, and on the *real* rate of interest facing the insurance company (i.e. the excess of the nominal interest rate over the rate of inflation). Two cases need discussion.

- *Certainty*: if inflation is 5 per cent each year with certainty, it is an easy matter to offer an annuity that rises by 5 per cent each year. Inflation is no problem.
- *Uncertainty*: as discussed in Section 3.1, inflation is a common shock and thus an uninsurable risk. A possible way out where inflation is purely domestic is to hedge through an internationally diversified portfolio of pension assets. Another escape route, from the insurer's perspective, is to offer limited indexation. If the limit is 5 per cent, then, so far as the insurer is concerned, the situation is similar to the certainty case above—the risk of inflation beyond 5 per cent is transferred to the pensioner.

The conclusion is that, once pensions are in payment, private, defined-contribution schemes can cope with limited inflation (i.e. can offer indexation up to some pre-specified level). But they face major problems with inflation beyond that level. The point is much more than academic. The price index in the UK in January 1974 was 100; in September 1978, in the wake of the first oil shock, it was 200. With 5 per cent indexation, pensions would have increased from 100 to about 133, rather than to 200. Pensions in payment would have lost one-third of their value. Two points are noteworthy: the loss is permanent—in contrast with pensions during build up, there is no opportunity to make up any of the lost ground; and, with rising life expectancy, people are retired today for many more years than previously.

The relative ability of PAYG and funding to cope with inflation is due less to the method of finance *per se* than to the fact that in many instances only the state can guarantee indexed amounts. Funded schemes can cope with inflation if their assets are indexed by the state—for example, where the state sells indexed gilts or where it underwrites directly the indexation component once funded pensions are in payment. However, the part of the return that compensates for inflation is paid out of current tax revenues—that is, on a PAYG basis. More generally, any receipts of funded schemes deriving from current tax revenues, whether the return to indexed government bonds[6] or the tax advantages they currently enjoy, constitute a PAYG element in such schemes.

3. Efficiency arguments for state intervention

Section 3.1 discusses efficiency aspects of public-versus-private provision, and Section 3.2 looks at the PAYG-versus-funding controversy. Social justice is discussed in Section 4.

[6] See the Glossary.

3.1. Public-versus-private provision

Efficient consumption smoothing requires that individuals buy the *socially* efficient *real* level of pension. The three major policy issues are why people would voluntarily contribute to a pension scheme, why the state makes membership compulsory, and why it provides retirement pensions itself.

In a world of certainty, including certainty about one's life expectancy, consumption smoothing takes place through saving. In practice, however, people do not know how long they will live and so a mixture of saving and insurance (i.e. the purchase of an annuity) is generally more efficient. Thus a rational, risk-averse individual will join a pension scheme so long as its net cost does not exceed the value of the certainty he thereby derives (Chapter 5, Section 2.1). Membership is compulsory because of the external costs that arise if an individual does not buy pension rights (Chapter 8, Section 2.1). The issue of public provision is more complicated. The private market provides pensions efficiently only if the standard assumptions of perfect information, perfect competition, and no market failures hold. Potential problems on the demand side were discussed in Chapter 5, Section 4.1. A central issue is whether buyers of a technically complex financial instrument are well informed. On the supply side, it is necessary to consider separately the five technical conditions (Chapter 5, Section 3) that must hold if the private market is to supply insurance efficiently.

The probability of living to a given age for pensioner A is independent of that for pensioner B, and is known and less than one. Data on mortality rates are generally reliable in all industrialized countries. Nor is there any problem of adverse selection—by and large people do not know when they are going to die. Moral hazard is not a problem either; suicide is costly to the individual, and works in the insurance company's favour.

The initial conclusion, therefore, is that there is no technical problem with private pension provision. This, however, overlooks inflation. Consumption smoothing, as its name implies, relates to a future consumption bundle—that is, to the *real* value of a person's pension. This can occur without intervention only if the private market can supply insurance against unanticipated inflation. Such insurance is not possible for two reasons.

- The probability distribution of different future levels of inflation is unknown.[7]
- Inflation is a common shock. The probability of pensioner A experiencing a given rate of inflation is *not* independent of that for pensioner B—the rate of inflation facing one pensioner will (by and large) face them all.

Inflation is therefore an uninsurable risk. Thus pensioners cannot insure each other. To what extent might they be able to find protection through some other mechanism—for example, by buying assets whose value keeps pace with inflation? That would be possible without intervention if real rates of return were independent of inflation. As an empirical matter, this is not the case. The dependence is partly the result of distortions elsewhere (e.g. non-indexed tax systems), which could in principle be corrected. However, where an inflationary shock represents other adverse movements in the economy, no private

[7] Inflation is not a problem for car repairs, for example, because automobile insurance, unlike pensions, is financed by *current* premiums.

agency can offer a complete hedge against inflation. Bodie's survey (1990: 36) points out that 'virtually no private pension plans in the US offer automatic inflation protection after retirement'.

The conclusion is that private pensions can offer limited indexation, as discussed in Section 2, but protection beyond that must ultimately come from government. Thus there is an efficiency argument, at a minimum, for state intervention to assist private schemes with the costs of unanticipated inflation once pensions are in payment. The state is able to offer such a guarantee because it can use current tax revenues on a PAYG basis. This will introduce a PAYG element into even the purest funded scheme. It should be clear that an indemnity against inflation, if publicly provided, is not true insurance (because it cannot be), but a form of tax/transfer. Since efficient consumption smoothing requires individuals to make decisions about the real value of the pension they purchase, and since the appropriate guarantees against inflation can be given only by the state on a PAYG basis, there is a cast-iron efficiency argument for at least some public involvement with pensions. Whether this should stop at the provision of inflation indemnities for private schemes, or whether the state should step in to provide pensions itself on either a PAYG or a mixed funded/PAYG basis, is an open issue upon which most of the rest of the chapter has a bearing.

3.2. Funding versus Pay-As-You-Go: Theoretical arguments

Having established the case for at least some public involvement, the next question is whether any state scheme should be funded or PAYG and, in particular, the relative merits of the two methods in the face of demographic change.

THE DEMOGRAPHIC PROBLEM is analysed by Barr (1979, 2002*a*), on which this section draws.[8] The root of the problem (Figure 9.1) is the peak in the birth rate in the 1940s, followed by the larger bulge in the 1960s in which more than ten million babies were born. These cohorts of 'bulge' babies will retire between 2010 and 2030, and will have to be supported in old age by the smaller succeeding generations. Specifically, in 1991 about 16 per cent of the population was 65 or over; the projected figure for 2041 is 24 per cent. The problem is not unique to the UK. A startlingly similar pattern exists in the USA, in most of the EU countries, and also in Australia, New Zealand, and Japan.[9]

How relevant is funding to the problem? The widely held (but false) view that funded schemes are inherently 'safer' than PAYG is an example of the fallacy of composition.[10] For *individuals*, the economic function of a pension scheme is to transfer consumption over time. But (ruling out the case where current output is stored in holes in people's

[8] The analysis is similar in spirit to Samuelson (1958).

[9] This is a remarkable fact. Why should countries as different as Denmark (Protestant and highly industrialized) and Italy (Catholic and with some less industrialized parts) have a similar pattern of birth rates? Australia, which escaped much of the recession of the 1970s, nevertheless had a declining birth rate. And Japan faces the same problem despite large differences in religion, social organization, and patterns of industry. No one has yet given a satisfactory explanation.

[10] It is a fallacy of composition to assume that because something is true for an individual it will *necessarily* be true on aggregate. For instance, if I stand on my seat in the theatre I will get a better view, but if everybody does so nobody will get a better view.

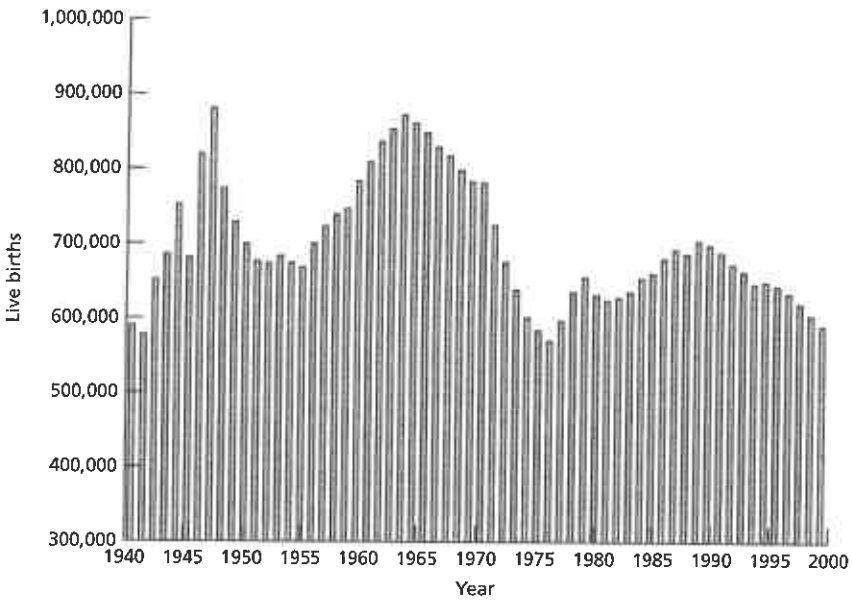

Fig. 9.1. Live births per 1,000 population, 1938–2001
Source: UK Government Actuary's Department.

gardens) this is not possible for society as a whole; the consumption of pensioners as a group is produced by the next generation of workers. From an *aggregate* viewpoint, the economic function of pension schemes is to divide total output between workers and pensioners—that is, to reduce the consumption of workers so that sufficient output remains for pensioners. Once this point is understood, it becomes clear why PAYG and funded schemes, which are both financial mechanisms for dividing output between workers and pensioners, should not fare very differently in the face of demographic change.

THE SIMPLE MODEL highlights the argument under strong assumptions, which are subsequently relaxed. These simplify the analysis without substantially altering the conclusion. They are:

1. Output per head remains constant over time, and is the same whether pensions are funded or PAYG.
2. The number of workers remains constant.
3. Wages are fixed in real terms, pensions in nominal terms.
4. There is no trade with other countries.

The simplest case is illustrated by the first column of Table 9.2. There are 10 workers who produce an output of 1,000. Assume that there are no taxes, so that workers receive the whole of their output; and assume that each unit costs £1. Now suppose that workers use 900 units of output for current consumption, and set the remaining 100 units aside for their retirement. Pension provision can take two forms. Workers can sell 100 units of

Table 9.2. Output and consumption with workforces of different sizes

Size of workforce, output, and consumption	Period 1 (1)	Period 2 (constant productivity) (2)	Period 3 (doubled productivity) (3)
Size of workforce	10	5	5
Total output = total income of workforce	1,000	500	1,000
Workers' consumption	900	450	900
Workers' non-consumption	100	50	100

Note: Output is measured in physical units.

output for £100 to the current generation of pensioners, who are able to buy it with their own past savings. The current generation of workers saves the money, and uses it when it retires to buy the non-consumption of the then workforce. This, at its simplest, is how funded schemes operate.[11] Alternatively, in a PAYG world, 100 units of output are transferred from workers to current pensioners via a 10 per cent tax on the workforce, so that it can afford to consume only 900. When the current workforce retires, it in turn receives 100 units of output.

Under the stated assumptions both schemes can continue indefinitely and both lead to the same three conclusions.

- Pensioners can consume only what workers produce but do not consume.
- Pensioners always depend on succeeding generations to provide the labour to produce the goods which they consume.
- Under the stated assumptions PAYG and funding lead to identical results.

THE EFFECTS OF A DECLINE IN THE WORKFORCE. The previous assumptions stand, except that the labour force halves, as shown in the second column of Table 9.2. With output per worker unchanged (by assumption) output halves to 500, and workers' consumption to 450, leaving 50 units for pensions. Under PAYG, the 10 per cent tax mentioned above leads to exactly this result. With a funded scheme matters are more complicated. The current pensioner generation is the previous workforce of 10 in column 1, which has accumulated sufficient funds to buy an output of 100 at the initial price of £1 per unit. If the saving behaviour of workers does not change, total spending will be £450 by workers on current consumption, plus £100 by pensioners from accumulated funds. The total of £550 is greater than the value at current prices of output of 500: though pensioners get their £100 in *money* safely transferred to their retirement, they will not necessarily receive 100 units of *consumption*.

In economic terms, if there is a large accumulation of pension funds when the workforce is declining, the high level of spending by pensioners out of their accumulated

[11] In practice things can be more complicated: contributions can come from employers and the government as well as from workers; and contributions may not be entirely at the expense of workers' consumption. These factors complicate the analysis but do not change the logic of the underlying argument.

savings will reduce the rate of saving in the economy. Pensioner consumption is greater than saving by workers (i.e. the excess of workers' production over their consumption at current prices); and at full employment this causes demand inflation, which erodes the purchasing power of pensioners' accumulated funds, and hence their consumption. The precise mechanism of this inflationary process is spelled out in Barr (1979), which shows that, if the labour force halves, then, under the stated assumptions, output will halve, the price level will double, and pensioner consumption will halve. In the extreme, it does me no good to accumulate a huge fund if on the day I retire the last worker flies to Australia—I will have plenty of ten pound notes, but no mechanism for transforming them into consumption.[12]

RELAXING THE ASSUMPTIONS. Suppose first that workers' wages are not necessarily indexed, nor pensions necessarily fixed in money terms. If the labour force halves (the other assumptions remaining in force), output will halve (column 2 of Table 9.2). This output can be divided between workers and pensioners in different ways; but their joint demand is constrained by total supply. The relative shares of the two groups will depend on such factors as their political and bargaining strengths—that is, whether pensioners are more powerful lobbying for current tax revenues (PAYG) or as the owners of capital. There is no difference of principle between the two methods, only a practical issue.

Suppose, next, that productivity doubles, but is unaffected by the method of pension finance. If the other assumptions still hold, a smaller workforce of 5 can now produce the same output as previously produced by 10 (column 3). Workers can consume 900, leaving 100 for pensioners. The system is in equilibrium, in this case because supply has adjusted. In a world of funding, the growth in output makes possible sufficient extra saving by the smaller workforce to match dissaving by the larger group of pensioners. Under PAYG, a tax at an unchanged rate of 10 per cent enables government to transfer to pensioners the 100 units of output promised to them.

Relaxing the demographic assumptions is straightforward. Suppose that the decline in the working-age population is entirely offset by increases in the labour-force participation of women, and in the retirement age. In this case, column 1 of Table 9.2 applies in period 2, notwithstanding demographic change. The problem is entirely resolved, again on the supply side, for both types of pension scheme, for the same reason as in the previous paragraph. A similar conclusion arises from any combination of increased productivity and labour-force participation that prevents output from falling.

Finally, it is possible to maintain the consumption of both workers and pensioners with goods produced abroad, provided the country has sufficient overseas assets to do so—for example, by owning factories in countries with a younger population. This approach, which is compatible with either PAYG or funding, increases the workforce by importing labour—analytically the same solution as in the previous paragraph.

Two conclusions emerge.

- If changes in productivity and labour-force participation are independent of the method of finance, then relaxing the assumptions does not change the previous results. In particular, it remains the case that funding and PAYG are not substantially different

[12] Australian producers would be unlikely to accept pounds in exchange for Australian goods in this situation.

in their ability to cope with demographic change. This should not be surprising. The task of both schemes is to reduce workers' consumption; PAYG does this by taxing workers, funding by allowing or forcing them to save. The only difference is that PAYG makes explicit the notion that pensions involve current resources.

- The crucial variable is *output*. A decline in the labour force causes problems only if it causes a fall in output; the problem is solved to the extent that this can be prevented.

The choice between PAYG and funding in the face of demographic change is therefore relevant only to the extent that funding (as is sometimes argued) systematically *causes* output to be higher. This is a matter of considerable controversy both theoretically and empirically, and is a central topic in Section 5.1.

OTHER ASPECTS. This section digresses briefly to a number of other issues about PAYG and funding, mainly to make clear that they have little or nothing to do with the central issue of paying for pensions. The main arguments are that funded schemes are safer, give more freedom, and impose greater financial discipline.

The question of safety, as we have seen, turns on whether pensioners as a group are better able to fight for their share of national output as recipients of current tax revenues or as the owners of capital. The PAYG mechanism makes clear both the quarrel over output shares and the dependence of pensioners on younger workers. Funding hides both issues, but does not remove them. It is, indeed, possible for the state to break promises under a PAYG scheme. But funded schemes are also vulnerable and also political (consider the political sensitivity of tax advantages for pension funds).[13] As a practical matter, the purchasing power of the flat-rate component of the national-insurance retirement pension in 2002/3 was 2.6 times its value in 1948. Funded benefits have frequently failed to keep up with inflation.

A related argument asserts that taxes in a PAYG world curtail individual liberty. The issue of freedom, however, is raised less by the way pensions are organized than by compulsion. A compulsory funded employer scheme gives no more freedom than PAYG; and a compulsory personal pension offers only constrained choice.

A final argument is that funding imposes greater financial discipline. With PAYG, the state makes promises now, but may not have to pay anything till later. The immediate revenue charge is negligible relative to the potential future liability, leading, it is argued, to irresponsible promises (an example of government failure discussed in Chapter 4, Section 5). With funding, promises of higher future benefits must be matched by increased contributions immediately, thereby, it is argued, guarding against government failure. Though factually true, this argument points both ways. The ability of social insurance (of which PAYG is an example) to respond to changing social and economic circumstances can equally be regarded as one of its advantages. Of course, PAYG can be abused, but—as with automobiles and pain-killing drugs—that is not a watertight argument for abolition.

[13] While on the subject, it should not be imagined that storing current output at the bottom of one's garden gives complete protection against *all* contingencies. The state can always expropriate such output either explicitly, or by a tax on individual wealth, or, more subtly, by engineering inflation and imposing a non-indexed capital-gains tax on an accruals basis. In similar vein, funded schemes run a potential risk of state direction of their investment portfolios, a besetting problem in Latin America (see Mesa-Lago 1990). For specific discussion of the safety of different pension regimes, see Diamond (1996).

4. Social justice

4.1. Public-versus-private provision

This section closely parallels Chapter 8, Section 2.4, and considers the equity arguments for public organization of pensions. Horizontal equity concerns goals like a guaranteed minimum standard of some commodities, or equal access to them. These occur without intervention (Chapter 4, Section 4.3) where individuals have perfect information and equal power, a line of argument that lends little support to public provision of pensions. If individuals did not have perfect information, they would generally be able to buy it. At most there is a case for regulation of minimum standards. The fact that individuals do not have equal power lends further support to minimum standards, but, again, there is no argument for public provision.

I have already discussed in Chapter 8, Section 2.4, and elsewhere the weakness of the vertical-equity argument that the state should provide pensions because otherwise the poor could not afford them. The earlier conclusions apply equally here—that public provision solely to foster redistribution is justified only by a consumption externality, where the rich confer pensions on the poor as a merit good.

Consumption externalities apart, equity reasons for public provision must appeal to efficiency arguments. In the case of pensions, these arise out of the inability of private institutions to guarantee protection against inflation, giving an efficiency justification for public involvement at least in underwriting the indexation component of pensions, and possibly (depending on the outcome of the funding-versus-PAYG debate) of some or all of the pension. As discussed in Chapter 4, Section 7.2, once a commodity is publicly provided on *efficiency* grounds, it is not inappropriate to finance it redistributively. In addition, the fact that membership is compulsory, by imposing a pooling solution, avoids the worst problems of adverse selection (Chapter 5, Section 4.1); in consequence, premiums based on income rather than individual risk need cause no major inefficiency. These efficiency arguments for compulsion and public provision, taken together, suggest that using publicly organized pensions for distributional purposes does not necessarily cause substantial efficiency losses.

4.2. The redistributive effects of pensions

A pension scheme, depending on its precise construction, can redistribute from young to old, from rich to poor, and from men to women. It will also redistribute over the life cycle. It is necessary to consider PAYG and funded schemes, and in each case to ask three questions: is such redistribution possible; is it inevitable; and to what extent does it occur in practice?

REDISTRIBUTION FROM YOUNG TO OLD. PAYG enables a generation as a whole to receive more than the sum of its past contributions. Thus redistribution from the workforce to the retired generation is *possible*. But it is not *inevitable*, since a PAYG scheme could be organized to pay actuarial benefits. *In practice*, as we shall see in Section 5.2, there has been substantial redistribution from young to old in many countries over the post-war period.

With funded schemes it is necessary to consider separately the cases of stable and unstable price levels. In a world with no inflation, the funded benefits of any generation are constrained by its past contributions, rendering redistribution from young to old impossible. The effect of unanticipated inflation is to bring about unintended redistribution from old to young, and vice versa for unanticipated price deflation.

REDISTRIBUTION FROM RICH TO POOR can, and usually does, occur with PAYG pensions. In many schemes there is *formula redistribution*, in that individual B with half the income of individual A generally pays half the contribution, but receives a pension that is more than half of A's. The UK system was described in Section 1. In the USA, though the formula has changed over time, it has always been explicitly redistributive. The same is true in the systems of most industrialized countries.

The effect of formula redistribution is partially offset by *differential mortality*, to the extent that the rich live longer than the poor. But redistribution is not inevitable—it is possible to organize a PAYG scheme in which pensions are proportional to contributions, as with 'notional defined-contribution' schemes in several countries, including Sweden.[14]

It might be possible to devise a (compulsory) funded scheme that redistributes from rich to poor. But, where membership is voluntary, the present value of the annuity received by a representative individual must equal the lump sum accumulated over his working years. This implies, *ceteris paribus*, that pensions must be proportional to contributions, thus ruling out systematic redistribution.

REDISTRIBUTION FROM MEN TO WOMEN. The following is broadly the case in the UK.[15]

- The normal retiring age for men is 65, at which age a man has a life expectancy of 80.5. The average man is thus retired for 15.5 years.
- The normal retiring age for women is 60, at which age women have a life expectancy of 83, so that the average woman is retired for 23 years.
- It is therefore $\frac{23}{15.5}$, or roughly 1.5 times, as expensive to provide a given weekly pension for a woman as for a man.
- If men and women pay equal contributions and receive equal weekly benefits, there is redistribution from men to women. Since women live longer than men, abolishing the differential retirement age would reduce the subsidy but would not eliminate it.

Redistribution from men to women occurs for these reasons in both funded and PAYG schemes. The phenomenon is widespread, but is particularly strong in the UK, which was an outlier in international terms in having a lower retiring age for women (a subject to

[14] Sweden introduced a 'notional defined-contribution' scheme in 1998 (Sweden: Federation of Social Insurance Offices, 1998). The scheme is financed through social-insurance contributions, but the pension a person receives bears a strict actuarial relationship to her notional lifetime pension accumulation (the amount being adjusted for the cohort's life expectancy). In addition, there is a safety net pension for people with low lifetime earnings and credits for periods spent caring for children.

[15] Interim figures from the Government Actuary's Department, based on data for 1999–2001.

which we return in Section 5.2).[16] Two issues arise: is such redistribution inevitable; and is it desirable? On the first point, one could devise a scheme (PAYG or funded) in which women receive benefits related to their longevity. A woman could receive a lower monthly pension than a man with an identical contributions record—that is, a definition of equity as a pension stream of equal present value. Alternatively, women could pay a higher contribution and receive the same monthly pension as men—that is, equity consists of women receiving a pension stream with a higher present value, matched by a larger contributions stream. Thus there are two definitions of equity: equal present value, or equal monthly value. Either is defensible, but they are different, hence the equity problem.

Redistribution from men to women in pensions, though not inevitable, is almost universal, partly from a belief that any differential is a form of discrimination. A decision by the US Supreme Court (1978) declared differential pensions unconstitutional even if calculated actuarially (i.e. on the basis of equation (5.11)).[17] Nor is such redistribution undesirable. Analytically, it occurs because women pay the same premiums as men despite being (from the insurer's viewpoint) worse risks because they live longer. As we saw in Chapter 5, Section 4.1, efficiency generally requires that premiums should be proportional to risk; where insurance is compulsory, however, low-risk individuals are not able to opt out, and charging the same premium for all categories of risk does not cause adverse selection. It is possible that secondary inefficiency might arise—for example, the possible distortion of labour-supply decisions that non-actuarial contributions might cause. To the extent that this is not a substantial problem, the decision whether all classes of risk should pay the same premium can be made mainly on equity grounds.

REDISTRIBUTION OVER THE LIFE CYCLE. Where none of the earlier types of redistribution occurs, redistribution over the life cycle (i.e. consumption smoothing) is the only redistributive effect of pensions. In comparison with PAYG, funded schemes generally have less redistribution from young to old and less from rich to poor. Thus a larger fraction of funded pensions will relate to redistribution over time than to redistribution between people.

5. Assessment of old-age pensions

5.1. Efficiency and incentives

Background questions

This section asks whether the national-insurance pension is efficient and equitable, starting with the *a priori* questions of Chapter 8, Section 3.1: should pensions be national (i.e. publicly provided), are they optimal in quantity and type, and are they actuarial?

[16] The Old Age Pensions Act 1908 established a common retirement age of 70, which was reduced to 65 under the Old Age and Widows and Orphans Contributory Pensions Act 1925. Women's retirement age was reduced to 60 in 1940, partly because of a campaign by women's organizations (for details of the events leading to the change in 1940, see Thane 1982: 245). Women's retirement age will over time be raised to 65; see note 2.

[17] Though tenable on equity grounds, the decision was based on a failure to understand the nature of insurance.

SHOULD PENSIONS BE NATIONAL? The efficiency arguments for state involvement rest on externalities, justifying compulsion, and technical failures in the insurance market, justifying public provision at a minimum of some sort of indemnity against inflation. It is agreed (*a*) that it should be compulsory for people to belong to a pension scheme, at least up to some minimum level, and (*b*) that efficiency is enhanced where people are able to reallocate consumption over their lifetime. Decisions about consumption smoothing are therefore efficient if inflation can be ignored; but only the state can guarantee full indexation. Thus there is a role for public provision at least of indexed assets for use by private, funded schemes. The efficiency argument for public provision of the whole pension is less clear-cut.

DOES THE STATE PROVIDE THE OPTIMAL QUANTITY AND TYPE OF PENSION? Only tentative answers are possible. Does the state provide the optimal level of pensions? Martin Evans (1998: table 7.7) shows that about one-third of increased state pension spending between 1973 and 1994 related to rising numbers of pensioners; the remaining two-thirds related to rising real pensions. For this and other reasons, the fraction of pensioners requiring additional means-tested assistance fell over the period from 22 per cent to 14 per cent. For the most part, this outcome resulted from deliberate government policy. The state has also acted to protect private pensions against inflation—for example, by issuing indexed bonds.

It can be argued that the increasing role of the state in indexing public and private pensions has contributed to the relative certainty with which individuals can plan for the future, and has therefore increased efficiency, albeit imperfectly because the state scheme makes no allowance for different degrees of risk aversion between individuals.

A second set of questions concerns the efficiency of private institutions. Though private pensions in the UK are well established and, for the most part, work well, they have had problems, largely connected with imperfect consumer information. Occupational pensions faced the so-called Maxwell scandal, in which the assets of an occupational scheme were illegally siphoned off for other purposes. Proposals to tighten regulations (UK Pension Law Review Committee 1993) led eventually to private pensions being regulated by the Financial Services Authority. With personal pensions the problem was different. 'What is clear . . . is that there is considerable inefficiency within the personal pensions market because of the high management costs and poor advice offered to savers. Individual purchasers have little chance of gaining full information about the wide array of highly complex long-term financial instruments on offer' (Johnson and Rake 1997: 44).

What this suggests is *not* that the state necessarily does a better job than the private sector but—as argued in Chapter 4, Section 7.1—that the choice of instruments is complex. In the case of pensions, the best way forward is to retain private institutions, with state intervention through stronger regulation and, possibly, an element of subsidy.

ARE PENSIONS ACTUARIAL? Chapter 8, Section 3.1, pointed out that national-insurance contributions are not geared to risk, that the scheme is not funded, and that rights to benefit are not determined solely by the occurrence of the insured event. In addition, as we shall see in Section 5.2, the scheme redistributes to the poor, and offers credits for people at home looking after young children, and for the unemployed. These arrangements are a considerable departure from the Beveridge scheme, whose lump-sum contributions and

benefits ruled out redistribution from rich to poor (assuming, for example, equal life expectancy); and, since the original proposals were for a funded scheme, they would also have ruled out redistribution from young to old.

For these reasons, some writers have questioned whether the basic pension should continue to be contributory. The counter-argument is that pensions are social insurance, as defined in Chapter 5, Section 4.2: they are insurance in the sense of offering protection against longevity and inflation risks, but not in the sense of being an actuarial mechanism. As discussed in Chapter 8, Section 3.1, social insurance, though it *enables* redistribution from rich to poor, does not *require* it. The extent to which social insurance is redistributive therefore depends on the relative weights attached to the different objectives in Chapter 1, Section 2.2.

Incentive issues

The incentive effects of pensions are the subject of considerable debate. This section makes no attempt to survey the large literature (see the Further Reading) but seeks only to sketch out why the issue is controversial. Two issues predominate: does PAYG restrict saving and output growth; and do pensions reduce labour supply?

PENSIONS, SAVING, AND ECONOMIC GROWTH. It is often regarded as self-evident that saving, and hence economic growth, will be higher with funding than under PAYG. But this assertion faces at least three major qualifications.

1. *Increases in saving, if any, occur only during the build-up of the fund.* It should be clear from column 1 of Table 9.2 that in the long run workers save 100 and pensioners dissave 100, so that net saving is zero.

2. *Does funding increase saving even during the build-up phase?* Opinion is divided. The issue can be posed simply. Suppose that my mandatory pension contribution of 100 is moved from a PAYG scheme to a funded scheme. Two illustrative outcomes are interesting.

- My voluntary savings behaviour (e.g. for retirement or bequests to my children) does not change. Thus my saving increases by 100.
- I reduce my voluntary saving by 100; thus there is no increase in my saving.

The issue, therefore, is the extent to which any increases in mandatory saving are offset by reductions in voluntary saving.

The issue is ancient. In the context of the 1908 Old Age Pensions Act (Chapter 2, Section 2.2), Sydney and Beatrice Webb (1909: 334) reported that 'some of our witnesses . . . have taken the view . . . that such non-contributory pensions would be likely to discourage thrift and saving'. Current debate was reopened by Feldstein (1974). His empirical work concluded that the US PAYG social-security (i.e. pension) scheme reduced personal saving by about 50 per cent, thereby reducing the capital stock by 38 per cent below what it would have been in the absence of the social-security system. That work was hotly disputed (e.g. Leimer and Lesnoy 1982). Gale (1998) argues that the savings offset is larger than previously supposed because of econometric biases in earlier work. The debate continues.

A second central question in considering the effect of funding on savings is what happens to the pensions of the older generation. If they are reduced, consumption falls, and hence, *ceteris paribus*, savings will indeed rise. But, if pensions are not reduced, they

have to be paid from taxes or government borrowing. Extra taxation exerts downward pressure on saving; extra borrowing at least partially offsets additional private capital formation. These macroeconomic effects could swamp moves from PAYG to funding. It is therefore not surprising that an IMF study (Mackenzie et al. 1997: 1) concluded: 'Studies of the U.S. economy, on which most research has been done, provide some moderately strong evidence that the introduction and development of the public pension plan have depressed private sector saving, although the extent of this impact has proved hard to estimate. Studies of other countries as a group have tended to be inconclusive . . .'.

3. *Do increased savings lead to increased output?* The third qualification is that an increase in saving does not *necessarily* raise output. There are not one, but three links in the argument that future output will be higher with funding than with PAYG:

- funding leads to a higher rate of saving in the build-up period than PAYG;
- this higher saving is translated into more and better investment; and
- this investment leads to an increase in output.

None of the three links *necessarily* holds. The evidence on the first, as just discussed, is mixed. On the second, increased saving does not necessarily lead to new investment; pension savings could instead be used to buy old masters. So far as the third link is concerned, the objective is to channel resources into their most productive investment use. But it cannot just be *assumed* that pension managers make more efficient choices than other agents. More generally, the declining growth performance of the Communist countries over the 1970s and 1980s, despite very high rates of investment, makes it clear that the volume of investment is not the sole determinant of growth—its quality is also of central importance.

As with the second link, there is also an important macroeconomic argument. The claim that higher savings contributes to growth is of dubious relevance in a small open economy, since investors can borrow internationally. Thus higher saving by people in countries such as Poland, New Zealand, South Africa, or Chile might well translate into higher income for them in the future, but will have little effect on the level of investment in those countries. The argument is less true in the USA, whose international borrowing, because of its size, will drive up world interest rates. Thus the USA (from which most of the literature emanates) is a special case.

All three links have to hold before it can be asserted that funding will lead to greater increases in output than PAYG. At best the assertion is not proven.

PENSIONS AND LABOUR SUPPLY. The question here is whether pensions (either PAYG or funded) reduce labour supply. The problems are similar to those affecting empirical analysis of the labour-supply effects of unemployment benefits (Chapter 8, Section 3.1). On the contributions side, the theoretical analysis of taxation on work effort is generally accepted (see Atkinson and Stiglitz 1980: 23–61). The effect of national-insurance contributions is to drive a wedge between gross and net money wages. If workers discount future benefits entirely, contributions have the same effect as an income tax; at the other extreme, where future benefits bear an actuarial relationship to contributions, and are perceived to do so, national-insurance contributions are not a tax but simply the price of insurance, which, like any other price, has little if any distortionary effect on labour supply.

The impact of future benefits, on the other hand, is harder to analyse. They are payable only in certain contingencies, can be changed by legislation, and will depend on marital status; and it is not possible to borrow against future benefits, which must therefore be weighted by the probability that each benefit will be received at some given future date. The weighted benefits must then be discounted to present value using the market rate of interest or, for people who cannot borrow as much as they wish, at a personal rate of time preference. Similar problems arise in valuing pension rights considered as part of personal wealth.

As a result, modelling the effect of pensions on labour supply is complex, with studies (see the Further Reading) reaching very different conclusions. That said, recent evidence paints a clear picture that badly designed schemes affect retirement decisions. Two potential distortions have to be considered: (*a*) retirement decisions and (*b*) labour-market responses earlier in life.

So far as the retirement decision is concerned, what matters is that pensions should be related *at the margin* to individual contributions, and that contributors and beneficiaries should perceive this to be so. The argument is important. It is possible to have a pension formula that is redistributive in the sense that worker A, with twice the earnings of worker B over his working life, gets a pension that is higher than B's, but less than twice as high. However, if either A or B retires early, his pension should be actuarially reduced relative to the pension he would have received at age 65.

In contrast, earlier labour-market behaviour depends not only on the marginal relationship between contributions and benefits, but on the effect of an increase in earnings on the total pensions package. In this case, labour-market distortions are minimized where contributions bear a fully actuarial relationship to benefits. This is the case with private defined-contribution schemes. It is also the case with state schemes which pay benefits strictly proportional to a person's contributions record—for example, the notional defined-contribution scheme in Sweden and other countries noted earlier (see note 14).

There is growing evidence that badly designed schemes, whether private or public, cause labour-market distortions. Gruber and Wise (1998, 1999; see also Gruber and Wise 2002), reporting on a study of eleven industrial countries, find a strong relationship between the design of public pensions and early retirement. In particular, they examine the fact that most countries increase pensions for people who delay retirement by less than the actuarial amount, thereby creating an incentive for people to leave the labour force at the age at which their pension wealth is maximized. Gruber and Wise call this 'the tax force to retire', and find a strong association between that variable and the labour-force departure of older men.

Such distortions also exist in private schemes. Employer schemes can encourage labour immobility—indeed, vesting rules (which specify the length of service before a worker gains title to any pension benefits) may be deliberately designed to discourage workers from leaving (Hannah 1986; Campbell 1999). Publicly organized defined-benefit schemes, being universal, do not impede labour mobility, since members can change jobs without changing to a new pension scheme.

Two conclusions are noteworthy. First, questions about labour supply, though highly significant, are logically separate from the PAYG-versus-funding controversy: what matters is pension design, not whether a scheme is private or public. Secondly, labour supply

should not be considered in isolation: what matters is not labour supply but economic welfare. A defined-benefit scheme might reduce labour supply at the margin; but if the utility loss from lower output is more than offset by the utility gain from greater security, defined-benefit arrangements may be welfare improving even if they do reduce labour supply.

Dealing with future problems

Britain's demographic problems are less acute than elsewhere in Europe. In addition, since the mid-1980s the state pension has been tied to changes in prices rather than earnings, the resulting savings being sufficient to keep contributions fairly constant despite population ageing. In many ways, therefore, Britain's pensions 'crisis' is not a crisis at all, but a matter that has largely been resolved (Hills with Gardiner 1997). This section therefore concentrates more on the logic of dealing with demographic problems than with the specifics of any particular country.

POLICIES IN THE FACE OF THE DEMOGRAPHIC PROBLEM. We saw earlier that the Eurotoddlers of the 1950s and 1960s will cause a sharp rise in the dependency rate when they retire in the years after 2010. Any solution to the declining population of working age must reduce the demand for goods and services and/or increase their supply. This implies one or more of three outcomes. Demand can be reduced (*a*) by increasing contributions, thereby reducing the average consumption of workers, and/or (*b*) by reducing benefits, thereby reducing the average consumption of pensioners. The UK has adopted (*b*) by deciding to increase pensions in line with prices rather than earnings.

Alternatively, on the supply side, workers and pensioners can have the consumption they currently expect, so long as (*c*) output rises sufficiently to maintain average consumption per head (hence the emphasis in Section 3.2 on the central importance of output). In theory, raising output involves either or both of two strategies. *Increased output per worker* can arise from increases in the quantity and quality of capital, and from increases in the quality of labour. *Increased numbers of workers* can arise from increased labour-force participation by those of working age; from an increase in the retirement age; and/or by importing labour.

In practice, supply-side policies in the face of a declining workforce should therefore include some or all of the following:

1. introducing policies to increase the capital stock and its quality, e.g. robots (which have the added advantage of not requiring pensions);
2. increasing investment in labour through education and training;
3. increasing labour-force participation by reducing unemployment and by encouraging more women to join the labour force (e.g. by improving child-care facilities);
4. raising the average retirement age;
5. importing labour directly, through immigration.
6. importing labour indirectly by exporting capital to countries with a young labour force.

Policy 4 has major advantages to which we return shortly.

TO WHAT EXTENT IS FUNDING A SOLUTION? Funding is clearly irrelevant to policies 2–5, which can all be pursued by *direct* methods. If funding makes any difference via policy 1, it can be so only if it (*a*) leads successively to an increase in saving, in investment, and in output (i.e. policy 1), *and* (*b*) does so more effectively than any other method of garnering resources and channelling them into productive investment. The stringency of these conditions should be clear from earlier discussion. The evidence on (*a*), both theoretically and empirically, is mixed, inconclusive, and controversial, and that on (*b*) is unlikely to be less so.

The effect of policy (6) requires discussion. Pensioners can consume goods made abroad so long as they can organize a claim on those goods. If British workers use some of their savings to buy Australian factories, they can in retirement sell their share of the factory's output for Australian money to buy Australian goods, which they then import to the UK. Though useful, this policy is not foolproof. It breaks down if Australian workers all retire; thus the age structure of the population in the destination country is important. Secondly, if large numbers of British pensioners exchange Australian dollars for other currencies, the Australian exchange rate might fall, reducing the real value of the pension. Thus the ideal country in which to invest has a young population *and* products one wants to buy. Accumulating assets in countries with younger populations is thus one way to maintain claims on future output. Overseas investment by pension funds is one way to implement this policy. But there are other ways: I could, for example, hold part of my saving in Australian equities or mutual funds. Funding *per se* is not paramount—what is paramount is saving.

The funding-versus-PAYG controversy can therefore be argued rather to miss the point by concentrating on a method of increasing output that is both indirect (namely, the three steps in (*a*)) and debatable. Since the issue is one of economic growth, it seems easier and more reliable to adopt direct methods of effecting policies 1–6.

This is *not* an argument against funding; but it *is* an argument against reliance on funding *alone* to address demographic problems. The analysis suggests three conclusions.

- In the face of demographic problems the key variable is output.
- Policy should consider the entire menu of policies that promote output growth directly.
- From a macroeconomic perspective the choice between PAYG and funding is secondary. Neither method (indeed, no method) can insure against common shocks. The future is full of uncertainties (about rates of inflation, output growth, birth rates, and the like), which affect pension schemes just as they affect most other institutions.

In short, the argument that funding insulates pensioners from demographic change should not be overstated. From an economic point of view demographic change is not a strong argument for a shift towards funding.

THE REAL SOLUTION: RAISING THE AGE OF RETIREMENT. Reforms in the UK since the mid-1980s have exerted downward pressure on state-pension spending by indexing pensions only to price changes, and by increasing the emphasis on private pensions. The first is a response to the demographic and global pressures discussed in Chapter 1, Section 3. The second results from fiscal incentives and is also to some extent the expression of people's choices. By the mid-1990s, six million people were contributing to the state earnings-related

pension, while fifteen million had contracted out, and were contributing to occupational or personal pensions. To some extent, therefore, people were voting with their feet.

Though the decline in the state pension halted in the years after 2000, a series of reforms and proposals for reform have continued a movement towards private arrangements, though the resulting institutions are subject to criticism and continuing discussion. A Green Paper (UK DSS 1998) foreshadowed the introduction of a state second pension (essentially a top-up to the basic rate pension for low earners) and of stakeholder pensions (simple individual funded accounts with low administrative costs aimed at low earners). However, the arrangements had significant problems, not least their complexity.[18] A further Green Paper (UK DWP 2002*d*) did not really address these problems: pensioner poverty continued, and the system remained complex, leading to calls for a higher basic state pension paid by raising the retirement age.[19]

All the advanced industrial countries, and many other countries, face a similar collision of demographics and fiscal pressures. A series of proposals in the USA has analysed the role of funding (Feldstein 1996; Diamond 1998; National Academy of Social Insurance 1998; Cogan and Mitchell 2003). In Europe, proposals for pension reform in the early 2000s created political turbulence but relatively little action.

Virtually none of the proposals got fully to grips with the real solution—raising pensionable age. The logic is straightforward. People today live much longer than 100 years ago. That is a wonderful outcome that we should all applaud. To talk about the 'problem' of ageing is grotesquely to miss the point. The problem is not that people are living longer but that they are retiring too early.

In considering the forces that drive pension spending, three issues cumulate.

(*a*) People are living longer and thus receive a pension for longer; at a given real pension that increases the total cost of providing for each pensioner.

(*b*) People are joining the workforce later because of increased education and training; thus there are fewer people producing the goods that pensioners consume.

(*c*) The high birth rates of the late 1940s and the 1960s were followed by lower birth rates; thus the population is ageing, raising the age-dependency ratio.

It should be noted that (*a*) and (*b*) would make it harder to finance pensions even in the absence of (*c*); the main effect of population ageing is to make the problem worse.

What can be done to accommodate these pressures? As discussed earlier in this section, there are four and only four ways in which pension finance can be improved.

1. *Increasing output* is possible by raising labour productivity and/or by increasing the number of workers: output growth sufficient to meet the growing demands of pensioners, if that is possible, is a complete solution. With a steady rise in life expectancy, however, that is unlikely.

[18] For critiques, see Agulnik (1999), Disney et al. (1999), Falkingham and Rake (1999), Agulnik and Barr (2000), and Rake et al. (2000).

[19] For the state of play in 2003, see Glennerster (2003*a*: 214–17); for overall assessment, see Emmerson and Wakefield (2003); on pensioner poverty, see Hancock (1998) and Goodman et al. (2003); for a critique and reform proposals, see Brooks et al. (2002: chs. 4, 6).

2. *Reducing the living standards of workers* by increasing pension contributions: this solution is problematic, first, because increased contributions, especially in a PAYG scheme, can create labour-supply disincentives, emigration being the extreme example, thus hindering growth. Reducing workers' living standards is also likely to be politically unpopular.

3. *Reducing the living standards of pensioners* faces analogous problems—the policy can create pensioner poverty (as in the UK) and will be politically unpopular.

4. *Raising the age of retirement* (more accurately, raising pensionable age): later retirement increases the number of workers and *simultaneously* reduces the number of pensioners—it is not double counting to include both effects, hence raising the retirement age is a powerful policy instrument.

It is also a good one. When pensions were first introduced they incorporated a retirement age that was very old relative to life expectancy (65 in the 1898 New Zealand pension, 70 in the 1906 Lloyd George legislation in the UK). Since then life expectancy has increased in the advanced countries on a linear trend, with no evidence that the curve is flattening. It is rational to embrace this extra life expectancy with open arms, but irrational to keep the retirement age fixed at 65 forever. By the time that people live to be 110 (not that implausible), they will work for 45 years (20–65) and then be retired for another 45.

As well as being good macroeconomic policy, raising pensionable age is also good social policy. First, a significant number of people would actively prefer to work longer.[20] Secondly, the policy contains pension spending not by reducing living standards in old age, but by reducing the duration of retirement. Even those who look forward to retirement would generally prefer the latter option. Thirdly, since adjustment to longer life expectancy could come either from lower consumption or from longer working life, it seems strange to adopt a corner solution by ignoring the latter option.

These arguments notwithstanding, the average retirement age in many countries has continued to fall, creating a problem that policy-makers have yet to face but which they will have no choice but to face.

What, then, should policy be? The most efficient and equitable policy is to raise the average retirement age to accommodate aggregate resource pressures, but to offer choice over retirement, in the face of efficient incentives, to accommodate individual preferences. Specifically, any well-designed pension scheme should have four elements:

- an initial retirement age that makes it fiscally possible to provide a genuinely adequate state pension;
- a subsequent retirement age that increases in line with rising life expectancy in a way that is rational and transparent, so that people know long in advance broadly when they will be able to retire;
- a flexible labour market that allows people to move from full-time work towards full retirement along a phased path of their choosing;
- public understanding of the simple economics of pensions.

[20] The US Age Discrimination in Retirement Act 1978, which enables (but does not compel) broad classes of people to defer retirement until they are 70, was not a top-down measure motivated by budgetary control, but a legislative response to grass-roots activism by people who resented compulsory retirement.

5.2. Equity issues

The discussion in Chapter 8, Section 3.2, of equity aspects of national insurance applies equally to pensions. This section concentrates on a number of other issues.

REDISTRIBUTION OVER THE LIFE CYCLE. Hills (with Gardiner 1997) looks at the combined effects of taxation and benefits. He finds that of every £1,000 of cash benefits (mostly pensions) paid to a representative person, nearly three-quarters is self-financed. To a significant extent, therefore, the welfare state acts as a 'piggy bank'. The point is broadly echoed in Table 7.3, where spending on benefits aimed at insurance and consumption smoothing was £72 billion, some 63 per cent of total benefit spending.

REDISTRIBUTION FROM RICH TO POOR. The system of benefits (Section 1) and contributions (Chapter 7, Section 2.1) together imply considerable formula redistribution (see Section 4.2). At its simplest, from Table 7.2, someone with weekly earnings of £120 pays a contribution of about £3.40 per week, and someone earning £500 pays about £45. If each received only the basic pension, the 'poor' person would receive thirteen times as much pension per pound of contribution. Because of the earnings-related component, the effect is not as strong as the example suggests; but, *ceteris paribus*, there is still redistribution from rich to poor. In 2002/3, the effect of taxes and benefits was to reduce the Gini coefficient for retired households from 66 for original income to 33 for post-tax income (Lakin 2003: table 11).

Other factors, however, work in the opposite direction. There is differential mortality, since the better off have a greater life expectancy (and hence collect their pensions longer) and tend to stay in education longer (and hence start to pay contributions later). Secondly, it is disproportionately the better off who contract out of the state scheme, and this, too, reduces its redistributive impact.

The overall redistributive effect is therefore complex and results are far from definitive. An implication of the life-cycle results just discussed is that about one-quarter of cash benefits are not self-financed. Hills (with Gardiner 1997: fig. 12) shows that the 'lifetime poor' are net gainers and the 'lifetime rich' net losers. Alongside redistribution over the life cycle, therefore, the system also redistributes from rich to poor.

REDISTRIBUTION FROM YOUNG TO OLD. The real purchasing power of the UK basic state pension increased by 260 per cent between 1948 and 2002, far beyond pensioners' actuarial entitlement. In the USA many retirees receive a social-security pension at least twice their actuarial entitlement. Whether this is more equitable than a funded scheme with no such redistributive possibilities is a matter of judgement.

REDISTRIBUTION FROM MEN TO WOMEN can occur in both funded and PAYG schemes as a consequence of differential life expectancy (Section 4.2). This type of redistribution is particularly strong in the UK, which is unusual in having a lower retirement age for women. To the extent that this redistribution is caused by the differential retirement age, it is inequitable. First is the anomaly whereby a woman who retires at 65 will receive a higher pension than a 65-year-old man with an identical contributions record, because

she has worked beyond her normal retirement age.[21] Secondly, there is the discrimination against women who would prefer to work longer. Thirdly, the earlier retirement age gives a woman fewer years to make up any deficiency in her contributions record. For these, as well as for fiscal reasons, women's retirement age will be increased to 65.

Removing this indefensible anomaly reduces the transfer from men to women but does not eliminate it. What, if anything, could or should be done about it? One answer is to recognize the fact but, having recognized it, to leave it at that. As discussed in Section 4.1, this is defensible, not least because compulsory membership means that the subsidy will not cause inefficiency in insurance markets through adverse selection.[22]

OTHER ASPECTS. Redistribution also takes place between households of different sizes. From Table 8.1, the basic pension for a married couple is 60 per cent higher than for a single person making the same contribution; in the USA the situation is broadly comparable.

Finally, note should be taken of the important relation between accrued pension rights —particularly to the state pension—and the distribution of personal wealth. Because pension rights are distributed more equally than most other forms of non-human wealth, the overall wealth distribution is more equal when they are included. The size of the effect, however, is controversial, depending on (*a*) precisely which types of pension wealth are included (e.g. how should national-insurance pension rights be treated?), and (*b*) the valuation placed on entitlements to a future income stream. The latter problem is particularly intractable (see Banks and Tanner 1996; Hamnett and Seavers 1996).

5.3. Conclusion

Empirical investigation suggests that funding is likely to make little difference, if any, to growth rates. The funding solution is indirect in its mechanism, controversial in its outcome, and likely in any case to have only a second-order effect. It would, therefore, be highly dangerous to imagine that simply by embracing funding the demographic problem would be solved. In addition, efficiency arguments of principle point strongly towards a public role at least in underwriting indexation. The efficiency case for continued public, PAYG involvement is therefore strong. Such an argument accepts that it is appropriate for people to use the state as a collective institution for consumption smoothing and insurance where it is able to perform these functions more cheaply and efficiently than any private alternative. This does not mean that PAYG schemes have never made profligate promises. But the efficiency case for state involvement is, at its very least, a counterblast to the government failure arguments in Chapter 4, Section 5.

Aaron (1982) contrasts the absence of conclusive evidence that PAYG schemes have deleterious efficiency effects, with the strong evidence that their equity impact is beneficial, in that they have greatly improved the economic status of the elderly. He argues that decisions about the future of state pensions should therefore be made mainly on equity grounds.

[21] The real pension is increased by 7.5% for each year of work beyond normal retiring age (section 1); thus a woman retiring at 65 receives a pension 37.5% higher than that of an identical 65-year-old man.

[22] Voluntary personal pensions do not offer unisex benefits. Reform would require EU-wide action.

QUESTIONS FOR FURTHER DISCUSSION

1. Pensions are said to be in crisis. What is the source of that crisis?
2. Is funding a solution to the problems of pension finance?
3. What solutions are there other than funding to the problems of pension finance?

FURTHER READING

For compendious description of institutions (including legal sources), see Child Poverty Action Group (2003) (the 2003 version of an annual publication) or UK DWP (2002*e*) (a detailed guide for pensions advisers), or other items on the Department of Work and Pensions web site (http://www.dwp.gov.uk). On institutions in the EU including discussion of pension regimes in different countries, see the various reports and overview documents on http://europa.eu.int/comm/employment_social/soc-prot/index_en.htm, and for survey of pensions in twelve countries, Pensions Policy Institute (2003). For institutions worldwide, see US Social Security Administration (2002, 2003), downloadable from http://www.ssa.gov/policy/pubs/index.html. See also the various government portals in the list of useful web sites at the start of the book. For a survey of private pension arrangements, see International Social Security Association/International Network of Pension Regulators and Supervisors (2003).

On the analytics of pensions, see, in ascending order of technical difficulty, Thompson (1998), Barr (2002*a*), Rosen (2002: ch. 9), Diamond (2002), and Diamond (2003), the last of which analyses social security as a particular example of optimal taxation theory. The classic articles are by Samuelson (1958) and Aaron (1966).

See Poterba et al. (1996), Mackenzie et al. (1997), and Gale (1998) for the effects of pensions on saving, and, for labour-supply effects, see Gruber and Wise (1998, 1999, 2002), Blundell et al. (2002) and Disney and Smith (2002).

The distributional effects of the UK state pension are discussed by Hills with Gardiner (1997) and Martin Evans (1998). On pensioner poverty, see Hancock (1998) and Goodman et al. (2003) and, on gender aspects, Falkingham and Rake (1999) and Bennett (2002).

There is a huge literature on pension reform. On the UK, see Agulnik (1999), Agulnik and Barr (2000), Brooks et al. (2002), and Glennerster (2003*a*: ch. 7). On the USA, see Feldstein (1996), Arnold et al. (1998), National Academy of Social Insurance (1998), and Lee and Skinner (1999). For pension reform in Europe, see Forni and Giordano (2001) (Italy), Angel (2002) (Spain), Ploug (2003) (Denmark), Cornelisse and Goudswaard (2002) (on convergence within the EU), and Andrietti (2001) (on the portability of supplementary pension rights within the EU). On pension reform in Central and Eastern Europe, see the symposium in the *International Social Security Review*, 54/2–3 (April–September 2001), Augusztinovics et al. (2002), and Schmähl and Horstmann (2002). On Australia, see Whiteford and Angenent (2001), and on South-East Asia, Asher (1998).

There is also a huge debate. For contrasting overviews, see Arnold et al. (1998), Disney (2000), Barr (2002*a*), Lindbeck and Persson (2003) and Diamond (2004). Cogan and Mitchell (2003) discuss perspectives of US pension reform in the early 2000s; for a specific US proposal, see Diamond and Orszag (2004). A major international debate about pension reform grew out of World Bank (1994), which strongly favoured a move to funded pensions in developing as well as developed economies; for a more recent World Bank view, see Holzmann (2000). For counterviews, see Gillion (2000), and also Hemming (1999), which (emanating from the IMF) argues that the gains from funding are relatively minor. Queisser (2000) and Scherman (2000) probe for the existence of an emerging consensus. On the political economy of pension reform, see Müller (2001) on Central and Eastern Europe, Mesa-Lago and Müller (2002) on Latin America, and Müller (2003) for a comparison.