OFFICE OF FAIR TRADING

Report of the Director General's Inquiry into Pensions

Volume Three

Research undertaken by the OFT
for the Pensions Inquiry:

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July 1997

APPENDIX E

Portability and the Preservation of Pension Rights in the United Kingdom

July 1997

Portability and Preservation of Pension Rights in the United Kingdom

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June, 1997

This study was commissioned by the UK Office of Fair Trading as part of its inquiry into UK occupational pension schemes.

Abstract

This study examines pensions portability and the preservation of pensions rights in the U.K. We review the economic theory underlying pension schemes and the arguments for and against more pensions portability. We show that the effect of current laws and actuarial practice is to penalize young early leavers heavily, so that they can lose up to 30% of the pension that they might have expected when they retire. We propose a policy to reduce this early leaver penalty according to a sliding scale that involves determining transfer values for younger workers on the basis of actual contributions paid rather than on notional accrued benefits, but with accrued benefits having a more significant weight in calculating the transfer values of older early leavers. The effects of the various actuarial valuation methods and assumptions used as well as the discretion allowed to actuaries are discussed in detail. We also compare the position of early leavers in the U.S., Canada, the Netherlands, and Japan.

Acknowledgments

We thank Andrew Johnson (Government Actuary's Department), Tim Roberson (Office of Fair Trading), and Jonathan Thurlwell (Office of Fair Trading) for extensive comments.

Executive Summary

For at least two decades, the issue of the pension rights of early leavers has been a matter of public policy concern in industrialized countries whose pension systems rely heavily on funded defined benefit private sector pension schemes. In the U.K., the average worker changes jobs at least five times in his or her career and only a small proportion of workers will hold the same job at retirement as when they began pensionable service. Yet about 60% of full-time male workers and 53% of full-time female workers are in an occupational pension schemes, most of which are of the defined benefit type in which pensions rights are either not fully portable or not fully preserved. *We show in this study that these people can lose a substantial fraction of their pension rights because they switch between jobs with different pension plans.* This capital loss leads to labour market imperfections which help to reduce job mobility.

In this study, we examine the ways in which early leavers from pension schemes are penalized because:

- Pension rights are based on the final salary in each job, with limited revaluation for inflation. This will lead to lower benefits if there is real earnings growth over the life cycle.
- Defined benefit plans involve implicitly backloaded contributions so that workers who move to defined contribution schemes in mid-career will lose pension benefits because they will not receive the benefits of the backloaded employer contributions in their late career.
- If employees leave a scheme during the vesting period (currently two years), they will lose their pension rights.
- There are penalties and variations associated with the calculation of transfer values to other pension schemes (including defined contribution schemes), or welfare costs of remaining in a defined benefit scheme when individual circumstances have changed.

In Chapter 2, we review the economics of pensions and portability. Our main conclusions are:

- Private pensions provide tax incentives to encourage savings.
- In the absence of more direct and precise instruments for dealing with unrecovered training costs, monitoring employee performance and inducing retirement in a world where the firm does not have complete knowledge concerning the type or ability of the workers it employs, the economics literature argues that the pension scheme will be used (however bluntly) to deal with these matters.

In Chapter 3, we review the U.K. legislation on portability and explain how the rules affect the computation of transfer values and deferred pensions. Our conclusion is that the outcome of U.K. legislation over the past two decades has been a dramatic improvement in the position of early leavers. Portability losses are still large, however. In addition, the transfer values that workers receive are subject to a large degree of actuarial discretion that can dramatically affect their size. Recent legislation (in particular the Pensions Act of 1995) has actually had the perverse effect of reducing transfer values for early leavers.

Chapter 4 quantifies the portability losses faced by workers who change jobs. Our analysis focuses on two types of portability loss:

- **Cash equivalent losses** arise because the early leaver's leaving salary is revalued to retirement age at a less favourable rate than used to determine the projected final salary. In computing transfer values, actuaries use the 'current unit method with revaluation' to revalue salaries, while they use the 'projected unit method' to project final salaries. These different methods lead to fewer 'added years' being credited in a new scheme than are earned in the leaving scheme. We show that, other things being equal about the entering and leaving scheme, about the jobs and about actuarial projections, the only factors determining the cash equivalent loss are the ages at separation and the estimated real growth rate of wages. The cash equivalent loss is largest in *absolute* terms for workers who leave schemes in middle age, but is *relatively* the highest for the youngest early leavers.
- **Backloading losses** due to the implicit backloading of contributions in a defined benefit scheme causes additional losses to those who switch to schemes which do not backload contributions. This type of loss is an especially significant consideration with the increasing importance of money purchase schemes.

From 6 April 1997, the 1995 Pensions Act imposes a Minimum Funding Requirement (MFR) for defined benefit pension schemes contracting out of SERPS. The individual's equivalent of the aggregate Minimum Funding Requirement

(MFR) is the Minimum Cash Equivalent. For the Minimum Cash Equivalent component of transfers, actuaries are required to base their assumptions concerning real wage growth, inflation rates and yields on securities on the MFR norms as specified in Guidance Note 27 of the Faculty and Institute of Actuaries, although they have some discretion to deviate from these norms. For any deferred benefit in excess of the Minimum Cash Equivalent, actuaries have considerably more discretion.

We show that, even if the MFR norms are realized and the actuaries make all transfer value calculations based on these norms, early leavers experience at least the **cash equivalent loss**. In addition, they also experience the **backloading loss** if their new scheme is a defined contribution scheme with age-independent contributions. With the MFR norms realized, early leavers will be indifferent as to whether to leave a deferred pension or to take the cash equivalent of their deferred pension as a transfer value to their next scheme.

Leaving a deferred pension is a better option if the actuaries *overestimate* the degree of future real wage growth and a transfer value is a better option if actuaries *underestimate* the degree of future real wage growth. The MFR norms stipulate a constant growth rate in wages of 2% per annum which is close to the historical average in the U.K.. However, it is a stylized fact of modern labour markets that most workers experience higher real wage growth early in their careers than nearer retirement. The implication of this is that the MFR norms will in general overestimate future wage growth for early leavers and as a consequence bias down the number of 'added years' that a given cash equivalent buys in a new scheme. This means that it is preferable on average for early leavers to choose to leave deferred pensions rather than to take transfer values to their new scheme. The downside to the financial advantage of the deferred pension option is the administrative inconvenience of having to draw a number of deferred pensions in retirement.

In Chapter 5, we apply a number of realistic job separation histories to the lifetime earnings profiles of a range of 'average' and 'typical' U.K. workers. We show that cash equivalent losses can be quite substantial: between 10% and 20% of the full service pension for those choosing deferred pensions and up to 30% for those taking transfer values. Losses are significantly larger for those switching into schemes that do not benefit from the implicit backloading of contributions in defined benefit schemes.

In Chapter 6, we review the discretion available to actuaries in making their calculations of cash equivalents. We compute elasticities of actuarial discretion which measure the ratio of the percentage change in the computed pension benefit to the percentage change in the actuarial assumption. We evaluate these elasticities at the MFR norms and find that small changes in actuarial assumptions can have relatively large effects on the value of the pension in payment. We examine the

following actuarial discretionary parameters in detail: discount rates, inflation uprating factors, annuity factors, and wage growth rates. With the exception of the annuity factor, the impact of changes in different assumptions depends on the time to retirement. We also identify a number of other areas (such as the valuation of discretionary benefits) over which the actuary also has discretion and on which it is not possible for us to comment in the absence of published documentation as to standard practice. We accept that individual circumstances can vary tremendously and recognize that either actuarial discretion or more complex rules (beyond the MFR assumptions) might be needed.

Chapter 7 examines pensions portability in other countries. We find that the Netherlands offers the highest degree of pensions portability and the U.S., at present, the least. The UK, along with Canada and Japan, comes somewhere in between.

In Chapter 8, we present a policy proposal which would not require major changes in legislation but would still improve dramatically the treatment of early leavers. It involves workers receiving some of their accrued contributions back when they leave a scheme in addition to a fraction of their accrued service credits calculated according to current methods. However, this proposal does not eliminate the portability losses of early leavers, it only reduces them. Within the context of defined benefit schemes, full portability requires either the complete transferability of service credits or the complete indexing of deferred pensions to real wage growth. In the absence of these changes to current practice, full portability in the context of private sector schemes can only be achieved using defined contribution schemes.

Contents

Chapter 1

Introduction

For at least two decades, the issue of the pension rights of early leavers has been a matter of public policy concern in industrialized countries such as the U.K. whose pension systems rely heavily on funded defined benefit private sector pension schemes.[1] In the U.K., the average worker changes jobs at least five times in his or her career (Booth, Francesconi, and Garcia-Serrano 1996). Only a small proportion of workers will hold the same job at retirement as when they began pensionable service: 4.6% of men and 1.1% of women have more than 30 years' tenure in a single company in the U.K. (Burgess and Rees 1994). Yet, about 60% of full-time male workers and 53% of full-time female workers are in occupational pension schemes ((Office of Population Censuses and Surveys 1996), p. 211), most of which are of the defined benefit type in which pension rights are either not fully portable or not fully preserved. We show that these people can lose a substantial fraction of their pension rights because they switch between jobs with different pension plans. This capital loss leads to strong labour market imperfections which tend to reduce job mobility.

The penalties for changing jobs that are built into most occupational pension schemes have broader implications. Workers who know that they face large portability losses may opt for personal pension plans which offer full portability but involve high charges and no employer obligation to contribute. Instead, the recent mis-selling of personal pension plans has proven to be a major and costly mistake and with fully portable occupational pensions, this crisis might have been averted. Another consequence of non-portability is that part-time workers and women who may spend years out of the labour force while their children grow up have lower participation rates in occupational pension schemes. Workers in high turnover occupations may opt to remain in SERPS (the State Earnings Related Pension Scheme), posing further financial burdens on the government. In

[1] See (Occupational Pensions Board 1981) for an early expression of this concern in respect of U.K. schemes.

addition, pension plans provide substantial tax relief to corporations, and if actuarial formulae do not account appropriately for early leavers, pension schemes may build up artificial surpluses and impose higher tax burdens on the rest of the population. Furthermore, actuarial formulae may incorporate an age bias if they have an implicit rising contribution rate for older workers, making it unprofitable for firms to hire or retain such workers.

In this report, we review how early leavers from pension schemes are penalized because:

- Pension rights are based on the final salary in each job, rather than at retirement. This will lead to lower benefits if there is real earnings growth over the life cycle.
- If employees leave a scheme during the vesting period, they will lose their pension rights.
- If preserved (deferred) rights are not indexed to real earnings growth or to the real return on securities, then early leavers will be penalized relative to stayers.
- There are penalties and variations associated with the calculation of transfer values to other pension schemes (including defined contribution schemes), or welfare costs of remaining in a defined benefit scheme when individual circumstances have changed.

These four penalties were identified in respect of UK pension schemes in the recent *Retirement Income Inquiry* (see (Johnson, Disney, and Stears 1996), p. 136)),[2] but they also arise in the defined benefit schemes of other industrialized countries (see, e.g., (Turner 1993) and (Turner and Watanabe 1995)). In addition, once a pension is in payment, the pensioner will suffer a detriment if the pension is not fully indexed to inflation. In Chapter 3, we analyze the effect on portability and preservation of pension rights in the UK of both current legislation and current actuarial guidance. In the light of this, we are able to quantify the size of portability losses faced by early leavers under different prescribed circumstances (Chapter 4).[3] This, in turn, enables us to estimate the portability losses experienced by different types of workers in the U.K. (Chapter 5). *We show that, using standard actuarial assumptions, typical workers may lose up to* 30% *of their pension due*

[2]These were also the four areas of concern of the OFT's inquiry as expressed in our terms of reference.

[3]Aspects of this analysis have been conducted before in the US (see, eg, (Hay/Huggins Company 1988) and (Gustman and Steinmeier 1989))

to early leaver penalties; even these penalties may be understated because of various charges, exclusions and variations in assumptions that are permitted to be made in calculating transfer values. In Chapter 6, we evaluate actuarial discretion and analyze the dependence of transfer value calculations on different actuarial parameters; we conclude that variations in actuarial assumptions can have a large effect on transfer values. In Chapter 7, we examine how the issue of portability and preservation of pension rights is treated in some other countries with funded defined benefit schemes.

Although early leavers are penalized under the current system, there are some economic arguments in support of an early leaver penalty. These arguments focus on the deferred pay feature built into defined benefit pension plans which is intended to raise worker retention rates, thereby increasing incentives for firms to invest in employee training. Thus, partly non-portable pensions can help counteract any tendency by firms to underprovide for training. However, non-portability is a two-edged sword: at the same time as it stimulates hiring, it also makes it harder for workers to switch to more efficient and better paid jobs. The structure of pension schemes therefore have implications for the allocation of labour in the economy. In Chapter 2, we review the literature on portability and the preservation of pension rights within the context of an analysis of the economics of pensions and labour mobility. Our main conclusion is that, even if one believes that there is an underprovision of training and a need for government incentives to counteract this, tax inducements for non-portable occupational pensions are a blunt instrument to use. The time it takes to amortize training costs is much shorter than the time to retirement; the young worker considering changing jobs is more likely to be influenced by instruments with shorter duration such as employee stock options and profit sharing, and the company considering investing in new workers is more likely to be affected by shorter-term instruments such as training subsidies. In addition, defined benefit pension plans place large risks on firms that provide pensions, since an ageing workforce renders them increasingly unattractive to corporations, in spite of the tax advantages.

While a mandatory, portable defined contribution pension scheme, such as implemented in Chile, Australia and elsewhere, is probably the best overall approach to maximizing labour market flexibility (Blake 1992), this may not be a feasible policy option in the short run. We therefore propose in Chapter 8 that early leavers receive a sliding scale cash equivalent of their accrued benefits which is a weighted average of contributions and projected benefits; the young will receive fairer treatment than at present, while early leaver benefits for the old will continue much as at present. We illustrate the effect of this policy proposal using the lifetime earnings profiles of some typical UK men and women workers and show that it substantially reduces portability losses while not imposing further risks on

firms.[4]

[4]Our proposal also has implications for women as well as pensions-and-divorce cases.

Chapter 2

Economic Theory of Pensions and the Mobility of Labour

2.1 The Tax Advantages of Pension Savings

Private pensions offer powerful inducements to save for old age, thereby providing the source of additional investment capital needed to stimulate economic growth, as well as helping to reduce the burden on the government of providing for the aged. To illustrate, consider a worker who faces the choice between putting $\pounds 1$ into a private pension plan or saving it in a unit trust (mutual fund) until retirement. If the worker puts money into the unit trust, he or she must first pay taxes on his or her earnings and then must pay taxes on both investment income and realized capital gains. On the other hand, wage income put in an occupational pension or personal pension plan is not taxed and neither is the investment income or capital gains; at retirement, the accumulated fund is taxed, although normally at a lower effective rate because of the possibility of taking a tax-free lump-sum, there are no National Insurance contributions payable and there is often a lower rate of income tax at retirement.[1] To give a simple illustration of the magnitude of these inducements to save for retirement, Table (2.1) presents the ratio of what the $\pounds 1$ of pension contributions is worth at retirement relative to $\pounds 1$ placed in a unit trust.[2]

[1] However, there are Inland Revenue limits on how much can be saved via an approved pension scheme.

[2] We assume that the income tax rate is 23% in work and 17% in retirement. In retirement, assuming a tax rate of 23% and that 25% of the pension can be commuted into a tax-free lump sum, then the effective tax rate is 17%. This calculation is for a money purchase scheme; defined benefit schemes are more complex, but the tax inducements and the percentage of the pension which is tax free are roughly similar (assuming an annuity factor of 12.5 (as discussed in Chapter 6 below) and that 300% of the initial annual pension can be taken as a tax-free lump sum). The specific formula used in Table (2.1) is $\frac{(1-\tau')[1+r]^R}{(1-\tau)[1+r(1-\tau)]^R}$ where τ' is the tax rate at retirement, τ

Years to Retirement	Investment Return	Relative Value of Pension
40	8.0 %	2.14
30	8.0 %	1.80
20	8.0 %	1.52
10	8.0 %	1.28
40	10.0 %	2.51
30	10.0 %	2.03
20	10.0 %	1.65
10	10.0 %	1.33
40	12.0 %	2.92
30	12.0 %	2.28
20	12.0 %	1.78
10	12.0 %	1.38

Table 2.1: Value of pension savings relative to non-tax-favoured savings.

The average long-term rate of return on UK equities is about 10% per annum (on a risk-adjusted basis); using this rate over the same 40 year investment horizon, Table (2.1) shows that for each $\pounds 1$ of savings accumulated in a unit trust after 40 years, there will be $\pounds 2.51$ of pension savings.

The effect of the tax advantages of savings using the pension scheme can also be illustrated in a simple diagram, Fig. (2.1), representing an individual's choice between consumption and savings over the life cycle expressed in two periods: 'young' (i.e., in work) and 'old' (i.e., in retirement). The horizontal axis shows consumption when young and the vertical axis represents consumption when old. The worker earns a wage W when young and can reallocate consumption between youth and old age along his/her budget constraint (WF) (whose slope is determined by the after-tax return on direct savings). With the availability of savings through a tax-favoured pension scheme, the worker earns a higher return by putting money into the pension scheme rather than into direct savings, so that it is possible to move along the bold broken line (WG). Preferences are captured by the indifference curves U_P and U_0 which express tradeoffs workers are willing to make and be equally well off. With the additional tax advantages, the worker chooses to save more (CW rather than C_0W) and enjoy a higher retirement consumption than otherwise (P rather than P_0).

Firms in Britain also have tax incentives to make contributions to occupational pensions schemes and these date from shortly after World War I, but the incentives

is the tax rate during the working life, r is the rate of return on investments and R is the number of years to retirement. This formula is simple and illustrative but the qualitative results would not change if it were made more complex to encompass additional institutional details.

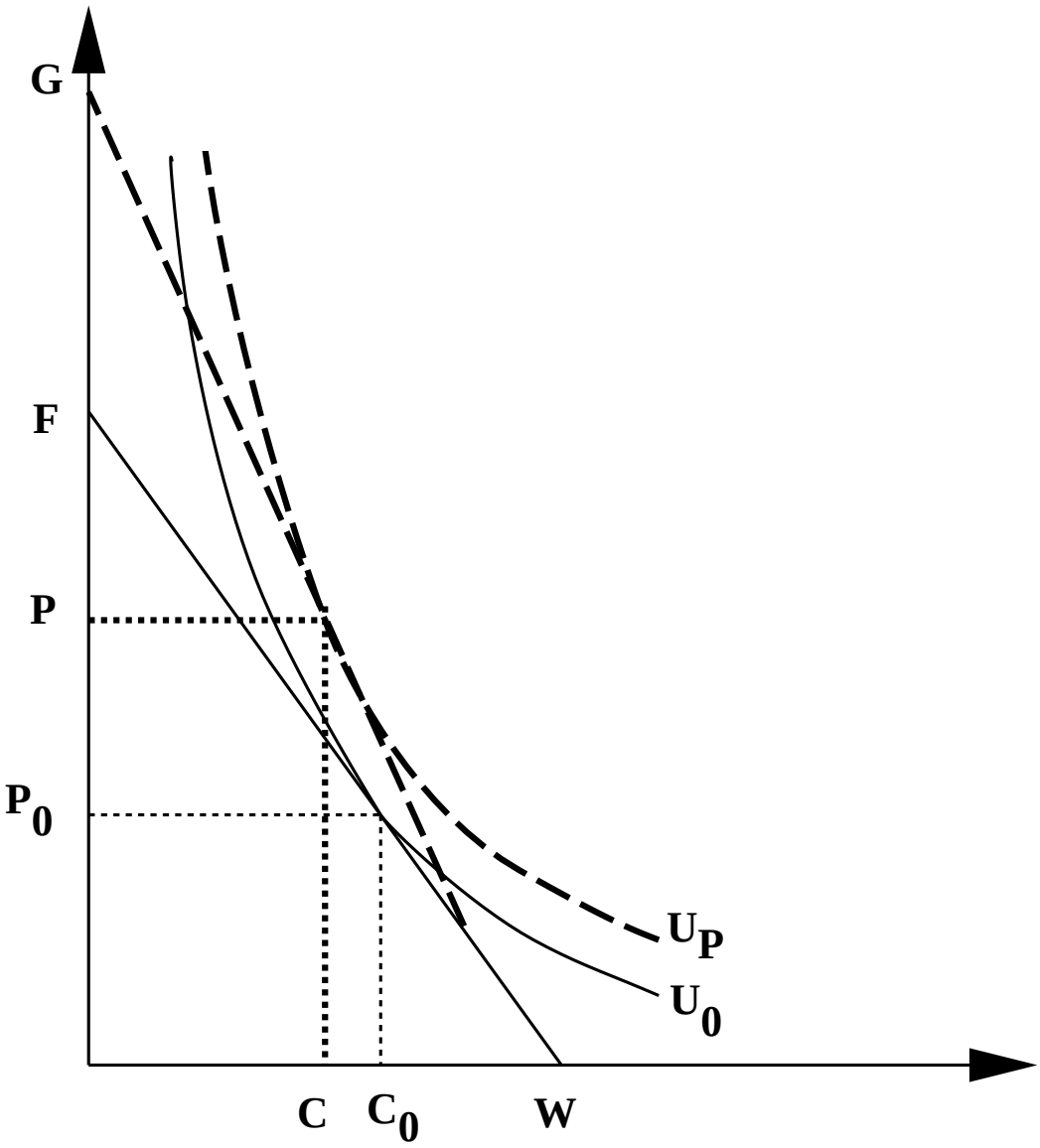

Figure 2.1: The effects of pensions on savings.

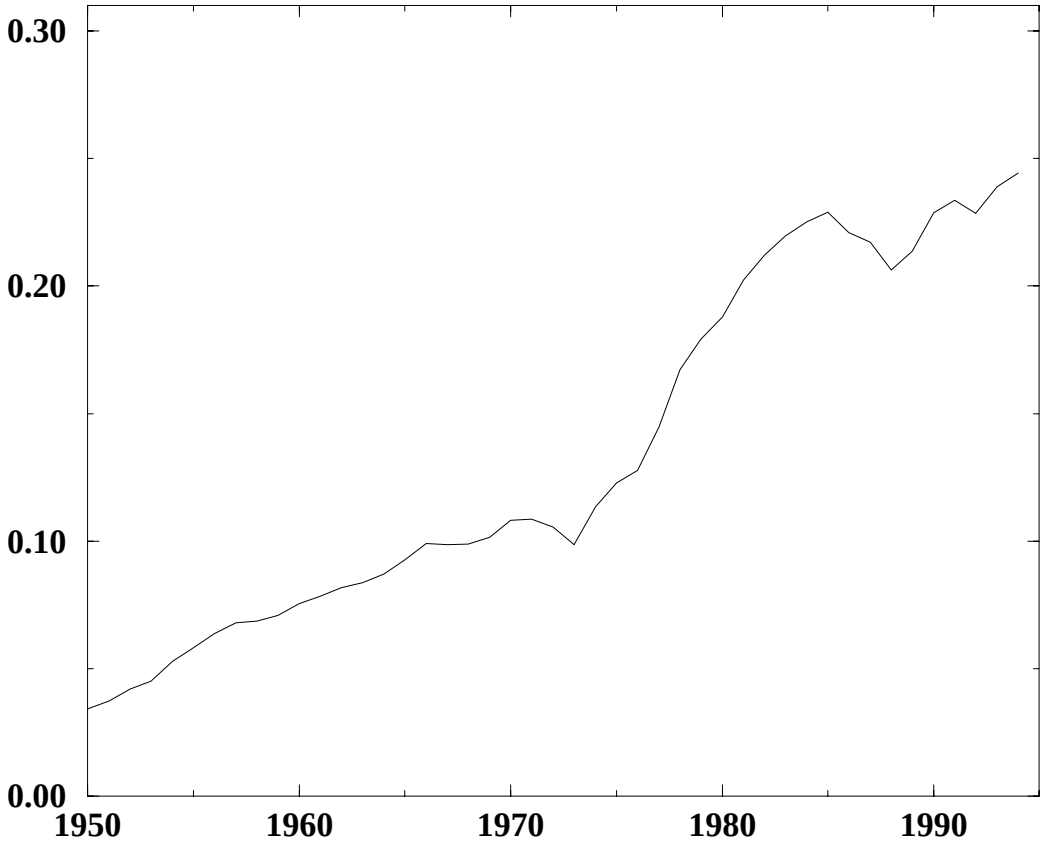

Figure 2.2: Ratio of private pension wealth to total wealth (Source: (Blake and Orszag 1997))

started to become particularly strong as a result of the high taxation of corporate profits after World War II and subsequent changes in tax rules such as those in the Finance Acts of 1956 and 1970 (c.f., (Blake 1995)). The result has been a steady increase in the ratio of private pension wealth to total wealth in the UK (which, in addition to private pension wealth, comprises housing assets, net financial assets and the value of basic state and SERPS pension wealth) as shown in Fig. (2.2)(c.f., (Blake and Orszag 1997)). Currently, the assets of private pension funds amount to three-quarters the size of the gross domestic product of the UK.

2.2 Pensions Portability

Most pension schemes in the UK are of the defined benefit type in which the size of the pension is related to the final salary and length of service instead of the level of contributions (and returns on these) as is the case with a money purchase or

defined contribution schemes ((Government Actuary's Department 1994), Table 5.2). This introduces complications for the pension portability for early leavers. 'Pension portability' is defined as *the capacity to carry the actuarially fair value of accrued pension rights from one job to the next* ((Turner 1993), p. 6). Similarly, 'portability loss' is defined as *the shortfall of actual retirement benefits from those that would have been paid if there had been no change in scheme membership as a consequence of job changes (either voluntarily or as a result of redundancy or firing) during the career* ((Ippolito 1986)).

Pension portability is associated with the portability of benefits, service or assets. Benefits are portable when a scheme member has a vested right to the real value of benefits accrued in the scheme at the time of leaving, in the sense that the accrued rights are indexed up to the retirement date in precisely the same way as would apply to a scheme member who remains in the scheme until retirement. Service is portable when the years of service in one scheme generate an equivalent number of 'added years' in a new scheme. Pension assets are portable when the scheme member receives a transfer value equal to the cash equivalent of the accrued benefits.

There are several types of portability loss. For example, scheme members can lose part or all of their pension rights if they leave during the vesting period or if they have a deferred pension from a scheme that is uprated to the retirement date at a less favourable rate than if they had remained in the scheme. Similarly, they can lose part of their pension rights if fewer than the equivalent number of added years are awarded in the new scheme.

Policies to reduce portability loss include ((Turner 1993), ch. 9): earlier vesting, indexing of deferred benefits to either price or wage inflation (i.e., calculating the present value of benefits by discounting future liabilities using a nominal market interest rate and then indexing that value to the growth in retail prices or national average earnings: in the latter case portability loss would be virtually eliminated), providing deferred indexed annuities, full service credit on transfer between jobs (also virtually eliminates portability loss, but provides a disincentive to employ older workers (Hutchens 1986)), a portability clearing house to administer asset transfers between schemes or to operate a central portability pension fund on a defined contribution basis, and moving over entirely to a system based on defined contributions. Many of the problems related to portability loss will be eliminated by the trend experienced in most industrialized countries away from defined benefit schemes towards defined contribution schemes. However, a different range of problems might have to be confronted in such circumstances: eg, high set-up and operating costs, inadequate and irregular contributions, high drop-out rates, low early surrender values, high volatility of fund values around the retirement date, and uncompetitive (i.e., actuarially unfair) annuity rates at retirement.

2.3 Economic Arguments On Portability Losses

Pension portability losses may be seen within the wider context of the design of an efficient labour contract (and in particular the design of an efficient pension contract) between a firm and its workers (Blinder 1981). Workers wish to have the best deal possible for their skills and circumstances and may well move between firms to achieve this. However, by doing so, workers could suffer a portability loss in terms of their pensions. But there is a countervailing argument based on the theory of equalizing differentials, which states that workers do not necessarily give up net pension wealth when they change jobs. This is because (unless they are fired or made redundant) they typically choose to move to jobs with higher pay, so that they can recoup any gross pension loss from leaving one job by earning greater pension rights in subsequent jobs; i.e., they can offset portability loss through higher pension benefits in future jobs.

But why should workers have to suffer any portability loss at all when they move jobs? Surely, portability loss just penalizes the most dynamic and efficient workers in the economy? A potential justification lies in the costs incurred by firms in managing and training their workers. There are three types of costs involved: the costs of training workers when they first join; the costs of monitoring the efficiency of their workforce on the job; and the costs of retaining on the payroll workers who have grown old and infirm. Firms can help to minimize these costs through the design of their pension scheme.

In other words, a firm can use the promise of a pension to provide an appropriate range of incentives to its workers. For example, the firm is more likely to invest in worker training and hence improve both worker productivity and wages if the trained workers can be persuaded to stay with the company through the promise of a pension that would otherwise be reduced if they left before the firm had recovered its training costs. Once trained, a worker has an incentive to move to a better paid job elsewhere, with the new firm also benefiting from the acquired skills of the worker without having to pay the training costs. The portability loss incurred on the pension scheme acts as a disincentive to such a move (Becker 1964). Similarly, the pension can be used to persuade a worker not to shirk in jobs where the efficiency of the worker is difficult to monitor. A defined benefit pension acts as a form of deferred compensation whose value increases over time and is at risk of being forfeited if the employer discovers that workers are shirking and fires them (Lazear 1979). If the size of the portability loss is set equal to the costs incurred by the firm in training its workers and of subsequently monitoring their performance, then the resulting job turnover that will still inevitably occur will be set at an efficient level. This is because the portability loss acts both to encourage training and to discourage shirking, while at the same time ensuring efficient job matching in the wider economy. Finally, a pension scheme can also

be used to induce the retirement of old workers once their productivity has fallen below their wage rate. This is because the pension scheme can be designed to reward additional service beyond an optimal retirement age (as decided by the firm) in an actuarially unfair manner ((Fabel 1994) and (Lazear 1979)).

There is substantial evidence that this happens (see, eg, (Mitchell 1982) and (Allen, Clark, and McDermed 1993)), but precisely how does it do so? First, most pension schemes are defined benefit schemes and they help to reduce turnover because they are 'backloaded' ((Bulow 1982), (Ippolito 1987), (Kotlikoff and Wise 1989) and (Lazear and Moore 1988)). This means that benefits (in relation to earnings) increase more rapidly the closer a worker is to retirement, since the benefit is based on final salary at retirement and this is generally much higher than salary earlier in the career. Each year of service late in the career of an employee buys a much bigger pension entitlement than a year of service early in the career. Total benefits depend on total service and final salary and both increase with tenure. There are therefore strong financial disincentives to early mobility (although some researchers dispute the extent of the financial disincentives (Gustman and Steinmeier 1995) or productivity effects (Dorsey 1995)). However, over a career as a whole, the 'portability loss schedule' (which shows *the difference between the value of the accrued benefits assuming an individual remains in the scheme until retirement and the value of the accrued benefits if that person leaves the scheme, as a function of their age at leaving*) is inverse U-shaped (as illustrated in Fig. (4.2) below). The portability loss is low early in the career because both service and earnings are low. It rises with service as benefits accumulate, reaching a peak for individuals in their 40s or 50s. But it then declines as the gap between early leaving and retirement age earnings narrows. At the retirement age itself, the portability loss reduces to zero. From the employer's position, backloading has two effects: the incentive in a downturn to layoff workers with long service and a disincentive to employ older workers.

Second, pension schemes act as a self-selection mechanism. Workers divide into 'stayers' and 'leavers' and the existence of a backloaded pension scheme can be used by a firm to provide an incentive for stayers to join the firm and to discourage people who know they are likely to be early leavers (Salop and Salop 1976). Third, jobs with pension schemes appear to offer a 'compensation premium' over those without pensions and this helps to reduce turnover in jobs offering pensions; the evidence supporting this argument is that turnover is higher in jobs without pensions than in jobs offering pensions, whether the pensions offered are backloaded (as in defined benefit schemes) or not (as in defined contribution schemes with age-independent contribution rates) (Gustman and Steinmeier 1995).

The deliberate backloading of defined benefit pensions reflects the original (nineteenth century, Victorian) view of pensions as a reward for loyal service by deserving, long-staying workers. That view extended well into the twentieth cen-

tury in the U.K.. It was not until May 1990 when the European Court of Justice ruled that pensions were equivalent to deferred pay within the definition of Article 119 of the Treaty of Rome that a more modern interpretation of pensions began to take hold. The use of a pension scheme in an attempt to influence and regulate worker behaviour over their working lifetimes was always going to be a fairly blunt instrument; the evolution of labour markets has made this instrument even blunter. There are other more flexible ways of influencing worker behaviour at different points in their careers, such as employee stock options, training subsidies, performance-related pay, team compensation, and more variable compensation profiles for older employees (c.f., (Lazear 1995) for details and examples). Because the duration of pension liabilities is not well-matched to that of training liabilities, nonportable pensions are not the best instrument for promoting hiring and securing employee loyalty.

2.4 Summary

The main conclusions from this chapter are:

1. Private pensions provide tax incentives to encourage savings. This leads to increased retirement income, more investment and fewer retirement liabilities that need to be met from government spending on state schemes.

2. In the absence of more direct and precise instruments for dealing with unrecovered training costs, monitoring employee performance and inducing retirement in a world where the firm does not have complete knowledge concerning the type or ability of the workers it employs, the economics literature argues that the pension scheme will be used (however bluntly) to deal with these matters. This should not in itself be regarded as unfair: it just becomes part of the calculation made by rational employees about the costs and benefits of leaving or staying in a particular job. After all, an employer in the U.K. is not obliged to operate a pension scheme or to contribute to an employee's own personal pension scheme.

3. There are two key issues of public policy concern:

   (a) **Is the portability loss workers suffer actuarially unfair in the sense of being higher than needed to recover training and monitoring costs?** In this case, the early leaver would be unfairly exploited by the firm. Although all these various 'costs' are difficult to determine and given a monetary value, the fact that there appears to be such a

wide variation in the size of the portability loss experienced by different workers in otherwise similar circumstances makes this a matter of legitimate public concern.

(b) **Are the government tax incentives for occupational pension schemes well-targeted?** There are substantial tax inducements in occupational pension plans and underprovision of training may be a legitimate public policy concern (Booth and Snower 1996). However, if firms are providing non-portable, firm-specific training, these tax incentives may not be well-targeted.

Chapter 3

The Impact of Legislation and Actuarial Guidance on the Portability and Preservation of Occupational Pension Rights in the UK

This chapter analyzes the effect of legislation on the rights of 'early leavers' (*people who move to a new job and cease to be members of their existing occupational pension scheme*) and reviews the state of actuarial practice as specified in the Institute and Faculty of Actuaries Guidance Notes (Institute and Faculty of Actuaries 1996). The outcome of U.K. legislation over the past two decades has been a dramatic improvement in the position of early leavers. Portability losses are still large, however. In addition, early leaver benefits are subject to a large degree of actuarial discretion that can dramatically affect their size. Nevertheless, we recognize that discretion is important because the circumstances of individual workers and individual pension schemes can differ tremendously. At the same time, however, it is likely that the most recent legislation (namely the 1995 Pensions Act) and the most recent revisions to the Institute and Faculty of Actuaries Guidance Notes will have some negative effects on early leaver benefits.

Under the current rules, individuals who change jobs and leave an occupational scheme can receive the 'cash equivalent' of their accrued pension benefits in the form of either a deferred pension or a transfer value. Before 1975, individuals had no such rights. We will illustrate the evolution of the rights of early leavers using the formula for the present value of the pension benefits at retirement of an

individual who joins a pension scheme at age t_{k-1} and leaves at age t:[1]

$$P(t_{k-1}, t) = \kappa a(t - t_{k-1})W(t)R(t, t_N)A(t_N)D(t, t_N) \tag{3.1}$$

where:

κ – a constant between 0 and 1 which captures the degree to which pension benefits are vested at the time of leaving,

a – the accrual rate (typically $\frac{1}{60}$),

t_{k-1} – the age at entry into the scheme,

t – the current age of the scheme member,

t_N – the normal retirement age of the scheme member,

$W(t)$ – the pensionable salary at age t,

$R(t, t_N)$ – the revaluation factor describing how benefits are uprated when wages and/or prices increase between ages t and t_N,

$A(t_N)$ – the annuity factor (the present value of a pension annuity of $\pounds 1$ per annum) at retirement age t_N (typically lies between $12 - 16$),

$D(t, t_N)$ – the discount factor ($\left[\frac{1}{1+r}\right]^{t_N - t}$ if the discount rate r is constant).

Eq. (3.1) shows that the pension benefit accrued at the time of leaving (assuming complete vesting; i.e., $\kappa = 1$) is the product of the accrual rate (a), years of service ($t - t_{k-1}$) and leaving salary ($W(t)$). The present value (at the time of leaving) of the corresponding pension benefits payable from retirement age is found by revaluing the accrued benefit to retirement age by the revaluation factor $R(t, t_N)$, capitalizing the subsequent stream of pension payments (multiplying by $A(t_N)$) and then discounting this capitalized sum back to the leaving date (multiplying by $D(t, t_N)$).[2]

From the point of view of the scheme, transfer values and deferred benefits have identical present values. However, from the early leaver's point of view, s/he is likely to have private information about career prospects in the new firm and may well value these two prospects differently. If career progression is projected to occur at a faster rate in the new firm than the old, the transfer value will result in a larger pension at retirement than the deferred benefit.

Deferred pensions and transfer values are of interest when workers change or leave a pension scheme. Since most pension schemes are job-specific, this is likely to occur when a worker changes jobs, but it may also occur if the worker wants to switch to a personal pension scheme. The public sector operates a portability

[1]This formula is presented to illustrate conceptually the evolution of UK legislation and actuarial practice on portability. In practice, actuarial formulae are somewhat more complex and may account for spouse's benefits and a variety of discretionary benefits. Complete formulae are presented in Appendices B and C.

[2]The concepts of discounting and capitalizing are reviewed in ((Blake 1990), Ch. 3).

clearing house in the form of a Transfer Club through which years of service in public sector schemes are fully transferable; such a system works well if the inflow of workers into a particular scheme is similar to the outflow. Some private pension plans are also industry-wide (e.g., electricity, railroads, university lecturers), so that workers who change jobs within this small subset of industries do not suffer portability loss either.

3.1 Portability Between 1975 and 1985

Before 1975, early leavers in the UK had no right under law to transfer their accrued pension entitlement to a new scheme or even to have a deferred pension from their old scheme. In Eq. (3.1), this corresponds to $\kappa = 0$. In practice, however, some schemes provided a frozen, deferred pension to early leavers (i.e., a pension related to the salary at the time of leaving, rather than at the time of retirement). This situation corresponds to $\kappa = 1$ and $R(t, t_N) = 1$ in Eq. (3.1). Setting $R(t, t_N) = 1$ means that early leavers lost out on two fronts compared with the stayers. First, the pension entitlement accrued by the time they left a scheme did not benefit from subsequent career progression. This is because real salaries at retirement are typically higher than real salaries earlier in the career, and long stayers benefit by having *all* their years of pensionable service valued in relation to their *salary at retirement* rather than their *leaving salary* (as is the case with early leavers). This meant that early leavers' 'frozen' pensions did not benefit from productivity growth. Second, the leaving salary of early leavers is a given nominal amount, and so its real value fell over time, whenever there was an increase in retail prices between the leaving and retirement dates. In other words, the deferred pensions of early leavers were frozen in the sense of not being protected or preserved against inflation.

The worker who stayed with the firm until retirement at retirement age t_N would have had a final salary proportional to $R(t, t_N) = [(1 + g)(1 + \pi)]^{t_N - t}$ instead of $R(t, t_N) = 1$ used in computing early leaver benefits; here g is the growth rate in *real* wages and π is the inflation rate in retail prices. The term in square brackets is therefore one *plus* the average growth rate in *nominal* wages between the leaving and retirement ages. The effects on a frozen pension of different inflation rates between the leaving and retirement dates are shown in Fig. (3.1), assuming real wages grow at a rate of 2% p.a.[3] For example, with an inflation rate of 6.74% (the average retail price inflation rate over the past forty years), anyone leaving a frozen, deferred pension with just 10 years to retirement would end up

[3]The average annual growth rate in real wages between 1955 and 1995 was 2.09% p.a., while the average rate of retail price inflation was 6.74% p.a.; however, the rate of inflation was much higher in the 1970s, averaging 13.67% p.a.

Years to Retirement	Inflation Rate	% of Full Service Pension
40	5 %	6.43 %
30	5 %	12.77 %
20	5 %	25.36 %
10	5 %	50.36 %
40	6.74 %	3.33 %
30	6.74 %	7.80 %
20	6.74 %	18.26 %
10	6.74 %	42.73 %
40	10 %	1.00 %
30	10 %	3.16 %
20	10 %	10.00 %
10	10 %	31.63 %
40	13.67 %	0.27 %
30	13.67 %	1.18 %
20	13.67 %	5.19 %
10	13.67 %	22.78 %

Table 3.1: Early leaver penalties with a frozen pension.

with a pension worth only 43% of one that was fully indexed against inflation.

In 1975, the Social Security Act of 1973 came into effect and this required pensions to be vested after a period of five years for those over 26 years of age. In Eq. (3.1), this corresponds to $\kappa = 0$ for the first five years that a member is in a scheme and $\kappa = 1$ thereafter.[4] The Social Security Act still did not require any uprating of the deferred pension (i.e., $R(t, t_N) = 1$) and so the penalties suffered by early leavers from both real wage growth and inflation continued.

3.2 Portability between 1985 and the 1995 Pensions Act

The position of early leavers was further improved in a series of legislation that included the Social Security Acts of 1985, 1986 and 1990. These provided for the uprating of deferred pensions to account for inflation up to a maximum of 5% per annum compound from April 1978 for those leaving occupational schemes

[4]Employee contributions are generally refunded so that, for schemes which have employee contributions, the effective value of κ is between 0 and 1.

after January 1991.[5] The 1985 Act also allowed those leaving employment to transfer the value of their accrued pension to another scheme or to a particular type of insurance policy called a section 32 buy-out policy (see (Blake 1995), sec. 6.4.2), (Freshfields Employment, Pensions and Benefits Department 1995), ((Fenton, Ham, and Sabel 1995), chs 6,10 and 11), and ((Reardon 1997), ch. 16)). In addition, the vesting period for employer contributions was reduced to two years by the Social Security Act of 1986.

In terms of Eq. (3.1), the effect of this legislation was to to enhance portability so that $\kappa = 0$ for the first two years of scheme membership and $\kappa = 1$ thereafter. In addition, it also gave early leavers a choice between accepting a pension at retirement in the leaving scheme, revalued for inflation up to a maximum of 5% ($R(t, t_N) = (1+\bar{\pi})^{t_N - t}$ where $\bar{\pi} = \min(0.05, \pi)$ and π is the realized (compound or geometric average) inflation rate) or taking a cash transfer value (computed by the leaving scheme's actuary) to a new scheme.[6] In comparison, the worker who stayed with the firm to retirement at age t_N would have had a final salary proportional to $R(t, t_N) = [(1+g)(1+\pi)]^{t_N - t}$ instead of $R(t, t_N) = (1+\bar{\pi})^{t_N - t}$ used in computing early leaver benefits.[7] Table (3.2) shows the early leaver penalties at different wage growth and inflation rates. The penalties in Table (3.2) for early leavers are smaller than those in Table (3.1), but they are still quite significant. Under the government's own Minimum Funding Requirement norms[8] (introduced in the 1995 Pensions Act), a worker who leaves his/her job 30 years prior to retirement only receives slightly over half the full service pension.

If, instead, the worker accepts a transfer value, his/her pension at retirement depends on the assumptions the actuary makes about a variety of factors, but for an actuarially fair computation of transfer values, s/he will suffer the same early leaver penalties as those illustrated in Table (3.2). Issues concerning actuarial discretion and the specifics of transfer value computation are covered in Chapters 4 and 6 below.

[5] In addition to the Social Security Acts, there were related Statutory Instruments: the Occupational Pension Schemes (Transfer Values) Regulations 1996 (SI 1996/1847), the Occupational Pension Schemes (Preservation of Benefit) Regulations 1991 (SI 1991/167), and the Occupational Pension Schemes (Minimum Funding Requirement and Actuarial Valuations) Regulations 1996 (SI 1996/1536).

[6] The Occupational Pensions Board (Occupational Pensions Board 1981) recommended that deferred pensions should be uprated in line with movements in national average earnings, a proposal that would have virtually eliminated portability losses. The 1985 Act was a direct consequence of the OPB report but, in offering only limited price indexation of deferred benefits, the Act fell short of the OPB's recommendations.

[7] The Guaranteed Minimum Pension portion of the contracted-out pension had to be uprated by the rate of increase in national average earnings but this requirement was removed by the 1995 Pensions Act so is not taken into account here.

[8] Real wage growth of 2% and an inflation rate of 4%; see Appendix A.

Years to Retirement	Inflation	Wage Growth (Real)	% of Full Service Pension
40	6.74 %	2.0 %	23.47 %
30	6.74 %	2.0 %	33.72 %
20	6.74 %	2.0 %	48.44 %
10	6.74 %	2.0 %	69.60 %
40	4.0 %	2.0 %	45.29 %
30	4.0 %	2.0 %	55.21 %
20	4.0 %	2.0 %	67.30 %
10	4.0 %	2.0 %	82.03 %
40	4.0 %	3.0 %	30.66 %
30	4.0 %	3.0 %	41.20 %
20	4.0 %	3.0 %	55.37 %
10	4.0 %	3.0 %	74.41 %

Table 3.2: Early leaver penalties with limited revaluation

3.3 The State of Current Legislation

One problem with deferred pensions is the difficulty an early leaver has in contacting his/her former pension schemes when s/he retires: they may have changed addresses, merged with other schemes, or even been wound up. A register of pension schemes and a tracing service have operated in the U.K. only since 1991. Deferred pensions also pose an administrative burden for occupational schemes. It is thus a potentially useful option to transfer the cash equivalent of the deferred pension to another occupational pension scheme or to a personal pension scheme. The 1995 Pensions Act introduced a number of provisions relating to transfer values and eliminated the Guaranteed Minimum Pension provisions for contracting out of SERPS.[9]

After the Pensions Act of 1995 came into effect on 6 April 1997, the cash equivalent must be applied in one of the following ways:

1. A refund of the early leaver's contributions if he/she has been a member of an occupational pension scheme for less than 2 years (i.e., the vesting period for UK pension schemes is 2 years).[10]

[9]Contracting out now requires schemes to provide Minimum Cash Equivalents and satisfy a Minimum Funding Requirement. For a readable review of the 1995 Pensions Act, see (McKenna and Co. 1996). More detailed information is available in (Freshfields Employment, Pensions and Benefits Department 1995) as well as the relevant DSS consultation papers (Department of Social Security 1995).

[10]Although there is no statutory obligation to refund non-vested employee contributions, it is

2. Used to buy a deferred or preserved pension payable at normal retirement age in the leaving scheme or in the new employer's scheme if the new employer is willing to provide this deferred pension.

3. Used to finance the transfer of service to a new employer's exempt approved occupational pension scheme on a defined benefit basis (i.e., the transfer value is used to buy 'added years' in the new scheme); the new employer must be able and willing to accept this transfer.

4. Used to buy 'protected rights' to a pension annuity on a defined contribution (or money purchase) basis either in:

   (a) a new employer's scheme (if the employer is able and willing to accept this transfer into his/her contracted-out money purchase scheme), or

   (b) an appropriate personal pension scheme (first permitted from 1 July 1988 by the 1986 Social Security Act), or

   (c) a section 32 buy-out policy (a policy arranged by insurance companies which provides deferred annuities and is named after the section of the 1981 Finance Act that first permitted such schemes).

If an employee leaves a scheme that has been contracted-out of SERPS before completing 2 years of qualifying service, s/he will generally receive a lump sum cash payment equal to the sum of the contributions s/he has paid into the scheme.[11] But s/he is not entitled to any interest on these contributions (although the employer may add interest) or to the contributions made on his/her behalf by the employer. In addition, the lump sum is taxed at 20%. If the original contributions were relieved at 23%, this means that every $£100$ of contributions costs $£77$ and returns $£80$ if this right is exercised.

The Pension Schemes Act 1993 states that "A scheme must provide for short service benefit to be computed on the same basis as long service benefit" (s74(1)). This implies that benefits must accrue uniformly at a constant fraction (eg, 1/60th for each year of service) of final pensionable pay (as of the date of retirement in the case of long service benefit (LSB) and of the date of leaving service in the case of short service benefit (SSB)). The short service benefit becomes a deferred pension at normal retirement age in the leaving scheme. Between the leaving date and the retirement date, the SSB has to be revalued according to rules that depend on the leaving date.

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the general practice to do so.

[11] However, the employer is entitled to deduct the implicit cost that the scheme has incurred in providing death-in-service and invalidity benefits for its members.

For someone leaving a scheme on or after 1 January 1991, the following rules apply. Pension benefits accrued before 6 April 1978 (the date SERPS came into operation) are subject to 'limited price indexation' (LPI) between the leaving and retirement dates. LPI involves uprating the deferred pension by the rate of retail price inflation up to a limit of 5% pa compound (LPI was first introduced by the 1990 Social Security Act). For pension benefits accrued on or after 6 April 1978 but before 6 April 1997, the component of these benefits in excess of the 'Guaranteed Minimum Pension' (GMP) are subject to LPI between the leaving and retirement dates. The GMP for both the member and widow/er (which between 6 April 1978 and 5 April 1997 schemes had to provide in order to contract out of SERPS) has to be revalued between the leaving date and state pension age in one of three ways: (a) by full revaluation in line with increases in national average earnings (known as revaluation of earnings factors or 'section 148 orders'), (b) by 'limited rate revaluation', namely 5% p.a. compound plus the payment of a limited revaluation premium to the National Insurance Fund to cover increases in national average earnings in excess of 5% p.a. compound; or (c) 'fixed rate revaluation' of 6.25% p.a. compound for those leaving after 6 April 1997, 7% p.a. compound for those leaving between 6 April 1993 and 5 April 1997, 7.5% p.a. compound for those leaving between 6 April 1988 and 5 April 1993, and 8.5% p.a. compound for those leaving before 6 April 1988.[12]

For someone leaving a scheme before 1 January 1991, the GMP is revalued as above, but only the pension in excess of the GMP that is accrued on or after 1 January 1985 is subject to LPI between the leaving and retirement dates. For someone leaving a scheme on or after 6 April 1997, limited rate revaluation ceased to be an option for revaluing the deferred GMP that had been accrued up till this date. The GMP ceased to accrue from this date, and all of the SSBs accruing after this date is subject to LPI between the leaving and retirement dates. These are minimum requirements and do not prevent schemes acting more generously than this (up to Inland Revenue limits).

Once in payment, the general rule is that the SSB is subject to LPI (so long as the pensioner is above 55 years of age, unless s/he is permanently incapacitated by mental or physical infirmity from engaging in full-time employment). However, the component of the SSB constituting the deferred GMP is fully indexed to retail price inflation once it is in payment (this is because it corresponds to the SERPS pension that it replaced and which is itself fully indexed). For GMP rights accrued between 6 April 1978 and 5 April 1988, the full amount of uprating once in payment is paid for by the Department of Social Security via the state pension. For GMP rights accrued between 6 April 1988 and 5 April 1997, the scheme itself is responsible for meeting increases in the retail price index up to a maximum of

[12]Note that public service schemes pay full price indexation on the full pension.

3% pa, with the DSS paying any difference between 3% and full indexation again via the state pension.

Turning now to benefits that are transferred from one scheme to another, the rules are as follows. Anyone leaving a scheme (or, for those leaving service after 1 January 1996, anyone who has ever left a deferred pension in a previous scheme) has the right to have the cash equivalent of his/her accrued rights transferred to a new scheme and this right can be exercised up to one year before the leaving scheme's normal retirement age. The cash equivalent represents the present value of the future benefits to which the employee is entitled as of the date the transfer value is requested, taking into account any increases, statutory or discretionary, that would apply to the benefits had they remained preserved in the scheme. The calculation of the cash equivalent must be undertaken by a qualified actuary as specified in Guidance Note 11 of the Institute and Faculty of Actuaries (see Chapter 4 below). This sum is guaranteed for 3 months and must be paid within 6 months of a request for a transfer.[13] The sum must be shown in a written 'statement of entitlement' sent to the early leaver. Failure to comply with these conditions can lead to monetary penalties being imposed on the trustees by the Occupational Pensions Regulatory Authority (OPRA).

The receiving scheme must also assume the GMP liabilities of the transferring member (accrued until 5 April 1997). From 6 April 1997, only the following possibilities are available in respect of an early leaver's GMP. It can remain deferred in the leaving scheme, transferred to another contracted-out salary-related scheme, converted into protected rights in a contracted-out money purchase scheme or an appropriate personal pension scheme, or bought out with a section 32 buy-out policy. The scheme of the new employer is not obligated to accept the transfer. The transfer may take the form of a deferred benefit or money purchase credit, but, according to the Government Actuary's Department and surveys of the National Association of Pension Funds (NAPF), most transfers take the form of service credits, and, for public schemes, this is the only option.

If the early leaver places the transfer value in a regular premium personal pension scheme, the initial charges are ordinarily quite high, possibly up to 25% of the value of any initial lump sum contribution. Thus, after receiving the transfer value, the worker loses another substantial fraction of it to charges.[14] Further, personal pensions tend to have relatively high annual charges imposed on additional regular premiums with the average annual percentage charge being about 2.5% ((Blake 1995), sec. 7.3.4). In addition to losing a substantial fraction of the incoming transfer value, the worker also bears all the asset market risk on the

[13] If payment would reduce the security of benefits of other members, payment may be delayed or reduced (Sec. 5.1 of GN11).

[14] Workers could instead put the transfer value into a low commission single-premium personal pension scheme for which charges might be only 4% but such schemes are not well-advertized.

scheme's investments.

3.4 Implementation of the Laws on Cash Equivalents

The actuarial profession has to implement the legislation on transfer values and the preservation of pension rights and does so on the basis of Guidance Notes published by the Institute and Faculty of Actuaries (Institute and Faculty of Actuaries 1996). The most relevant ones are:

1. Guidance Note 11: Retirement Benefit Schemes - Transfer Values
2. Guidance Note 26: Pension Fund Terminology
3. Guidance Note 27: Retirement Benefit Schemes - Minimum Funding Requirement

We will review these particular guidance notes in terms of the specific information on computing transfer values.[15]

Guidance Note 11 (GN11) provides the key framework for actuarial practice on the calculation of transfer values. A new version of GN11 was released to satisfy the requirements of the Pensions Act of 1995. GN11 only applies to individual transfer values where a cash equivalent under the Pension Schemes Act of 1993 applies and to the valuation of director's pensions in annual reports. The Secretary of State for Social Security has also approved GN11 for valuing pension benefits in divorce.[16] The new version of GN11 now includes the treatment of the effects of the Minimum Funding Requirement for contracted-out schemes (evaluated using GN28) and has more stringent rules and allows less discretion on the computation of Minimum Cash Equivalents than other pension liabilities. The key principle for computing transfer values is that they should equal the actuarial value of preserved benefits (GN11 version 7.0, 3.1):

[15]Other guidance notes of the Institute and Faculty of Actuaries relevant to pensions are: Guidance Note 3 (Certificates for the Occupational Pensions Board), Guidance Note 4 (Insolvency of Employers: Safeguard of Occupational Pension Scheme Contributions), Guidance Note 9 (Retirement Benefit Schemes - Actuarial Reports), Guidance Note 16 (Retirement Benefit Schemes - Bulk Transfers), Guidance Note 17 (Accounting for Pension Costs under Statement of Accounting Practice No. 24), Guidance Note 19 (Retirement Benefit Schemes - Deficiency on Winding Up), Guidance Note 28 (Adequacy of Benefits for Contracting-out on or after 6 April 1997), Guidance Note 29 (Occupational Pension Schemes - Actuaries Advising the Trustees of a Participating Employer).

[16]See (Department of Social Security 1996) for more information on this topic. GN11 has also been approved in Northern Ireland and Scotland for valuation of pensions benefits in divorce.

> It is a fundamental requirement, stemming from legislation, that a cash equivalent should represent the actuarial value of the benefits which would otherwise have been preserved....

In addition, incoming transfers should be valued using the same methods and assumptions as for outgoing transfers (but with permissible adjustments for projected salary increases on incoming transfers). The actuary will include discretionary benefits in the calculation of transfer values (unless the trustees prohibit this). They may also make allowance for early retirement and administrative costs. Protected rights calculations must be performed for those transferring money to a money purchase scheme or to an appropriate personal pension scheme. There are also rules for partial cash equivalents for those who remain with the firm but who switch to a personal pension scheme, preserving their accrued benefits in their original scheme. The actuary is required to certify that the calculations are in accordance with legislation and actuarial practice; an appendix to GN11 includes a sample certification to the trustees. Departures from normal bases of calculations are allowed when the scheme is substantially in deficit or in certain circumstances where previously added years have been credited.

For Minimum Cash Equivalent calculations, the actuary is required, with some exceptions, to use the MFR norms stated in GN27 (and reproduced below in Appendix A). These assumptions cover mortality rates, equity and gilt yields, rates of inflation, and real wage growth. If the actuary produces a transfer value using a method which would in aggregate produce Minimum Cash Equivalents for the whole scheme different from the MFR, s/he is required to inform the trustees.

3.5 Summary

In this chapter, we have reviewed UK legislation on portability and shown how the rules affect the computation of transfer values and deferred pensions. There has been a dramatic improvement in pension portability over the past twenty years but workers who change jobs still suffer substantial portability losses.

In the next chapter, we will use the Guidance Notes published by the Institute and Faculty of Actuaries to quantify the portability losses suffered by early leavers. In the following chapter, we estimate that portability loss that would be experienced by both ‘average’ and ‘typical’ workers in the U.K. on the basis of different job separation assumptions. We will use MFR norms in our calculations. Because individual circumstances differ, actuaries have discretion over many of the assumptions used, particularly in non-Minimum Cash Equivalent cases. We will subsequently (Chapter 6) analyze the effects of actuarial discretion on transfer values.

Chapter 4

Quantifying Portability Losses Based on Current Legislation and Actuarial Guidance in the UK

In this chapter, we show that there are two types of portability loss faced by early leavers in the U.K.: a 'cash equivalent loss' and a 'backloading loss'.[1]

4.1 Cash Equivalent Loss

In order to quantify the size of the cash equivalent loss, we need to follow the precise methods used by actuaries in valuing the accrued rights of pension scheme members. These methods differ depending on whether the member is treated as being a continuing (or ongoing) member of the scheme or treated as being an early leaver. In the first case, actuaries will use the 'projected unit method' (PUM) to value their accrued rights, while in the second case they will use the 'current unit method with revaluation' (CUM). The first method recognizes that pension rights accrued to date will cost the scheme more to deliver if the member stays until retirement, since these rights will depend on the retirement salary which is typically higher (at least in nominal terms) than the current salary; this method therefore needs to make projections of the nominal final salary of the member. The second method takes account of the fact that, for the early leaver, the pension

[1]We make certain simplifying assumptions. We ignore GMP liabilities as they have been discontinued. We also assume that incoming and outgoing schemes value death-in-service and spouse's benefits, etc. in similar ways. These subtleties are examined in Chapter 6 which reviews actuarial discretion in computing transfer values. We assume an annuity factor throughout of 12.5. (The choice of annuity factor and its effect on the computation of transfer values are considered in sec. 6.3 below; however, assuming that actuaries agree on the annuity factor, we show in this chapter that the choice of annuity factor does not affect the relative portability loss.)

rights accrued to date are frozen at the current or leaving salary, although under current legislation this salary is typically revalued using a specified revaluation factor to retirement age.[2] *It is because the leaving salary is revalued to retirement age at a less favourable rate than used to determine the projected final salary that a portability loss arises in respect of an early leaver's service in a given pension scheme.*

When an individual leaves his/her pension scheme, s/he can ask the scheme to calculate the 'cash equivalent' of the accrued benefits at the departure date. The actuary will use the CUM to do this. The early leaver then has the choice of becoming a deferred member in the leaving scheme (in effect using the cash equivalent to buy a deferred pension in the leaving scheme) or taking the cash equivalent as a transfer value into a new scheme (assuming the new scheme is willing to accept this transfer value). From the leaving scheme's point of view, the deferred pension and the transfer value cost the same, so the leaving scheme will be indifferent as to the choice made by the early leaver (disregarding, of course, the additional administrative costs involved with the first option). If the new scheme accepts the transfer value on a defined benefit basis, it will generate service credits or added years in the new scheme. The number of added years will be determined using the PUM since the new member will be treated as a continuing member of the new scheme.

The PUM values the accrued pension of a fully-vested member aged t who joined the scheme at age t_{k-1}, as follows:[3]

$$\begin{aligned} P_{PUM}(t_{k-1},t) &= a\,(t-t_{k-1})\,W(t)\,R(t,t_N)\,A(t_N)\,D(t,t_N) \\ &= a\,(t-t_{k-1})\,W(t)\,\left[(1+g)(1+\pi)\right]^{t_N-t}A(t_N)\,D(t,t_N) \end{aligned} \tag{4.1}$$

where:

a – the accrual rate (typically $\frac{1}{60}$),

t_{k-1} – the age at entry into the scheme,

t – the current age of the scheme member,

t_N – the normal retirement age of the scheme member,

$W(t)$ – the pensionable salary at age t,

$R(t,t_N)=\left[(1+g)(1+\pi)\right]^{t_N-t}$ – the revaluation factor describing how benefits are uprated between ages t and t_N,

$A(t_N)$ – the annuity factor (the present value of a pension annuity of $\pounds 1$ per annum) at retirement age t_N (typically lies between $12-16$),

[2]The PUM and CUM are examples of 'accrued benefits funding methods'.

[3]For clarity, this formula assumes time-invariant rates of discount and wage growth and a one-year control period. More generally, $P_{PUM}(t_{k-1},t)=a(t-t_{k-1})A(t_N)PV(W(t_N))$ where $PV(.)$ is the present value function.

g – the growth rate of real wages (MFR norm 2%),
π – the inflation rate (MFR norm 4%),
r – the discount rate (MFR norm $8\% - 10\%$),
$D(t, t_N)$ – the discount factor ($\left[\frac{1}{1+r}\right]^{t_N - t}$ if the discount rate r is constant).

If we take the MFR norms, the PUM projects the final salary of the member on the basis of a real growth rate in wages of $g = 2\%$ and an inflation rate of 4% (implying a growth in nominal wages of about 6% p.a.).

The CUM values the accrued pension of a member aged t who joined the scheme at age t_{k-1} as follows:

$$P_{CUM}(t_{k-1}, t) = a(t - t_{k-1})W(t)\,(1 + \bar{\pi})^{t_N - t}\,A(t_N)D(t, t_N) \qquad (4.2)$$

where:

$\bar{\pi}$ – revaluation rate for the deferred pension (MFR norm 4% p.a.).

In Fig. (4.1) we plot the values of Eq. (4.1) and Eq.(4.2) against the scheme member's age using MFR norms. In particular, the discount rate used is the same as the yield on equities assumed by the MFR (i.e., 9%) until 10 years before the 'MFR retirement age'[4]; in the ten years before the MFR retirement age, the discount rate is somewhere between 9% and 8%[5]; after the normal retirement age, the appropriate discount rate is the same as the yield on gilts assumed by the MFR (i.e., 8%); and, if the MFR retirement age is before the normal retirement age, a discount rate of 10% is to be used between the MFR retirement age and the actual retirement age. The worker is assumed to begin his/her working life at age 25 and retire at 65 and has an initial annual salary of $£15,000$. In Fig. (4.2), we plot the difference between Eq. (4.1) and Eq.(4.2); this difference captures the portability loss (measured along the vertical axis) suffered the *first time* a worker (who joined a scheme at the age of 25) leaves the scheme, as a function of the age of leaving.

Fig. (4.2) shows that the *absolute* penalty for one change of job is inverse U-shaped. Since the average worker switches jobs at least five times, we need a formula for the total pension received relative to the pension that would have been received had the worker worked a full career at a single firm *or* had an 'equivalent' defined contribution scheme. The standard actuarial practice in the U.K. is to use Eq. (4.2) to value outgoing transfers and Eq. (4.1) to value both incoming trans-

[4]The MFR retirement age is the earliest age at which a member can retire without a reduction in pension (Statutory Instrument 1996/1536, Minimum Funding Requirement and Actuarial Valuations). For example, for a scheme that allows early retirement without penalty at age 55, the MFR retirement age is 55. We assume that all workers are pre-MFR retirement age.

[5]The actual adjustment involves multiplying the formulae Eq. (4.1) and Eq. (4.2) (which are calculated using a pre-MFR retirement age discount rate of 9%) by $(1 + 0.005 \times n)$ where n is the minimum of 10 and the years to MFR retirement age.

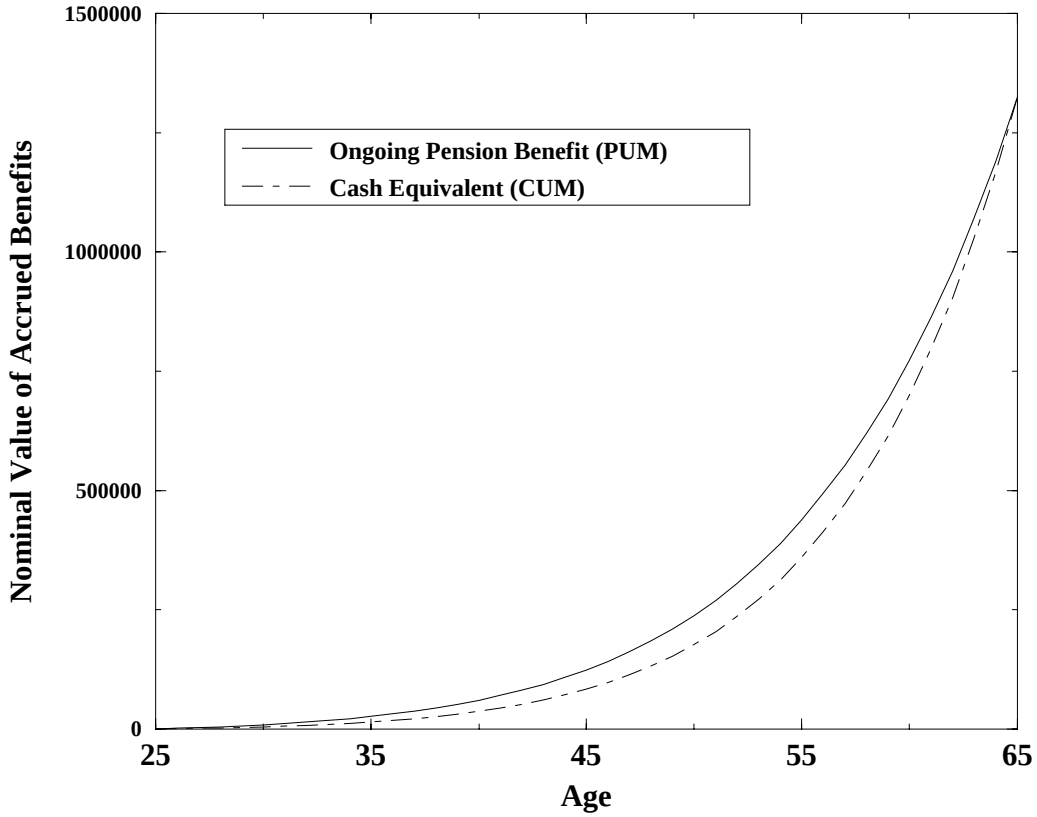

Figure 4.1: Accumulated values of ongoing pension benefit and cash equivalent.

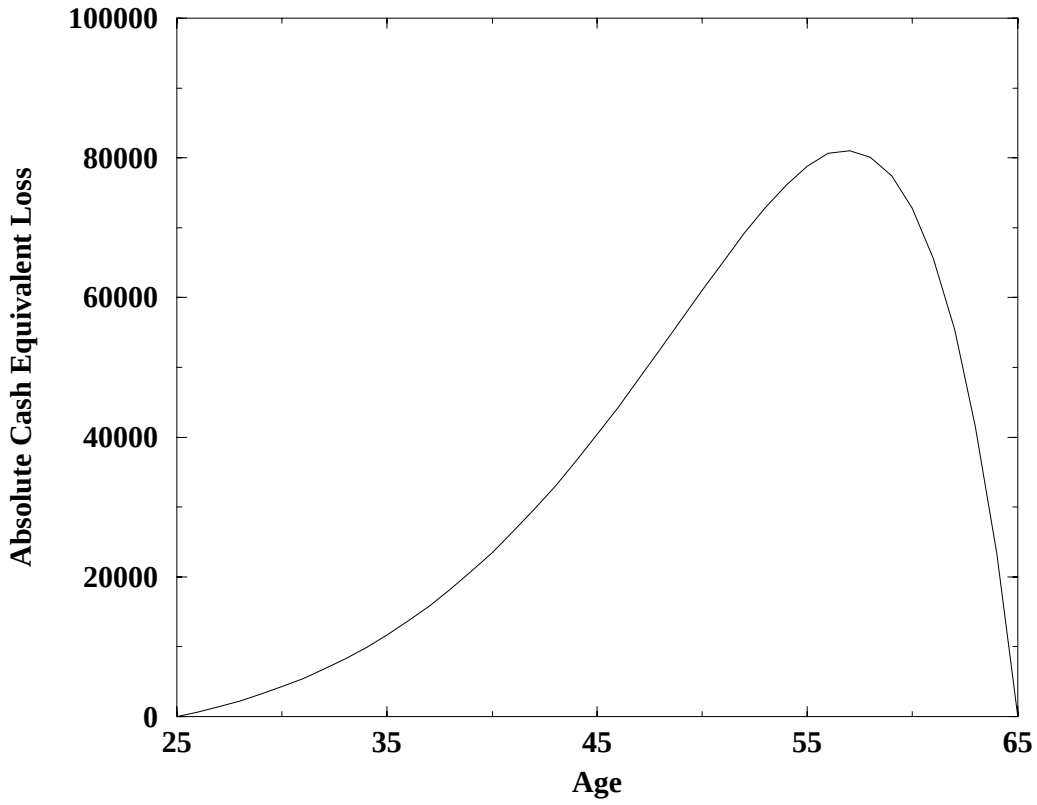

Figure 4.2: Difference between ongoing pension benefit and cash equivalent.

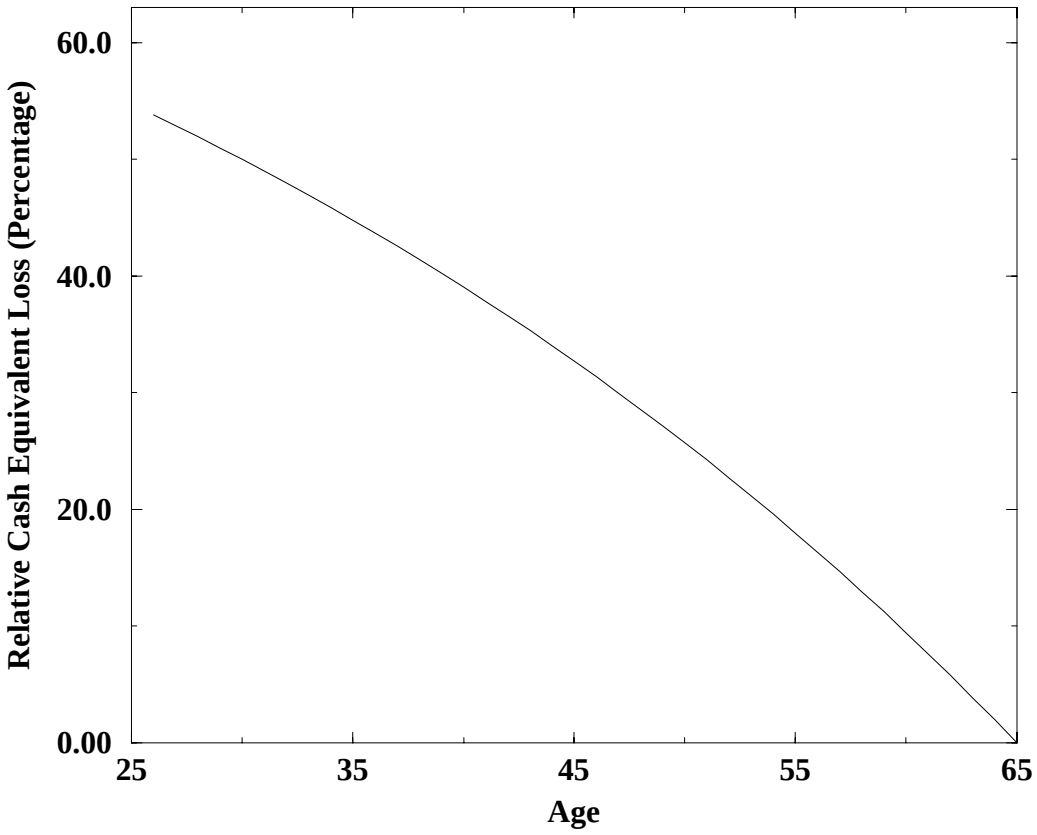

Figure 4.3: Relative cash equivalent loss as a proportion of the ongoing pension benefit.

fers and the accrued benefits of continuing members. Standard practice therefore produces a ratio of transfer value to ongoing value of:

$$\lambda(t) = \frac{(1+\bar{\pi})^{t_N - t}}{(1+g)^{t_N - t}(1+\pi)^{t_N - t}}. \tag{4.3}$$

Eq. (4.3) shows the fraction of the pension received relative to what would have been received in the absence of pension portability problems.[6]

While Fig. (4.2) shows that the *absolute* loss is highest for someone who leaves a scheme in their 50s, the *relative* loss of years is greater the further the early leaver is from retirement. Fig. (4.3) shows the relative cash equivalent loss is a decreasing function of age. Early leavers are therefore penalized relatively more than long stayers under current legislation and actuarial practice.

For workers who change jobs multiple times during their careers and always leave deferred pensions, the total portability loss (PL_{DP}) is given by:

$$PL_{DP} = \frac{\sum_{k=1}^{N} \lambda(t_k)\,[t_k - t_{k-1}]}{t_N - t_0} \tag{4.4}$$

where N is the number of jobs held, t_k is the leaving age from the kth scheme, t_{k-1} is the entry age into the kth scheme, and t_0 is the date of entry into the labour force.[7]

Suppose instead that the worker always takes transfer values, then the pension s/he receives depends on the *estimated* real wage growth and inflation uprating factors chosen by the actuary in the receiving scheme instead of the realized quantities. Plugging in the actuarial estimates of real wage growth ($\hat{g}$) and inflation uprating factor ($\hat{\pi}$) into the denominator of Eq. (4.3), we obtain $\hat{\lambda}(t)$, the ratio of years of service in the new scheme to those in the old scheme. Since $\hat{\lambda}(t) < 1$ with positive real wage growth, fewer years are credited than years worked. If a worker who has several jobs always chooses transfer values, his/her portability loss (PL_{TV}) is given by:

$$PL_{TV} = \frac{\sum_{k=1}^{N} \hat{\lambda}(t_k)\,[t_k - t_{k-1}]}{t_N - t_0}. \tag{4.5}$$

[6]While our formulae do not take into account spouse's benefit and death prior to retirement, the result in Eq. (4.3) is robust to altering these assumptions.

[7]Consider a worker who receives a number of deferred pensions: s/he receives a total pension proportional to $\sum_{k=1}^{N}(t_k - t_{k-1})W(t_k)(1+\bar{\pi})^{t_N - t_k}$. The worker who works until retirement with the same firm receives a pension proportional to $(t_N - t_0)W(t_N)$. The latter expression can be written as: $(t_N - t_0)((1+g)(1+\pi))^{t_N - t_0}W(t_0)$ and the former can be written as: $\sum_{k=1}^{N}(t_k - t_{k-1})W(t_0)\left[(1+g)(1+\pi)\right]^{t_k - t_0}(1+\bar{\pi})^{t_N - t_k}$. Taking the ratio of these expressions produces the formula in Eq. (4.4).

This formula assumes that the new scheme accepts the transfer values which it is not legally required to do. This issue will be discussed in more detail below.

To illustrate these formulae, we will assume that the MFR norms are realized in the sense that the actual outcomes for wage growth and inflation rates and asset returns correspond exactly to the MFR assumptions. In this case, Eq. (4.4) and Eq. (4.5) are equal to each other. We consider the cash equivalent loss of an individual who switches pension schemes several times during his/her career and compare the resulting pension with that of someone who stayed in a single defined benefit scheme for their whole career or someone who joined an 'equivalent' portable defined contribution scheme. The constant contribution rate for this 'equivalent' defined contribution scheme is determined by the ratio of the the present value of pension benefits to the compound value of salaries as of the retirement date.[8] With MFR norms satisfied, this contribution rate works out to be 12.2%. However, this contribution rate ignores administrative costs as well as the costs of providing additional benefits (such as death-in-service benefits). With these costs added, the contribution rate would be closer to the industry average contribution rate of about 15%.

Eq.(4.4) shows that *the only factors determining portability loss are the ages at separation and the estimated real growth rate of wages*.[9] . UK empirical work indicates that workers hold at least 5 different jobs and that they change jobs much more frequently when young (Booth, Francesconi, and Garcia-Serrano 1996). We therefore consider three baseline examples, two of which have workers changing jobs frequently and one in which a worker only changes jobs once. The first involves a worker (referred to as MFR worker 'A') who enters the labour force at age 25 and has separations at ages $28, 29, 30, 40, 57$ and therefore holds six jobs. The total pension received is approximately 75.12% of that for a full service pension. The total service credits from the various jobs are shown in Table (4.1).[10] Fig. (4.4) shows the accrued defined benefit pension as a fraction of the full service defined benefit pension; the black area represents the effect over this worker's career of the portability loss implicit in UK pensions legislation.[11]

As a second baseline example, we consider MFR worker 'B' who enters the labour market at age 25 and in early career switches jobs more frequently with separations at ages 26, 27, 30, 31, 38, 44, and 55. The total pension received at

[8]Since expectations are realized, no surpluses or deficits accrue and the funding formula is equivalent to prospective benefits (or aggregate liability) funding methods such as the attained age method (see section 4.2 below and (Institute and Faculty of Actuaries 1984))

[9]This is because the MFR norms are realized over the remaining lifetime of the member, so that π, $\bar{\pi}$ and $\hat{\pi}$ are all equal.

[10]Note the pensions in the second and third job are not vested, so the accrued service from these two jobs is zero.

[11]Because the discretization used is annual, the lines are not vertical at separation dates.

Separation Age	Years Worked	Years Accrued
28	3	1.44
29	1	0.0
30	1	0.0
40	10	6.10
57	17	14.51
65	8	8.0
TOTAL	40	30.05

Table 4.1: Service accrual for MFR worker 'A'

Separation Age	Years Worked	Years Accrued
26	1	0.0
27	1	0.0
30	3	1.50
31	1	0.0
38	7	4.10
44	6	3.95
55	11	9.02
65	10	10
TOTAL	40	28.58

Table 4.2: Service accrual for MFR worker 'B'

retirement is approximately 71.46% of the full service pension. The pattern of pension accrual from the various jobs is shown in Table (4.2) and Fig. (4.5).

A third baseline example is a worker (MFR worker 'C') who enters the labour market and stays in a single job for twenty years and is made redundant at age 45, 20 years from normal retirement. The worker immediately finds another job and remains in that job for the remainder of his/her career.[12] This worker receives only 13.46 years' credit for 20 years of service and loses 16% of the value of the retirement pension as shown in Fig. (4.6). Because the worker does not change jobs until age 45, a full pension is earned up to this point. When the worker is made redundant, s/he loses about one-third of his/her years of service. However, by working at another job steadily until retirement, s/he is able to raise his/her pension to more than four-fifths of the full service pension.[13]

[12]This is a reasonable example because the mean elapsed job tenure for men in the U.K. aged between 61 and 65 in 1991 was 17.75 years ((Burgess and Rees 1994), p. 31).

[13]These calculations ignore expenses. An earlier study by (Davies 1990) found that the portability loss was also 16% for a worker who leaves a pension scheme 20 years prior to retirement if no expenses are deducted (his 'Example 2'); but if expenses are taken into account and certain

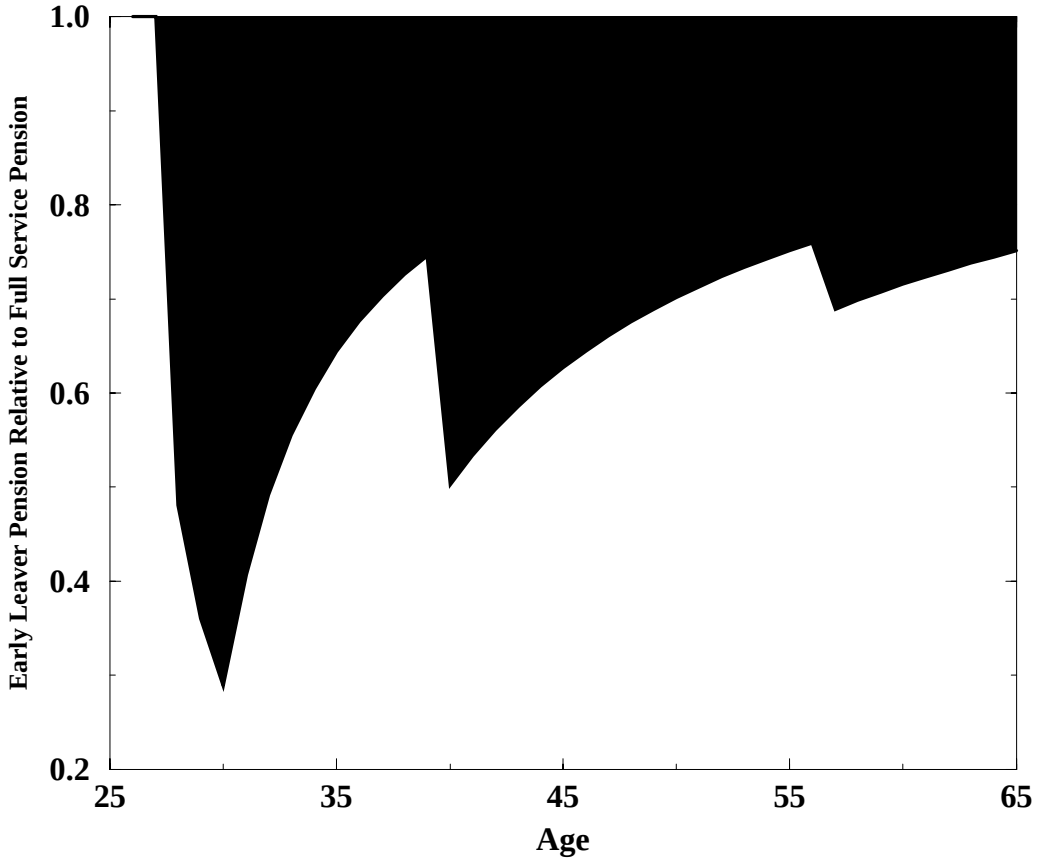

Figure 4.4: Accrued early leaver pension as a proportion of the full service pension for MFR worker 'A'.

4.2 Backloading Loss

In addition to the cash equivalent loss a worker faces when changing pension schemes, there is a second type of potential portability loss which increases with the age of the early leaver. This loss arises as a result of the backloaded marginal cost and contributions structure built into the methods (namely, PUM and CUM) used to determine cash equivalents; thus, we refer to this type of loss as a 'backloading loss'. Although actuaries using the PUM to value aggregate pension liabilities of a firm set a *single* contribution rate (as a proportion of earnings) for all members whatever the age, the effective cost to the scheme of employing older members is higher than that of younger members. This follows because an addi-

exclusions and deductions from earnings are made, then the portability loss rises to 46 % (his 'Example 1').

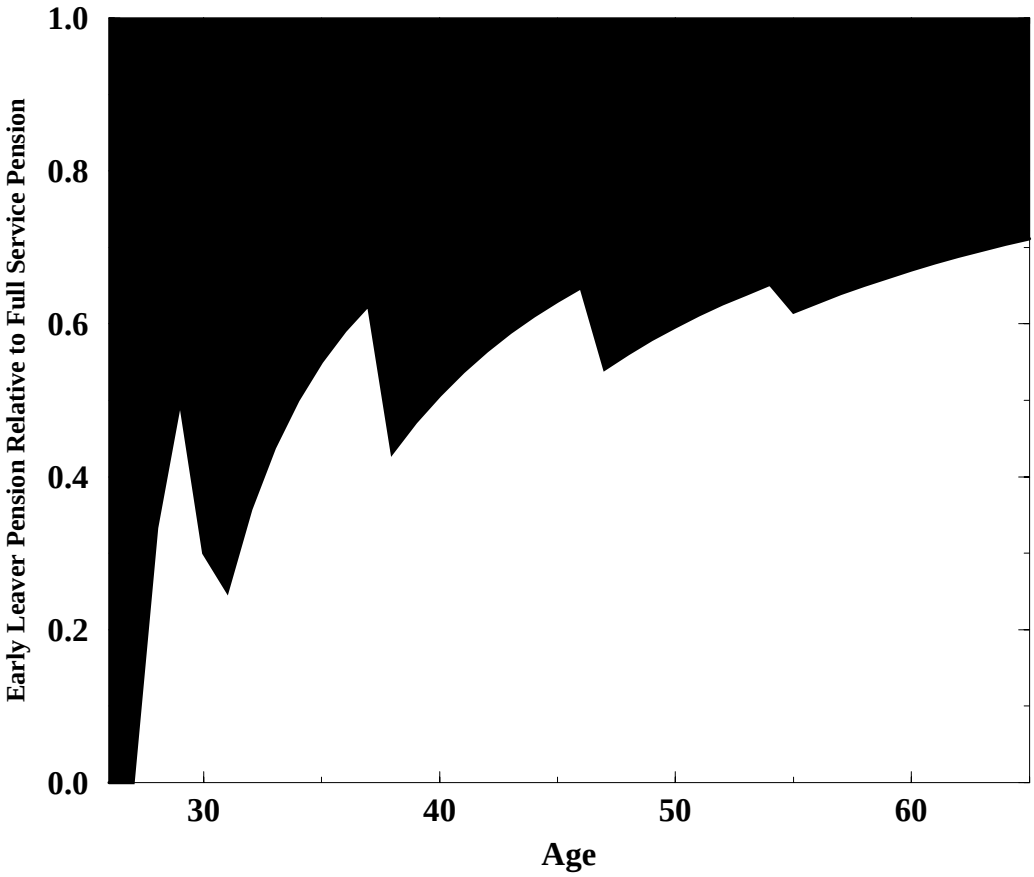

Figure 4.5: Accrued early leaver pension as a proportion of the full service pension for MFR worker ‘B’.

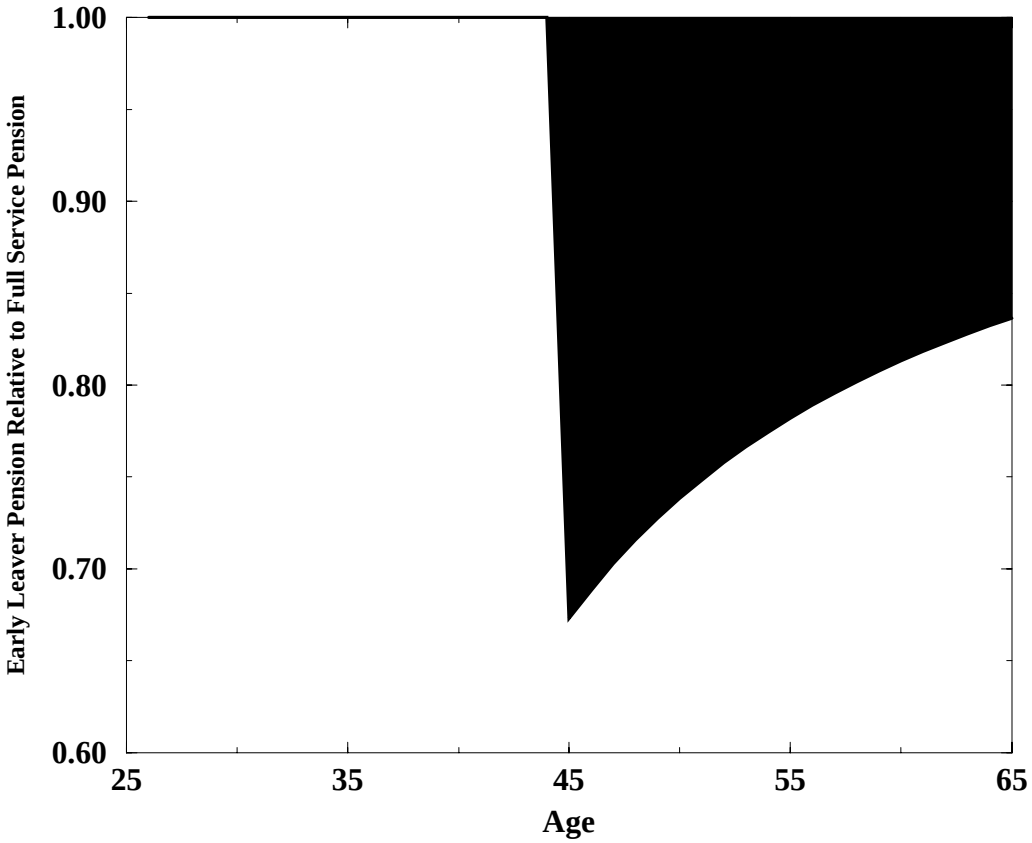

Figure 4.6: Accrued early leaver pension as a proportion of the full service pension for MFR worker ‘C’.

tional year of service from an older worker buys a larger pension entitlement than an additional year of service from a younger member. This occurs because pay is almost invariably backloaded, being higher in real terms towards the end of a career than at the start and also because greater service has already accrued for an older worker than for a younger worker. The marginal effective contribution rate *rises* with age if the PUM is used.

We can compare the PUM (which is used by about 75% of UK pension schemes to value their liabilities) with a 'prospective benefit funding method' such as the 'attained age method' (AAM). This method sets the contribution rate taking into account future salaries and service and hence, if expectations about these are realized, arrives at a constant, age-independent *marginal* contribution rate. We can determine the constant contribution rate (c) needed to generate the same pension in retirement as given by the PUM by setting:[14]

$$c = \frac{P_{PUM}(t_0, t_N)}{\sum_{s=t_0}^{t_N} W(s)(1+r)^{t_N - s}}. \tag{4.6}$$

Eq. (4.6) shows that the constant contribution rate using the AAM is given by the ratio of the full service pension at retirement age (using the PUM) to the compound value of lifetime earnings. So long as the interest rate (r) in Eq. (4.6) is the same as the realized yield on pension fund assets (as will be the case if the MFR norms are satisfied), there will exist an 'equivalent' defined contribution pension scheme that will also generate the same pension in retirement if the annual contribution rate into this scheme is also set at c.[15] The accrued value of the pension benefits in the defined benefit scheme using the AAM (P_{AAM}) or in the 'equivalent' defined contribution scheme (P_{DC}) is given by:

$$P_{AAM}(t_0, t) \equiv P_{DC}(t_0, t) = c \sum_{s=t_0}^{t} W(s)(1+r)^{t-s} \tag{4.7}$$

With the MFR norms satisfied, the standard contribution rate is 12.2%.[16] Fig. (4.7) compares the constant contribution rate with the upward sloping contribution

[14]This formula follows from equating the value of the attained age pension fund with that of the PUM fund at the retirement date t_N.

[15]By definition, the defined contribution scheme cannot build up surpluses or deficits. However, if the realized yield on the portfolio of assets differs from r, then a surplus or deficit will build up in a defined benefit scheme, and under the AAM (or other similar prospective benefit methods) the contribution rate will be adjusted to eliminate the surplus or deficit.

[16]This contribution rate depends on the choices of annuity factor and accrual rates. However, schemes which provide spouse's benefit and discretionary benefits will have higher contribution rates to compensate for these additional benefits.

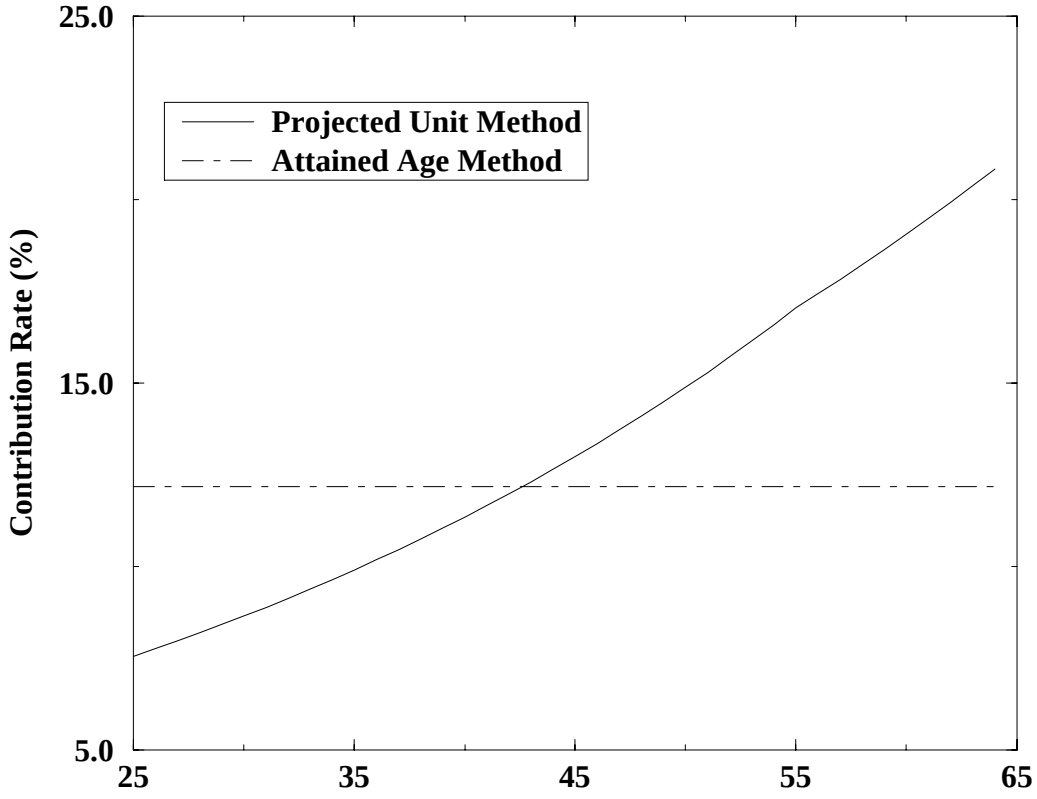

Figure 4.7: Implicit marginal contribution rates using the PUM and AAM.

rate implicit in the PUM. With the PUM, the effective contribution rate is initially much lower than the AAM contribution rate, equals it in mid-career and is more than double the constant contribution rate at retirement. The slope of the upward sloping contribution rate flattens out slightly at retirement as the discount rate is lowered on a 10 year sliding scale from equity yields to gilt yields. This factor is already taken into account in determining the constant contribution rate.

Fig. (4.8) shows how pension benefits accrue over a scheme member's career using the backloaded (PUM) and non-backloaded (AAM) valuation methods. We can calculate the *additional* loss to the cash equivalent as a result of the backloading of pay and contributions.[17] Fig. (4.9) reveals that the *absolute* backloading

[17]The use of the term 'loss' here is not meant to imply that the AAM is the 'best' valuation method. The term 'loss' is intended to mean what is lost by switching to a scheme with a constant contribution rate, such as most defined contribution schemes. It may be that the optimal defined

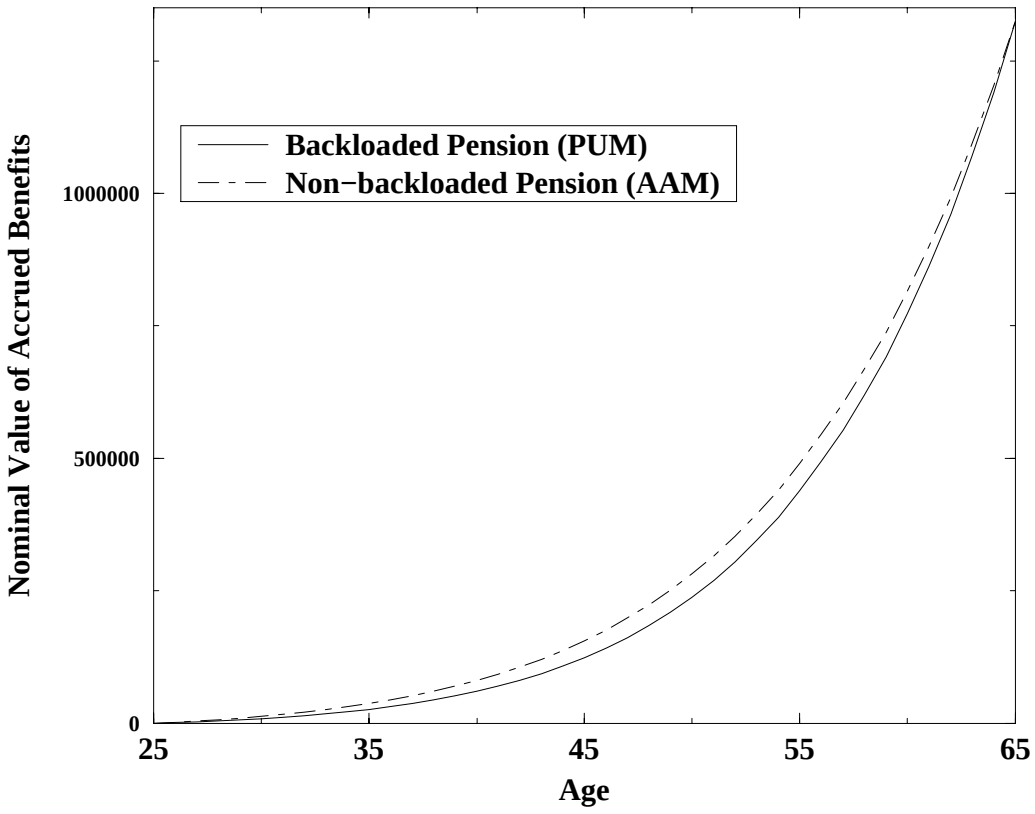

Figure 4.8: Accumulated values of backloaded and non-backloaded pensions.

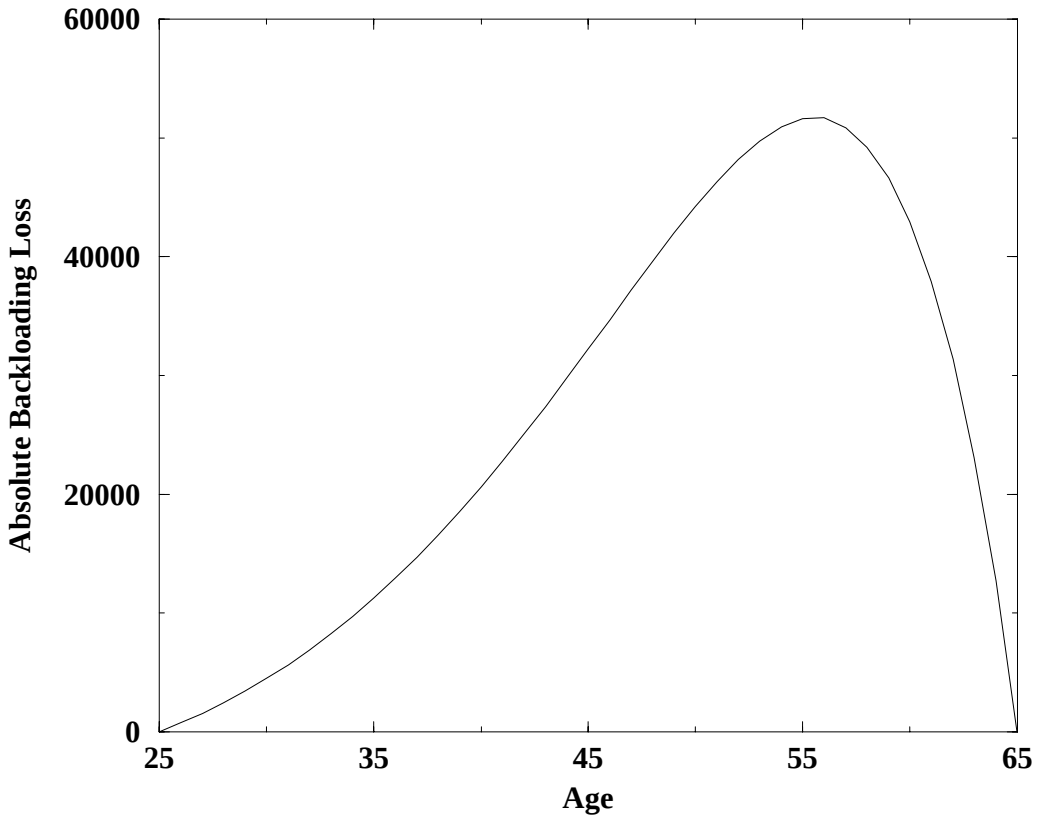

Figure 4.9: Difference between backloaded and non-backloaded pension benefits.

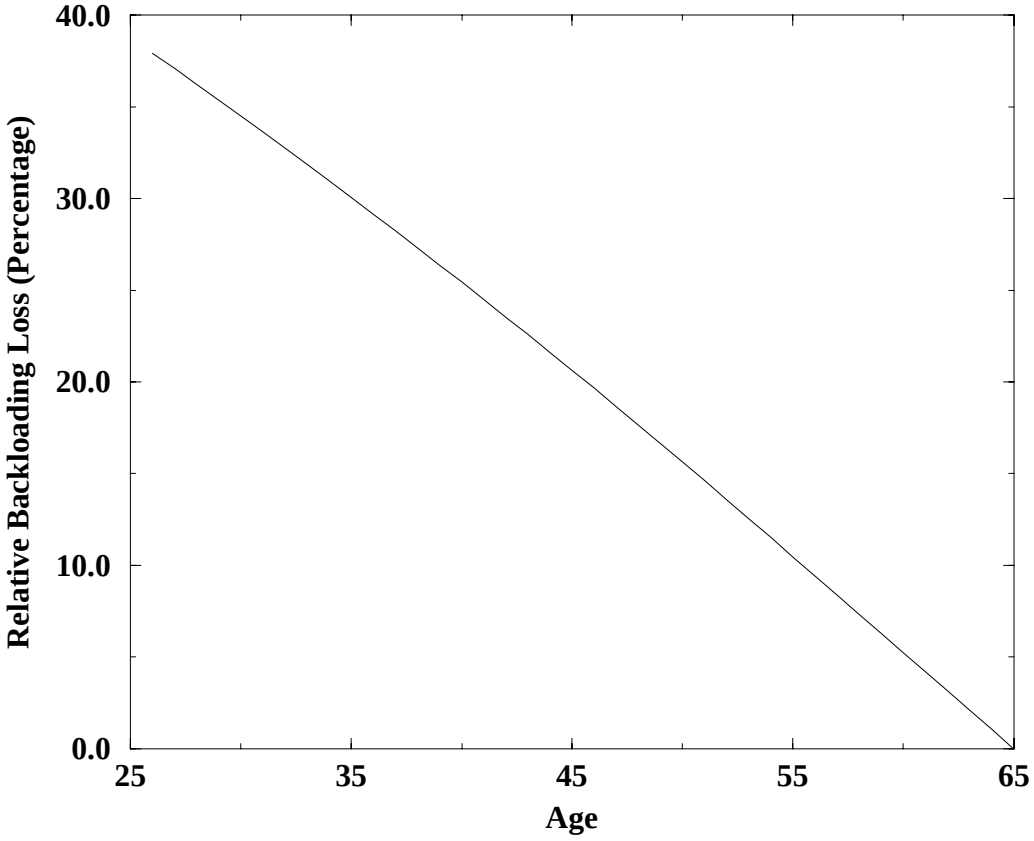

Figure 4.10: Relative backloading loss as a proportion of the non-backloaded pension benefit.

loss is inverse U-shaped, reaching a maximum for someone who leaves a scheme in their 50s; indeed, the shape of the backloading loss as a function of the age of the early leaver is similar to that of the absolute cash equivalent loss, although the magnitude is lower (c.f., Fig. (4.2)). In Fig. (4.10) we plot the *relative* backloading loss which is similar to the case of the cash equivalent loss (c.f., Fig. (4.3)) in that it is decreasing with the age of the early leaver.

To illustrate the potential implications of the backloading of pay on portability loss, we return to the case of MFR worker 'C'. We recall that this worker entered the labour market and stayed at a single job for twenty years and was made redundant at age 45. In the previous section, s/he received 13.46 years' credit for his/her 20 years of service when changing jobs. However, suppose that the new scheme that this worker transfers into is identical to the first scheme in terms of the expected full service pension it provides, except that it does so on the basis of a constant contribution rate for all members whatever their age.

In Fig. (4.11), we show that worker 'C' faces an additional portability loss if the new employer operates a defined contribution pension scheme (or another defined benefit scheme with a constant marginal contribution rate). The worker is left with only 70.7% of the full service pension at retirement rather than 84%. His/her job loss at age 45 costs him/her in two separate ways. The first cost is the black area which represents the effect of the loss of added years on his/her transfer value. The second cost is the hatched area which represents the loss due to the backloading of pay. Thus, when the worker transfers to an 'equivalent' defined contribution scheme at the new firm with its flat contribution structure, s/he is worse off. This happens *even if* the same amount of contributions are paid into both schemes from his/her salary: the explanation for this lies in the rate of accrual of pension benefits, not in the level of contributions.

Fig. (4.11) assumes *no charges*. Charges can be very high in personal pension schemes. To illustrate the effect of charges, we consider instead the case where the worker switches into a personal pension scheme which makes an initial charge of 25% on any incoming lump sum and thereafter charges 2.5% on any subsequent premia paid.[18] In this case, as shown in Fig. (4.12), the worker suffers an additional portability loss, so that at age 45 s/he will only have half the accrued pension benefits to which s/he would be entitled if s/he had stayed in the original job and pension scheme. Even if his/her employer contributes fully at the same rate as in the original scheme, s/he only receives 61.3% of the full service pension.[19] In

contribution pension scheme has a stepped contribution structure. Nevertheless, workers who switch from defined benefit schemes into defined contribution schemes will ordinarily encounter constant contribution rates and hence experience this loss.

[18]This cost structure is typical of UK personal pension schemes (c.f., (Blake 1995), sec. 7.3.4).

[19]A portability loss of a similar size was reported by (Davies 1990) (c.f., his 'Example 1') under similar conditions.

the UK, most employers do not contribute to personal pension schemes. If the employer does not contribute, then the worker would end up with only 37.1% of the full service pension.[20]

Fig. (4.11) therefore illustrates the consequences of the mis-selling of personal pension schemes in the UK during the late 1980s and early 1990s. Older workers were persuaded to transfer from a defined benefit scheme into a personal pension scheme. They suffered in five different ways: they experienced (1) a cash equivalent loss, (2) a backloading loss, (3) high initial charges, (4) high annual charges, and (5) the loss of employer contributions.

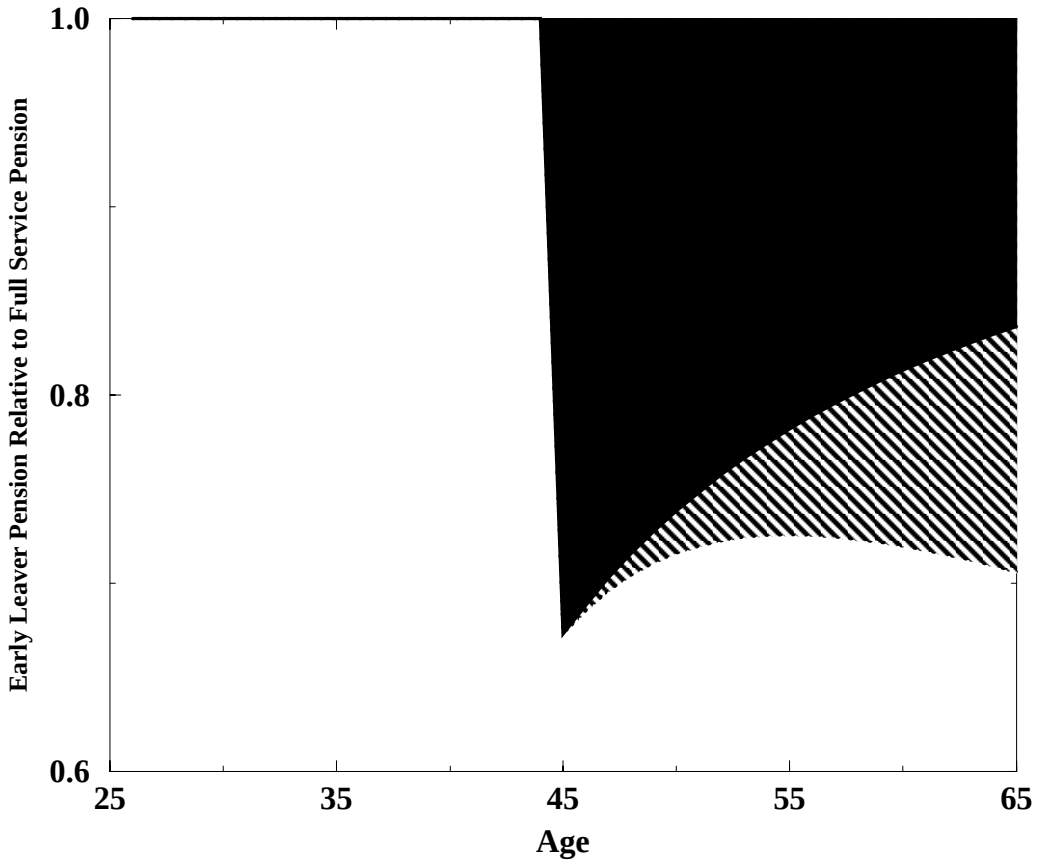

Figure 4.11: Accrued early leaver pension as a proportion of the full service pension for MFR worker 'C'. The black area is the cash equivalent loss, while the hatched area is the backloading loss.

[20]We are assuming that the employee contribution rate is half the employer contribution rate ((Government Actuary's Department 1994), Table 6.1). We ignore the SERPS rebate.

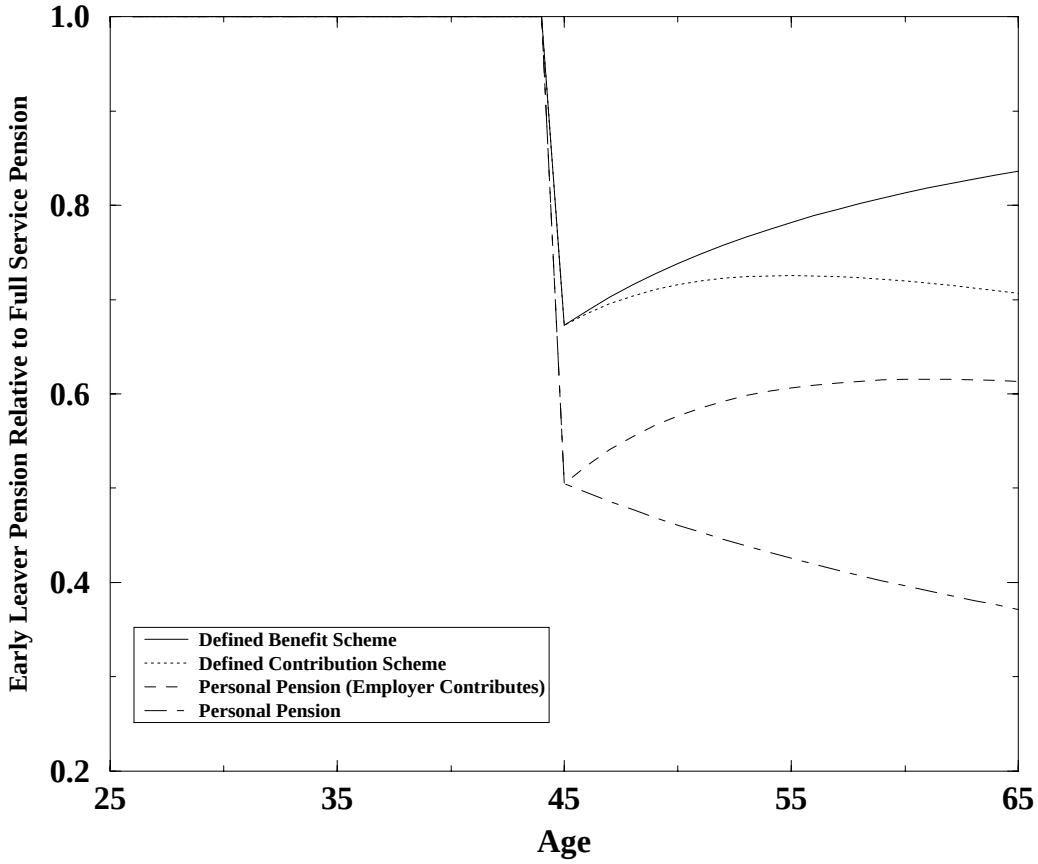

Figure 4.12: Accrued early leaver pension as a proportion of the full service pension for MFR worker 'C', switching at age 45 into various alternative types of scheme.

The backloaded structure of contributions and pension benefit accrual implicit in defined benefit schemes is not a direct issue in the mechanical calculation of transfer values and added years of service, but it has major implications for the welfare of individuals who may have no choice but to switch to money purchase schemes with their new employers. Furthermore, employers who realize the pension costs associated with providing defined benefit pensions to an ageing workforce may either switch to defined contribution schemes or show more hesitation in employing older workers.[21]

[21]Both these features have been observed in the U.K. over the last decade.

4.3 Summary

In this chapter, we have identified two sources of portability loss:

- a **cash equivalent loss** in which the worker switching jobs suffers a portability loss in the value of his/her accrued pension benefits because future real wage growth is disregarded.
- a **backloading loss** in which the worker switching jobs may suffer an additional portability loss because contributions are backloaded in one scheme but not in another.

We have shown that early leavers would experience one or both of these losses, *even if the actuary's forecasts about price inflation and returns on investments were fully realized*. The average worker in the UK is likely to change jobs at least five times during his/her career, with most of the changes taking place early in the working life. We considered the costs for changing jobs in a stylized world in which the MFR norms were satisfied. In the case where a worker changed jobs seven times, his/her final pension was 71% of the full service pension; in the case of five changes, it was 75%; even with just one change in mid-career, the final pension was only 84% of the full service pension. In the last case, if the worker had switched into an 'equivalent' defined contribution scheme (with constant contributions), s/he would have ended up with 71% of the full service pension, because she had lost the benefit of contributions backloading in the first scheme. If, instead, the worker had switched into a personal pension scheme, the high charges incurred with such schemes would have reduced the fund pension to either 61% or 37% of the full service pension, depending on whether the new employer did or did not contribute to the scheme. These are extraordinary potential penalties for just a single job change in a worker's life.

Chapter 5

Estimating Portability Losses for Different Types of Workers in the U.K.

So far, we have assumed that the actuary's assumptions have been realized in full. In this case, early leavers will be indifferent as to whether they take transfer values or leave deferred pensions, since they will end up with identical pensions. However, it is likely that the actual outcomes for wage growth, inflation and yields on assets over a member's lifetime in a pension scheme will differ widely from the actuary's assumptions. It therefore follows that one of the options, the transfer value, the deferred pension, or even a switch into a personal pension scheme, will turn out to be better than the others at the time of retirement; however, it is impossible to know what the best choice will be with certainty when it has to be made. *However, the option most likely to offer the largest pension in retirement for most British workers is the deferred pension.* This is because of two factors: the shape of the lifetime earnings profiles of the majority of British employees and the high charges associated with personal pension schemes.

We showed in the last chapter that the portability loss on transfer values depends only on the separation ages and the actuary's assumptions concerning future real wage growth. An actuary performing MFR calculations is required to assume a *constant* rate of growth of real wages of about 2% p.a. While this is a reasonable assumption when aggregating across all workers, it does not reflect the reality of most workers' earnings profiles over their lifetimes. This is because a constant growth rate in real wages implies a *convex* lifetime earnings profile, whereas the experience of most workers is to have a *concave* lifetime earnings profile, with real growth rates in earnings higher than average in early life and lower than average in later life. Even if the growth rate in wages is higher than the 2% average in just one year, this implies that it will be lower than average in each of the other

years (on average). This suggests that for most years, actuaries will predict higher real wage growth rates than will turn out to be realized subsequently and hence credit a smaller number of added years on an incoming transfer than warranted by subsequent experience. In other words, the transfer value will on average turn out to involve a greater portability loss than the deferred pension for most workers. We can illustrate this using lifetime earnings profiles for 'average' workers generated from data contained in the New Earnings Survey (Office of National Statistics 1996) and also from a study of 'typical' men and women over their life cycle developed from labour market survey data (Joshi, Davies, and Land 1996).

5.1 Average UK Wage Profiles

To examine potential portability losses faced by average UK workers, we constructed lifetime earnings profiles from the 1996 New Earnings Survey for manual and non-manual workers.[1] We continue to assume that MFR asset market and inflation assumptions are realized.

An Average Manual Worker

In Fig. (5.1), we show the earnings profile of the average UK manual worker in terms of the real wage a 20 year old worker today can expect to earn when s/he reaches a given age. In Fig. (5.2), we show the accrued pension benefits of the manual worker in a defined benefit scheme (calculated using the projected unit method) as well as the cash equivalent (transfer value) should s/he leave the job at a given age (calculated using the current unit revalued method) and the value of a constant contribution pension designed to deliver an equivalent pension at retirement.[2] The difference between the constant contribution and the ongoing pension benefit curves is the backloading loss. The difference between the ongoing pension benefit and the cash equivalent curves shows the cash equivalent

[1]The New Earnings Survey reports wages for workers in various age brackets. We used cubic spline interpolation to construct wages as a function of age, producing estimates of wages at each age. Cross-sectional wage data shows that wages are lower for older workers than middle-aged workers; however, a worker aged 50 today will not necessarily be earning a lower wage when he retires. The reason for this is that the static profile needs to be uprated for real economic growth. To make this correction, we used the age distribution of the labour force from the Labour Force Survey((Office of National Statistics 1997), pp. 62-63) to compute the average growth rate implicit in the static interpolated profile, computed from ages 25-65 (by summing over all the age-specific growth rates implicit in the static profile weighted by the age distribution of the labour force). This growth rate (which arises from career progression) is less than the historical real growth rate and we attribute the difference to real economic growth, scaling up the wage profile by the difference between observed real wage growth and the implicit growth rate from the static profile. This then produces a wage profile with implicit wage growth equal to the historical average.

[2]This is calculated using the attained age method with realized wages.

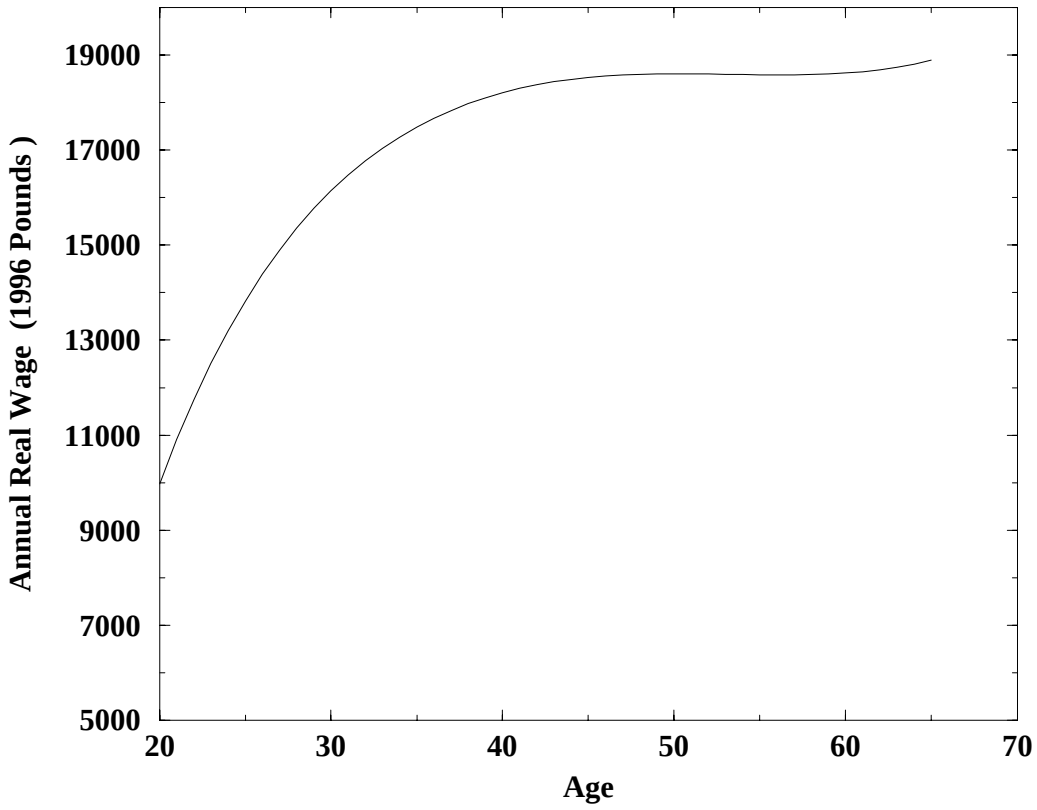

Figure 5.1: The lifetime earnings profile of the average UK manual worker

loss.

In Fig. (5.3), we show the actuarial value of the cash equivalent loss for the average manual worker when s/he leaves a job at a given age; it depends on whether s/he chooses to take a transfer value or leave a deferred pension. Since the actuary using MFR norms forecasts a higher growth rate in earnings than will be realized with the average UK manual worker, it will never be optimal for this average worker to take a transfer value.

To get some idea of the size of typical portability losses, we suppose that the worker only changes his/her job once at age 45, after 20 years of service. S/he will receive a transfer value of approximately $£32,664$ or about 1.7 times his/her wage. Just before the worker lost the job, the actuary using MFR norms would have valued his/her pension benefits on an ongoing basis at $£48,537$. In this case, there is no direct backloading of pay because the invested value of the employer and employee contributions would have been $£48,361$ (assuming a constant contribution rate over the lifetime and an equity yield equal to the MFR norm). Nevertheless, the worker still ends up with a loss at retirement as the final pension is

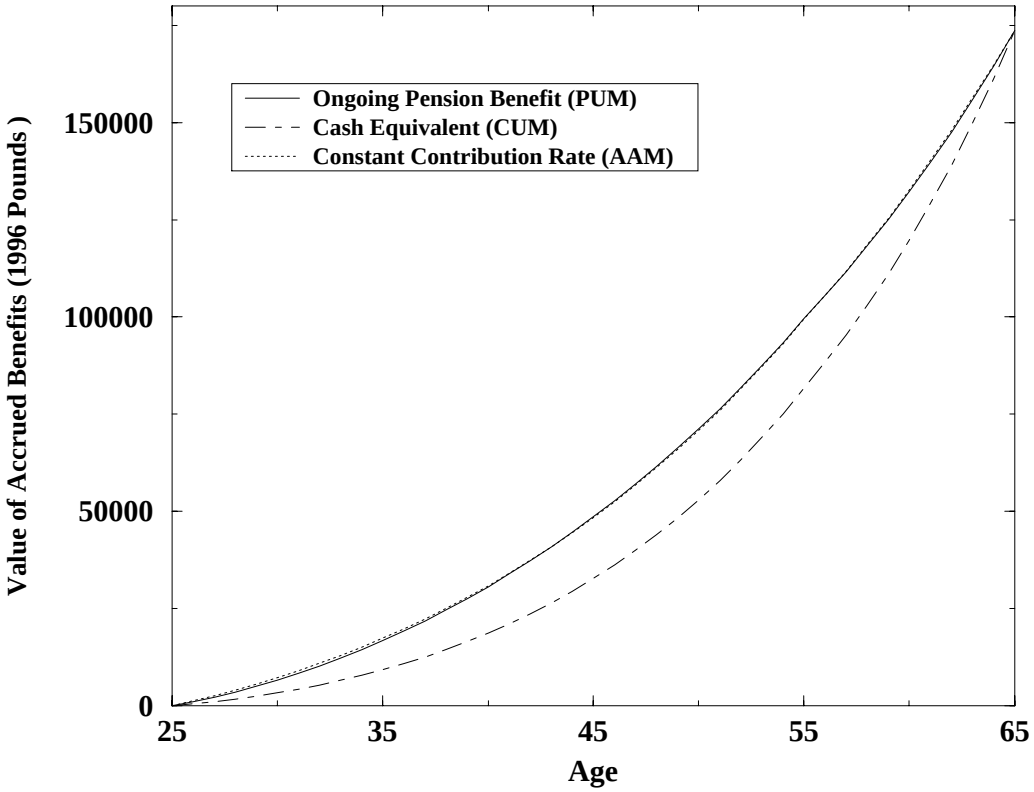

Figure 5.2: The accrued pension benefits of the average UK manual worker.

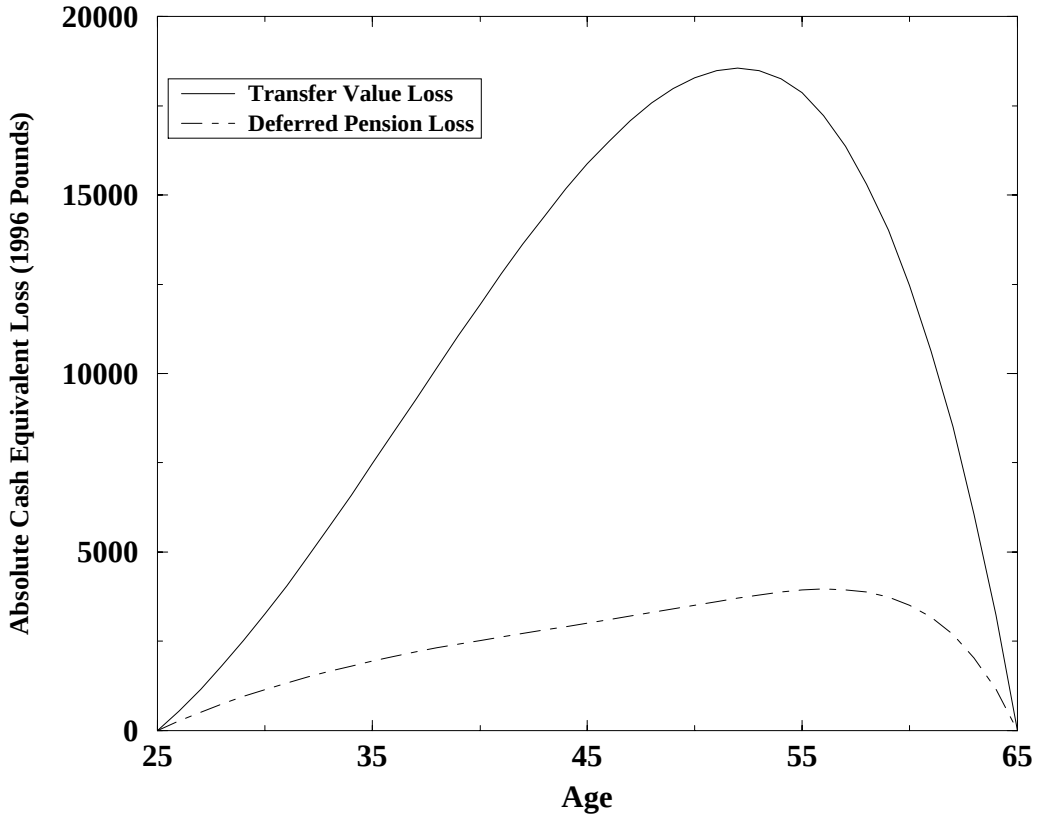

Figure 5.3: Transfer value and deferred pension losses for the average manual worker.

only 78% of the full service pension which is less than the 83.6% which would have been received if the new scheme was a defined benefit scheme. The first loss is incurred if the employee switches to another equivalent defined benefit scheme. The second loss is an additional loss that would arise in the case where the new employer operates an 'equivalent' defined contribution scheme.

Assuming that his/her new job and pension scheme have similar characteristics, the worker will be offered a transfer value of 13.46 years, whereas if s/he accepted a deferred pension s/he would have received the equivalent of roughly 18.3 years. The net result is that, if s/he accepted the transfer value, his/her final pension (assuming 20 years' service is earned in the next scheme) is approximately 84% of the full service pension whereas if s/he took a deferred pension, it would be worth about 96% of the full service pension. The reason for this is that the MFR assumptions overstate his/her anticipated wage growth in middle age and as a result the number of years credited is only 74% of the number that should have been credited if the subsequent salary experience of this worker had been known to the actuary.

Suppose instead that the new scheme is an 'equivalent' defined contribution scheme with a constant contribution rate set according to Eq. (4.6) to give the same pension at retirement. The average manual worker will still be worse off than the typical MFR worker considered in the last chapter because his/her wage growth has slowed down in later life. At the end of his/her career, the worker has a pension of only 78% of the full service pension in the original scheme, even though we are assuming the worker has the same final salary in both cases. As an alternative, if the worker takes out a personal pension at age 45 *with the same contributions* as the defined contribution scheme we have just considered, commission charges reduce the size of his/her pension to about 66% of the full service pension in the original scheme. The single event of switching in mid-career into a personal pension scheme has cost this worker about one-third of

Separation Age	Years Worked	Years Transferred	Implied Deferred Years
28	3	1.44	2.08
29	1	0.0	0.0
30	1	0.0	0.0
40	10	6.10	8.81
57	17	14.51	16.33
65	8	8.0	8.0
TOTAL	40	30.05	35.22

Table 5.1: Service accrual for an average UK manual worker under separation assumptions 'A'.

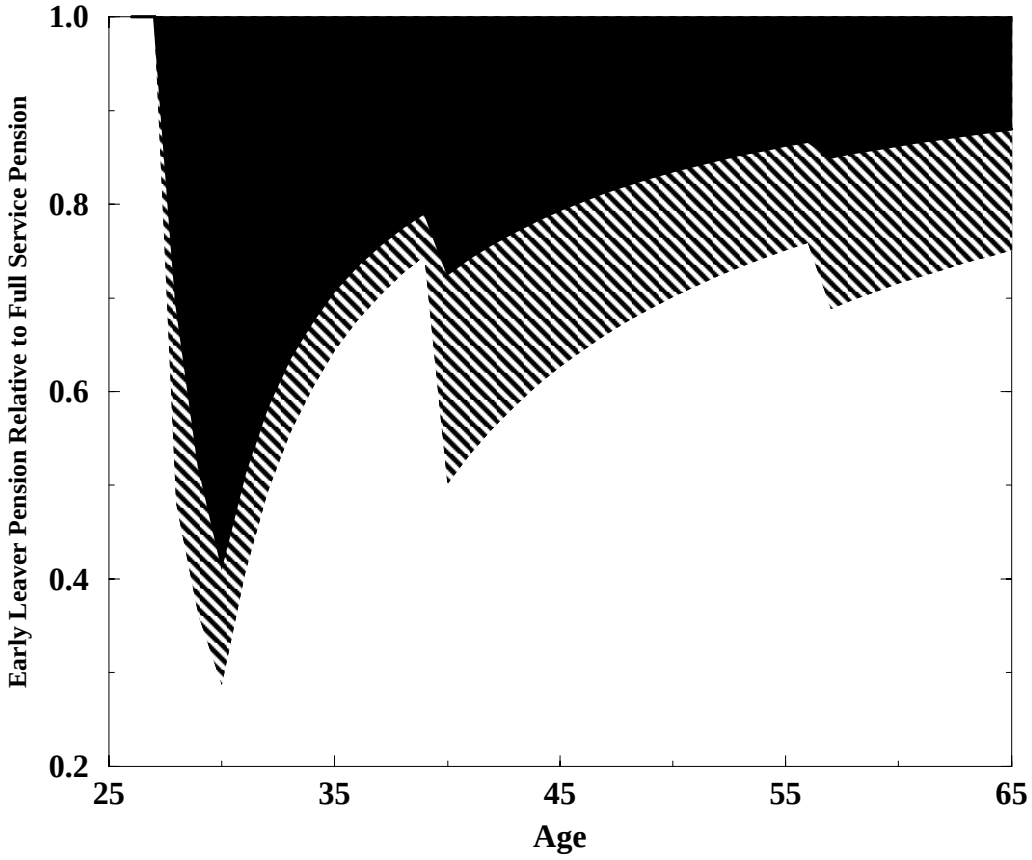

Figure 5.4: Accrued early leaver pension as a proportion of the full service pension for an average manual worker with the same job tenure patterns as MFR worker 'A'. The black area is the portability loss from leaving deferred pensions, while the hatched area is the *additional* portability loss from taking transfer values.

his/her retirement pension.

We now consider what happens to the average manual worker who changes jobs several times during his/her career with the same job tenure patterns as MFR worker 'A' (see Table (5.1)). Figure (5.4) shows pension portability losses for an average UK manual worker who switches jobs five times. The black area is the portability loss if the worker always leaves deferred pensions. The hatched area is the *additional* portability loss if the worker applies his/her transfer values to purchasing service credits in the next scheme. If the worker leaves deferred pensions, s/he receives 88% of the full service pension, compared with the 75% received by the worker who accepts transfer values. This follows from the concavity of the worker's lifetime earnings profile.

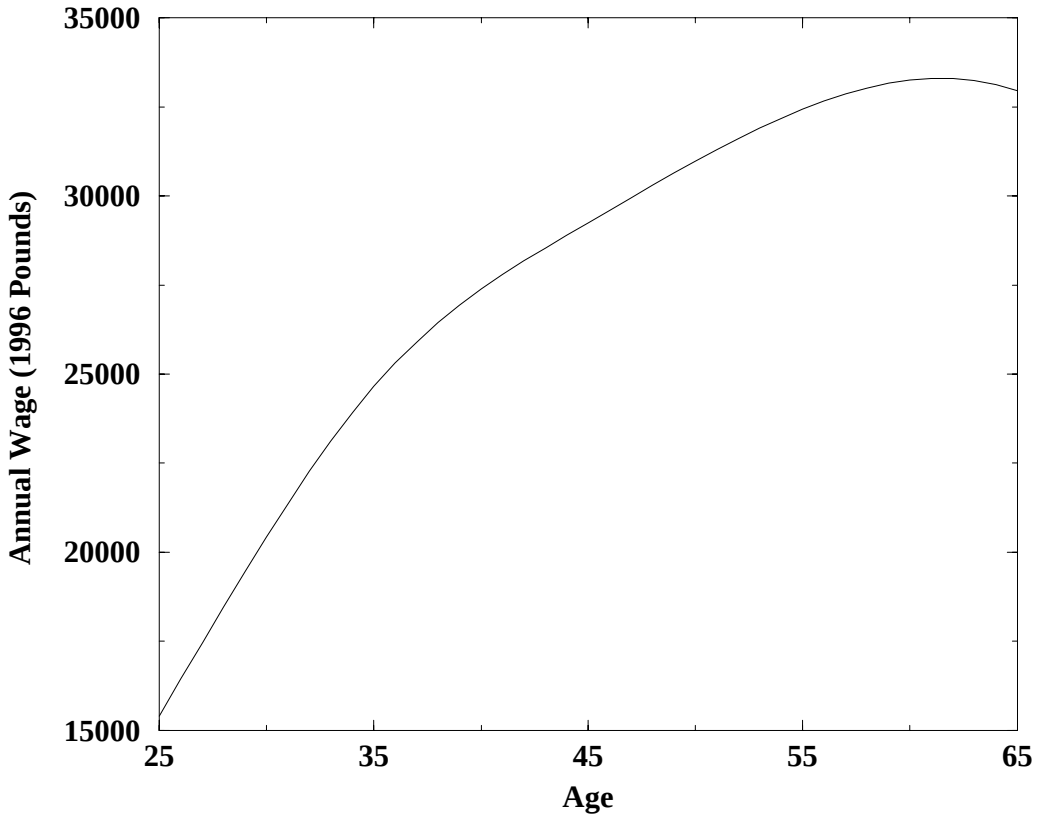

Figure 5.5: The lifetime earnings profile of the average UK non-manual worker

An Average Non-Manual Worker

We now consider the case of the average UK non-manual worker. Fig (5.5) shows the wage of the average UK non-manual worker. It is worthy of note that the real wage at retirement is actually slightly *lower* than the real wage a few years before retirement. In Fig. (5.6), we plot the accrued pension benefits for this worker. We observe that, because the real wage falls as retirement approaches, the constant contribution pension benefit curve dips below the ongoing pension benefit curves, although it always remains above the cash equivalent curve. In Fig. (5.7), we plot the portability losses/gains for this worker. At age 58, the worker's real wage exceeds his/her subsequent retirement wage, so that by quitting shortly after this age, the worker has a small portability gain if s/he leaves a deferred pension. However, the transfer value losses are always positive and are shown by the solid line.

To illustrate the portability loss in cash terms, suppose again that the worker only changes employment once at age 45, after 20 years of service. S/he will receive a transfer value equal to 13.46 years' service or $£49,430$ or 1.7 times of

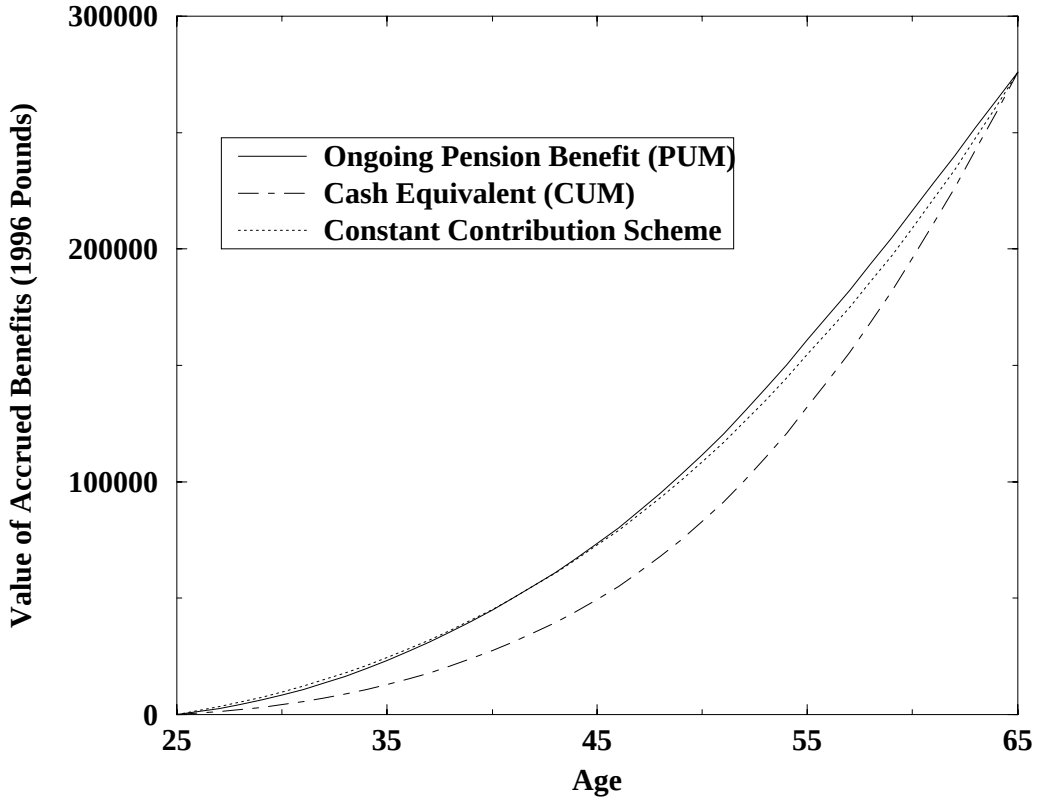

Figure 5.6: The accrued pension benefits of the average UK non-manual worker.

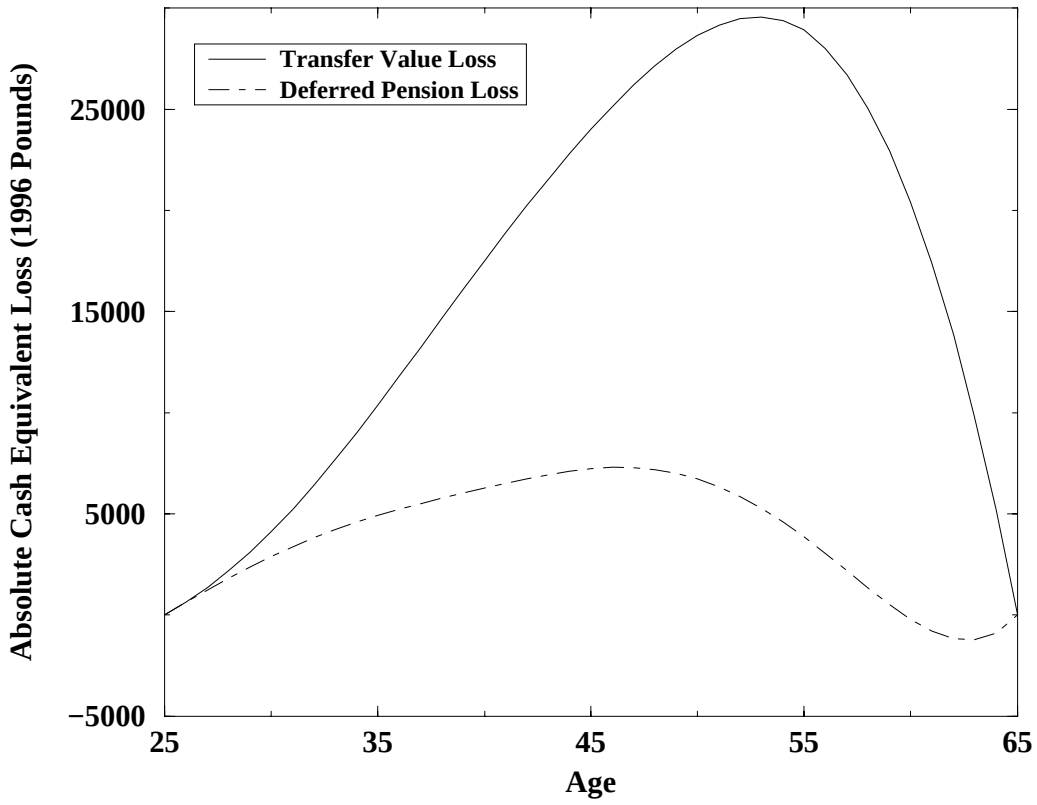

Figure 5.7: Transfer value and deferred pension losses for the average non-manual worker.

his/her annual wage. In contrast, the total accumulated value of employer and employee contributions (assuming a constant contribution rate with contributions invested at the equity yield) would be $£72,696$, whereas the actuary values the employee's ongoing pension benefits at $£73,451$.

Assuming that the new job and pension scheme have similar characteristics, s/he will be offered a transfer value 13.46 years, whereas if s/he had left behind a deferred pension, s/he would have received the equivalent of 17.45 years. The net result is that, with the transfer value, his/her final pension is worth only 84% of the full service pension, whereas the deferred pension is worth 93.6% of the full service pension. The reason for this is that the MFR norms again overstate the anticipated wage growth in middle age and, as a result, the number of years credited is only 70.3% of the number that would be credited if the subsequent wage history of the worker was known to the actuary.

Fig. (5.8) shows what happens if the non-manual worker switches either into an 'equivalent' defined contribution scheme or into a personal pensions scheme where the employers also contributes. In the case of an equivalent defined contribution scheme, the pension is 79% of the full service pension, whereas if the cash equivalent was put into an approved personal pension scheme with the same employer contribution, the pension would be worth 68% of the full service pension. Without employer contributions, the pension would be worth 44% of the full service pension.

Summary

In this subsection, we have used data from the New Earnings Survey to analyze the portability losses faced by average UK workers. The results are qualitatively quite similar to those found for the typical MFR workers in the previous chapter except that, because of the *shape* of the wage profile of average U.K. workers, transfer values may not be actuarially fair for older workers and they would be better off leaving deferred pensions in their former schemes. Because older workers tend to have smaller wage growth late in their careers relative to the MFR assumptions, they will be hurt even more than the MFR workers by switching to a firm with a money purchase scheme that was designed to be equally generous (but only under the condition that an individual remained in the scheme for his/her whole career).

5.2 Some Typical U.K. Wage Profiles

In this section, we examine pensions portability losses using some 'typical' UK workers. The lifetime earnings profiles of these typical workers were constructed by Heather Joshi, Hugh Davies and Hilary Land (Joshi, Davies, and Land 1996)

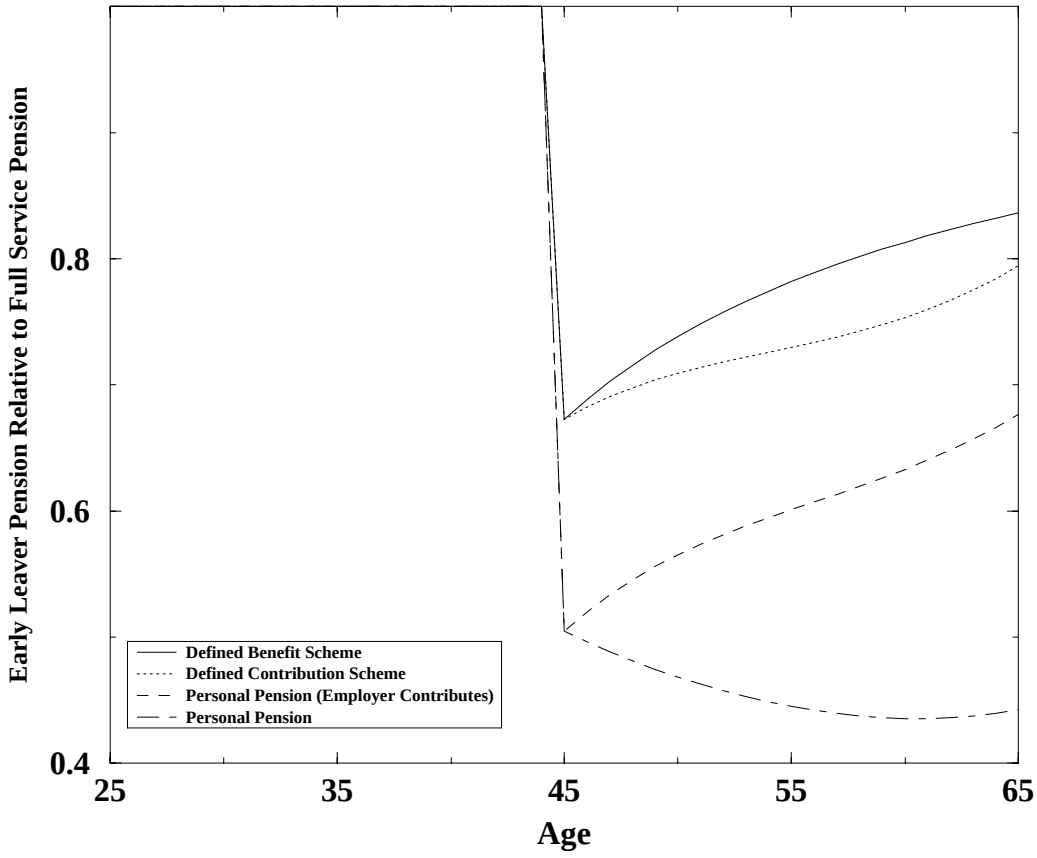

Figure 5.8: Accrued early leaver pension as a proportion of the full service pension for the average non-manual worker, switching at age 45 into various alternative types of pension schemes.

to fit the employment patterns in various employment datasets such as the 1980 Women and Employment Survey. We consider the following typical (rather than average) individuals:

- Mr. High, a typical high-earning male.
- Ms. High, a typical high-earning female with no children.
- Mr. Low, a typical low-earning male.

who were used in (Joshi, Davies, and Land 1996) (Joshi and Davies 1994) to analyze various features of the state pension scheme.[3] These studies provide many other typical earnings profiles, especially of married low-income women, but such cases are not relevant for the analysis of occupational pension portability issues in the U.K. since such people are unlikely even to participate in these schemes; they are either part-time workers or spend many years out of the labour force raising children. Although part-time workers now have the same pension rights as full-time workers, the transfer values of such workers (in defined benefit schemes) are so poor that these rights are worth little in practice.

Mr. High

The wage profile of Mr. High, a typical high-earning man, is shown in Fig. (5.9). We assume that Mr. High has no pension before age 25 and then consider in Table (5.2) the case where he changes job several times over his career (according to job-leaving assumptions 'A'). If Mr. High always leaves deferred pensions, he receives 79.7% of the full service pension, whereas if he accepts transfer values he receives 75.1%. On the other hand, if we use job-leaving assumptions 'B', Mr. High receives 76.4% of his full service pension if he takes a deferred pension and 71.5% if he always accepts transfer values (see Table 5.3).

As an alternative example, we consider the case in which Mr. High changes jobs only once in his career, at age 45. If he accepts a transfer value, he will receive at retirement 83.6% of the full service pension. This is because his real wage appreciates less quickly than the actuary predicts between the ages of 45 and 65. In comparison, he receives 88.4% of the full service pension if he accepts a deferred pension. In this case, a transfer value calculated according to MFR norms is 94.6% of the value of the deferred pension. If the new scheme ran a defined contribution plan, he would receive a final pension of only 74.4% of the full service pension, while if he put his transfer value into a personal pension with the same charges as above the final pension would be 63.9% of final salary. These results are shown in Fig. (5.10).

[3]For more details on the construction of these earnings profiles, see also (Davies and Joshi 1992). The wage profiles used in this study take into account historical real wage growth.

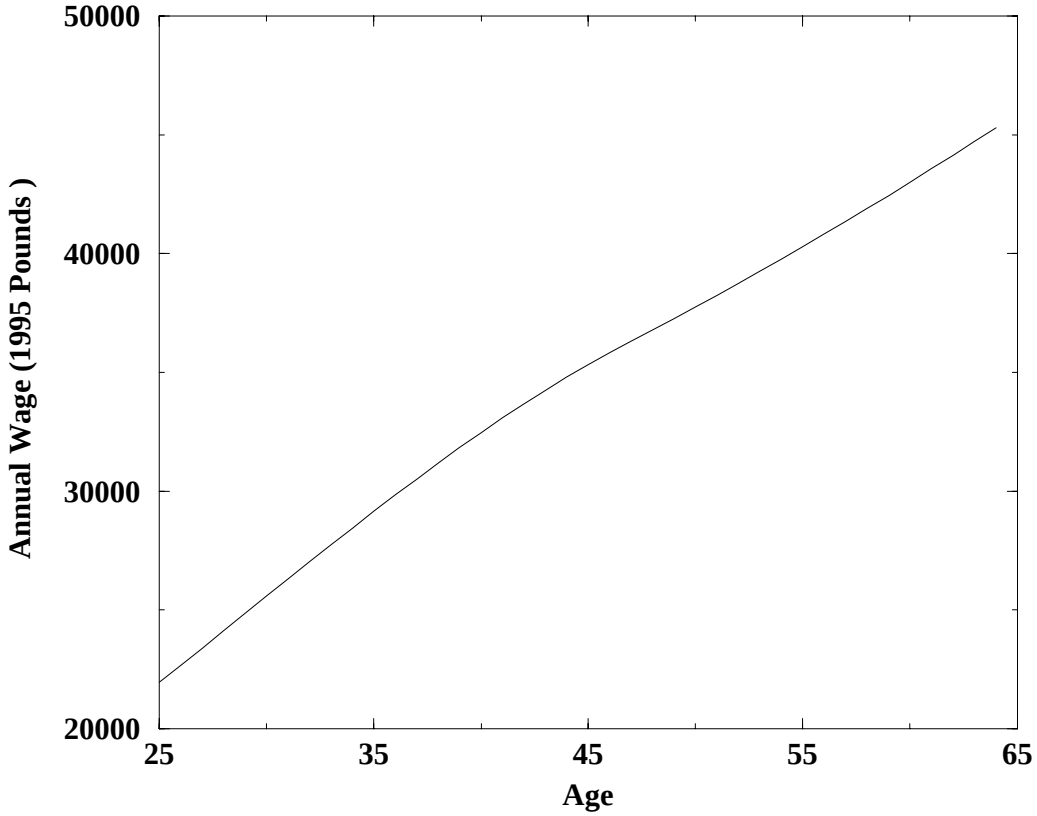

Figure 5.9: The lifetime earnings profile of Mr. High, a typical high-earning man.

Separation Age	Years Worked	Years Transferred	Implied Deferred Years
28	3	1.44	1.55
29	1	0.00	0.00
29	1	0.00	0.00
40	10	6.10	7.03
57	17	14.51	15.32
65	8	8.0	8
TOTAL	40	30.05	31.89

Table 5.2: Service accrual for Mr. High under separation assumptions ‘A’.

Separation Age	Years Worked	Years Transferred	Implied Deferred Years
26	1	0.0	0.0
27	1	0.0	0.0
30	3	1.50	1.65
31	1	0.0	0.0
38	7	4.10	4.71
44	6	3.95	4.54
55	11	9.02	9.66
65	10	10	10.0
TOTAL	40	28.58	30.55

Table 5.3: Service accrual for Mr. High under separation assumptions 'B'.

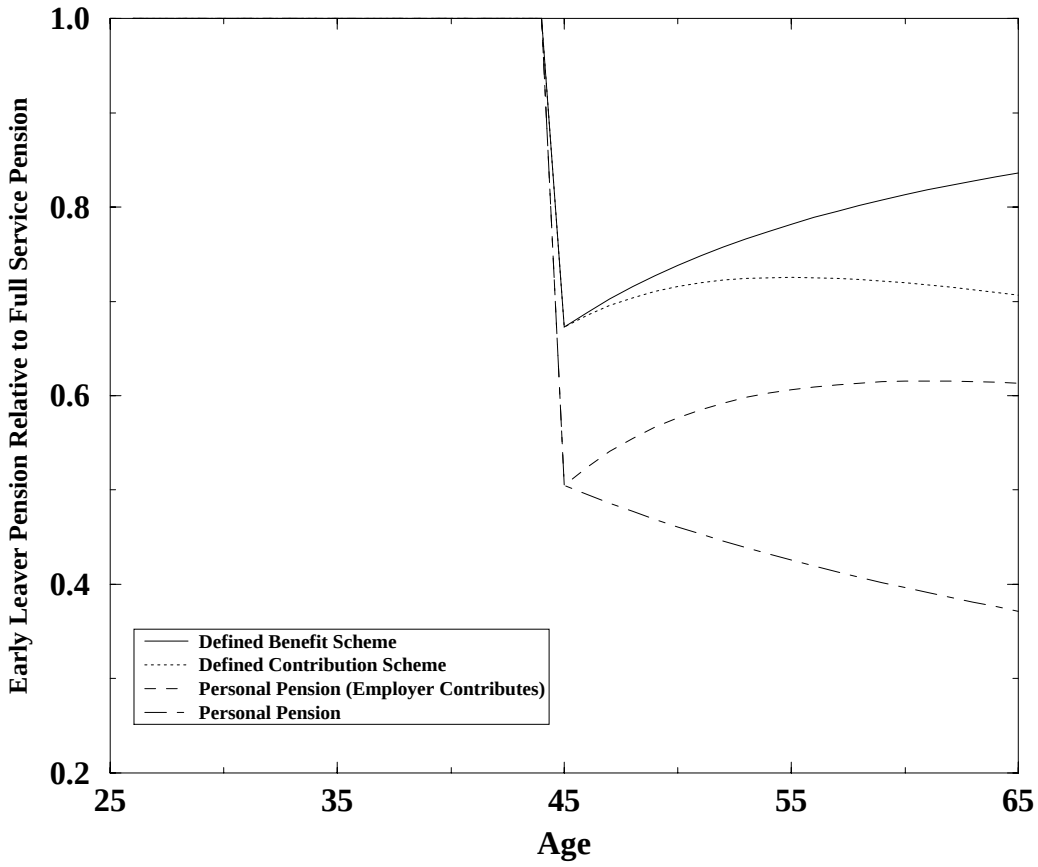

Figure 5.10: Accrued early leaver pension as a proportion of the full service pension for Mr. High who switches at age 45 into various alternative types of scheme.

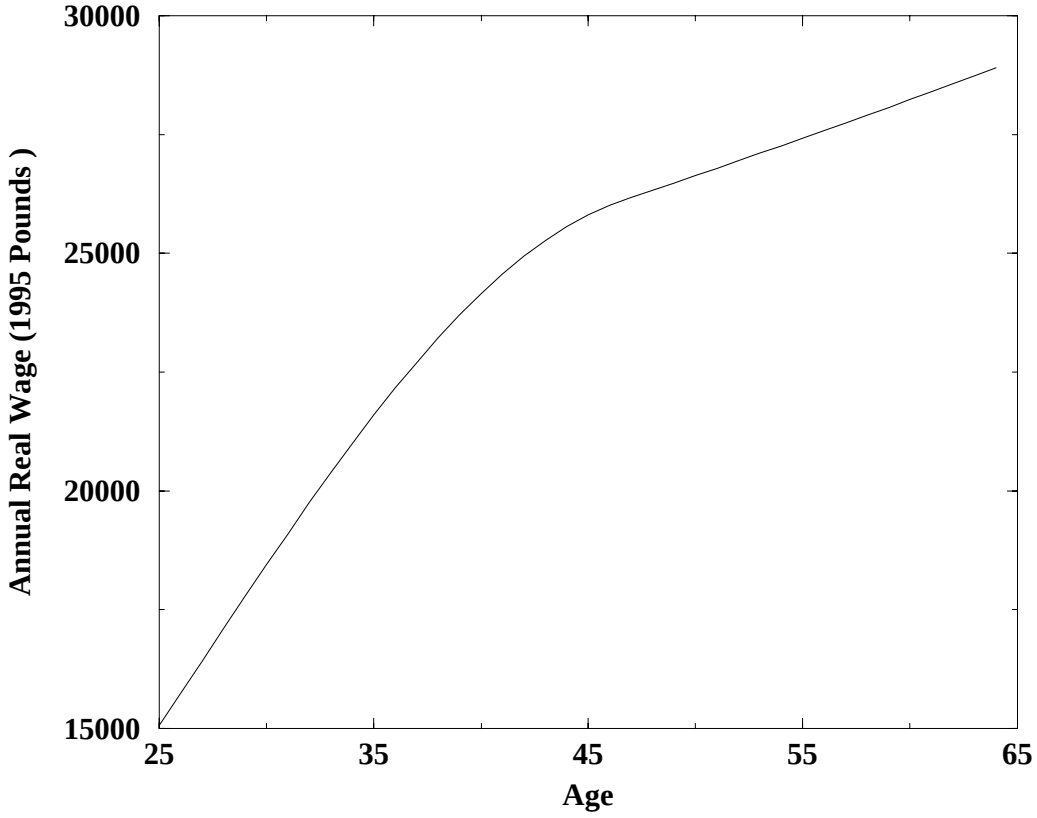

Figure 5.11: The lifetime earnings profile of Ms. High, a typical high-earning woman with no children.

Ms. High with No Children

The lifetime earnings profile of Ms. High, a typical high-earning woman who works full-time throughout her career, is shown in Fig. (5.11). We assume that Ms. High has no pension before age 25 and then consider in Table (5.4) the case where she changes job several times over her career (according to job-leaving assumptions 'A'). If Ms. High always leaves deferred pensions, she receives 85.3% of the full service pension, whereas if she accepts transfer values she receives 75.1%. On the other hand, if we use job-leaving assumptions 'B', Ms. High receives 82.4% of her full service pension if she leaves a deferred pension and 71.5% if she always accepts transfer values (see Table (5.5)).

Suppose instead that Ms. High changed her job only once in her career, at age 45. If she accepts a transfer value, she will receive at retirement 83.6% of the full service pension. On the other hand, because her real wage does not appreciate as much as that of Mr. High, she would be relatively better off with a deferred pension with the equivalent of 17.69 years of service instead of the 13.46 she is

Separation Age	Years Worked	Years Transferred	Implied Deferred Years
28	3	1.44	1.70
29	1	0.00	0.00
29	1	0.00	0.00
40	10	6.10	8.20
57	17	14.51	16.22
65	8	8.0	8
TOTAL	40	30.05	34.13

Table 5.4: Service accrual for Ms. High with no children under separation assumptions 'A'.

Separation Age	Years Worked	Years Transferred	Implied Deferred Years
26	1	0.0	0.0
27	1	0.0	0.0
30	3	1.50	1.85
31	1	0.0	0.0
38	7	4.10	5.50
44	6	3.95	5.25
55	11	9.02	10.38
65	10	10	10.0
TOTAL	40	28.58	32.97

Table 5.5: Service accrual for Ms. High with no children under separation assumptions 'B'.

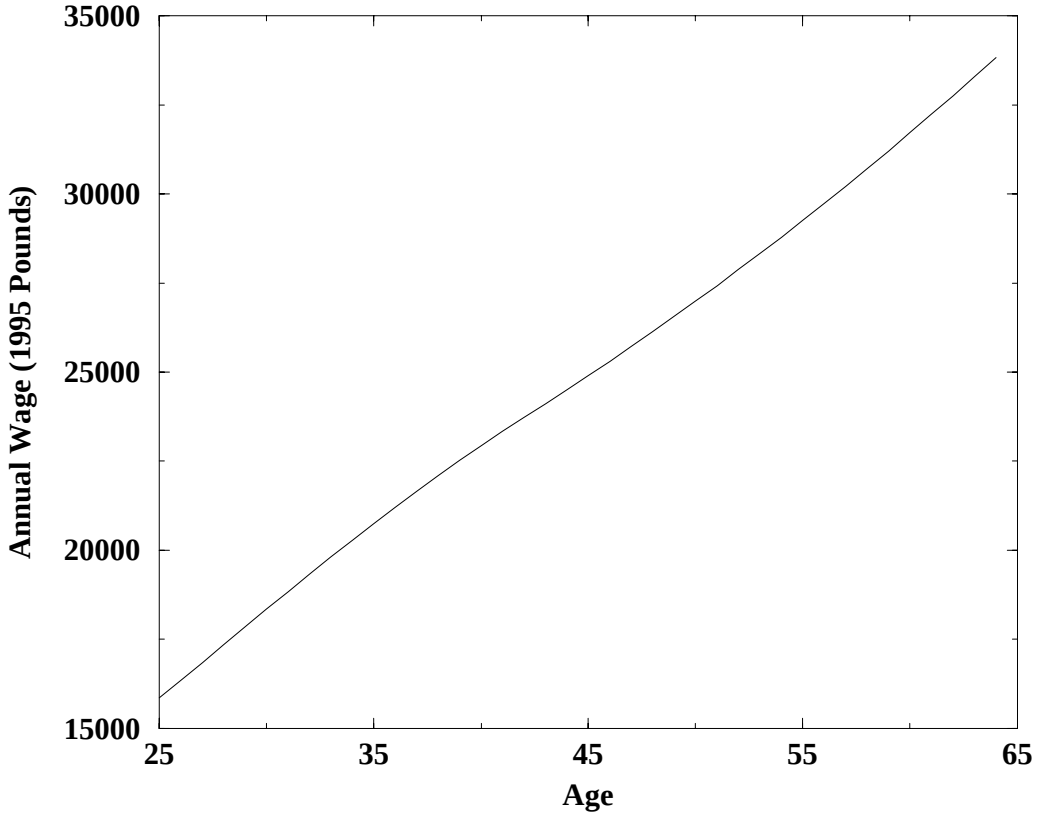

Figure 5.12: The lifetime earnings profile of Mr. Low, a typical low-earning man.

offered with a transfer value. In this case, a transfer value calculated according to MFR norms is only three-quarters of the value of the deferred pension. If her new scheme operated on a defined contribution basis, she would receive a final pension of 79% of the full service pension, a slightly higher percentage than that accruing to Mr. High with a steeper earnings profile. The transfer value she is paid is $\pounds 43,731$, while the actuary values her ongoing pension benefits at $\pounds 64,982$.

Mr. Low

The wage profile of Mr. Low is shown in Fig.(5.12). In Table (5.6), we show the loss Mr. Low incurs if he switches jobs using the same pattern as MFR worker 'A'. If Mr. Low always accepts transfer values calculated according to MFR assumptions, he receives 75.1% of the full service pension at retirement, whereas if he leaves a deferred pension, he receives 77.7% of the full service pension. The portability losses of Mr. Low under the job separation patterns of MFR worker 'B' are shown in Table (5.7) and Fig. (5.14).

Separation Age	Years Worked	Years Transferred	Implied Deferred Years
28	3	1.44	1.49
29	1	0.00	0.00
29	1	0.00	0.00
40	10	6.09	6.66
57	17	14.51	14.94
65	8	8.0	8
TOTAL	40	30.05	31.09

Table 5.6: Service accrual for Mr. Low under separation assumptions 'A'.

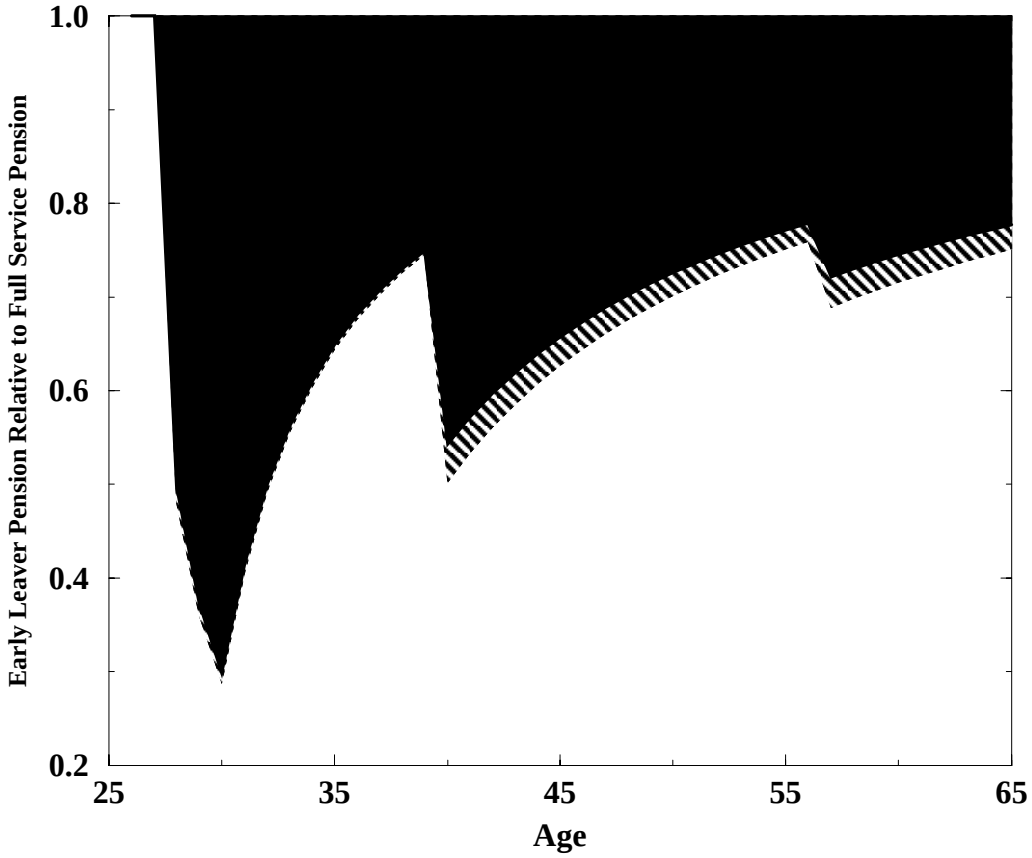

Figure 5.13: Accrued early leaver pension as a proportion of the full service pension for Mr. Low with the same job tenure patterns as MFR typical worker 'A'.

Separation Age	Years Worked	Years Transferred	Implied Deferred Years
26	1	0.0	0.0
27	1	0.0	0.0
30	3	1.50	1.58
31	1	0.0	0.0
38	7	4.10	4.48
44	6	3.95	4.27
55	11	9.02	9.36
65	10	10	10.0
TOTAL	40	28.58	29.70

Table 5.7: Service accrual for Mr. Low under separation assumptions 'B'.

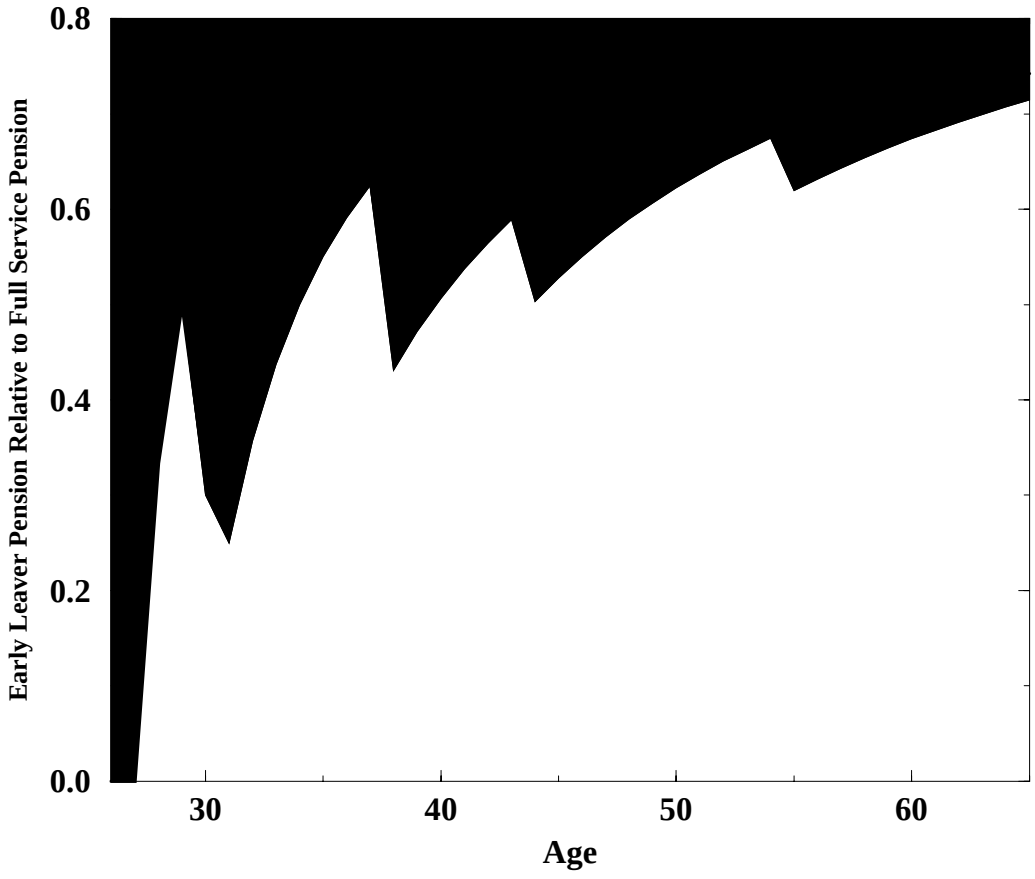

Figure 5.14: Accrued early leaver pension as a proportion of the full service pension for Mr. Low with the same job tenure patterns as MFR worker 'A'.

Even if Mr. Low changed jobs only once at age 45, he would receive service credits in the new scheme worth 13.46 years, whereas based on final salary, the deferred pension is worth 14.48 years. The total transfer value paid out is $£41,902$, whereas the actuary valued the worker's pension benefit prior to leaving at $£62,265$. Before the 1995 Pensions Act, the worker would have received $£47,985$ as a transfer value since gilt rather than equity yields were used for discounting then. Again, there are substantial portability losses if the new scheme of the worker is a defined contribution scheme (because of the backloading of pay); the value of accumulated contributions to a constant contribution scheme intended to lead to the same level of retirement income is $£73,665$. The full service retirement pension has a present value at retirement of $£281,940$, while the pension based on the transfer value credited for added years is worth $£235,839$ and the deferred pension is worth $£243,043$. On the other hand, if Mr. Low switched schemes to an 'equivalent' defined contribution fund, at retirement his pension would be worth only $£213,330$ or 73% of the full service final salary pension.

5.3 Summary

In this chapter, we have illustrated how the portability losses affect different types of UK workers. The results are summarized in Table (5.8). Under reasonable assumptions, early leavers can end up with the following percentages of a full service pension, depending on what they choose to do with the cash equivalent: 74% - 86% for those leaving deferred pensions, 71% - 75% for those taking transfer values, 73% - 79% for those switching into 'equivalent' defined contribution schemes, 63% - 68% for those going for a personal pension scheme into which the employer also contributes, and 39% - 45% for those joining a personal pension scheme where the employer does not contribute.

One surprising result is the relative gain from keeping deferred pensions instead of accepting transfer values. The reason for this is that, although the average real growth rate of wages in the UK is approximately the same as the MFR norm, the MFR norms assume that annual salaries grow exponentially with age. This has the striking implication that it is, on average, not optimal for workers to take transfer values; instead, they should ordinarily leave behind a deferred pension every time they switch pension schemes. The explanation for this lies in the front-loading of earnings growth rates which leads actuaries using MFR norms to overestimate future earnings, thereby biasing downwards service credits received in the new scheme. Those who lose the most from accepting a transfer value relative to a deferred pension are the middle-aged workers who most need a protection against portability loss. This is a powerful argument against the MFR assumption of constant growth rates in wages over the lifetime and an argument for actuar-

Worker	Type	Transfer Value	Deferred Pension	Defined Contribution	Personal Pension (Employer Contributes)	Personal Pension
MFR	A	75%	75%			
	B	71%	71%			
	C	84 %	84%	71 %	61 %	37 %
Average Manual	A	75%	88%			
	B	71%	86%			
	C	84%	96%	78 %	66 %	45 %
Average Non-Manual	A	75 %	86 %			
	B	71%	83%			
	C	84%	94%	79%	68%	44%
Mr. High	A	75%	80%			
	B	71%	76%			
	C	84%	88%	74%	64 %	40 %
Ms. High	A	75%	85%			
	B	71%	82%			
	C	84%	94%	79%	67%	44 %
Mr. Low	A	75%	78%			
	B	71%	74%			
	C	84%	86%	73%	63%	39%

Job separation assumptions:
A: separates at ages 28,29,30,40, and 57.
B: separates at ages 26,27,30,31,38,44, and 55.
C: separates at age 45

Table 5.8: Summary of portability losses (percentage of full service pension received at retirement)

ial discretion or at least more suitable rules. The next chapter reviews actuarial discretion in detail.

Chapter 6

Actuarial Discretion

Recommendation 74 of the Pension Law Review Committee chaired by Professor Goode was that: "The actuarial profession should be charged with responsibility for tightening the bases under its Guidance Note: Retirement Benefit Schemes - Transfer Values (GN11) so that the possible range of transfer values becomes much narrower than at present" ((Goode 1993), p. 25). In particular, the Goode report states in sec. 4.7.29: "If the scheme is fully funded, transfer values should be calculated on a basis which is no less favourable to the departing member than that used in assessing the minimum solvency of the scheme."

In reviewing the new version of GN11 which was drawn up in response to the Goode Report and the 1995 Pensions Act, we find that actuarial calculations are still subject to a wide range of discretion and that there is no guarantee that the basis used will not be less favourable than the MFR basis (as described in Guidance Note 27 and listed in Appendix A below). Actuaries are permitted to calculate the whole amount of the cash equivalent using the MFR basis. However, if they choose not to do this, they must still calculate the Minimum Cash Equivalent (the minimum a scheme must provide to each of its members in order to contract out of SERPS after 6 April 1997) using the MFR basis, although some variation is permitted. The new GN 11 states (sec. 4.9):

> In most cases the modification of the GN27 assumptions, as set out in this section, to take account of individual circumstances should not produce an aggregate result of the minimum cash equivalents for the whole scheme greatly different from the MFR. However, if the assumptions used combined with any unusual features of the scheme produce a significant bias, which results in this relationship no longer remaining valid, the actuary should inform the trustees of this and advise them of any implications.

This means that, in aggregate, if the assumptions the actuary uses to calculate the Minimum Cash Equivalent should differ from the MFR basis, s/he is obliged to

inform the trustees. But there is no guarantee that *any individual* cash equivalent will be close to that which would be obtained using MFR assumptions.

For any excess above the Minimum Cash Equivalent, considerably more discretion is permitted. The significance of this is that for schemes contracted out of SERPS, the Minimum Cash Equivalent portion of transfer values is subject to less discretion than the remainder of the pension, but even the calculation of the Minimum Cash Equivalent for *each worker* is subject to actuarial discretion.

Calculations of outgoing transfer values are subject to the following key elements of actuarial discretion:[1]

- The choice of discount factor in computing present values.
- The choice of inflation rate in revaluing projected wages.
- The choice of annuity factor. GN27 (D.1) suggests the PA90 mortality tables downrated two years, at least for smaller schemes (less than $\pounds 100$ million of pension liabilities). However, GN11 does not place any constraints on the actuary outside of Minimum Cash Equivalent calculations and, even in this case, GN11 allows the actuary to vary the morality assumptions, e.g. they are permitted to use unisex mortality factors.[2]. In cases where a pension would be payable only to the current spouse, the spouse's age may be used (GN11, 4.5) and this may affect the annuity factor.
- Marital status. MFR norms specify proportions married but the actuary in Minimum Cash Equivalent calculations can make use of the actual marital status of the spouse.
- Discretionary benefits. Both the old and new versions of GN11 allow for variations due to additional discretionary benefits. Discretionary benefits may be franked against the Minimum Cash Equivalent (which does not take into account discretionary benefits).
- If some accrued service arises from an earlier transfer value, GN11 allows modifications to be made in the calculations in certain circumstances (Sec. 5.2, 5.3).
- For non-Minimum Cash Equivalent transfers (both inward and outward), allowance may be made for expenses (GN11, 3.6), although there is no

[1] In practice, most transfer values are not calculated on an individual basis by an actuary. The most common procedure is for actuaries to lay down a set of factors or formulae (often presented in the form of easy to read tables) which scheme administrators use to calculate transfer values.

[2] According to the Government Actuary's Department, the majority of UK schemes use unisex mortality factors.

indication of the permissible size of these (however, the expenses allowed by GN27 for winding down a scheme are 4% for the first $£50$ million in liabilities).

- If the pension scheme is in actuarial deficit or a payment out would create a problem for the security of benefits, transfer payments can be reduced or delayed.

- Sec. 3.2 of GN11 allows the actuary discretion in making adjustments to the value of the transfer payment to cover any implicit options (about retirement date, etc.) in the pension scheme. This, however, is an improvement over the previous GN11 which did not discuss options and option values.

- Application of market value adjustments (MVAs). For Minimum Cash Equivalent calculations, the actuary calculates MVAs based on market conditions on preset dates, no less frequently than one month apart; typically the MVAs are calculated on the same day each month and all calculations during the month are based on these MVAs. For amounts above the Minimum Cash Equivalent, the actuary has full discretion over any market value adjustments. MVAs are relatively complex and a full analysis is left to Appendix D.

Computation of inward transfers involves all the above elements of discretion plus:

- The choice of projected increases in real wages.

To assess the effect of actuarial discretion, we have where possible computed the percentage changes in both outgoing transfer values (valued using Eq. (4.2)) and incoming service credits (i.e., added years) with respect to changes in discretionary parameters and evaluated these changes at the MFR norms. For example, suppose we wish to consider how transfer values change when the discount rate assumption r changes by a small amount, then we compute the elasticity of transfer value with respect to the discount rate:

$$\eta_r = \frac{\partial P_{CUM}(t_0, t)}{\partial r} \frac{r}{P_{CUM}} \tag{6.1}$$

and evaluate the other parameters in this expression at the MFR norms.[3]

[3]The elasticities for outgoing transfers are:

Actuarial Parameter	Years to Retirement			
	40	30	20	10
Inflation	1.54	1.15	0.77	0.38
Discount Rate	-3.30	-2.48	-1.65	-0.83
Annuity Factor	1.00	1.00	1.00	1.00

Table 6.1: Elasticities of the outgoing transfer value with respect to actuarial discretion.

Actuarial Parameter	Years to Retirement			
	40	30	20	10
Real Wage Growth	-0.78	-0.59	-0.39	-0.20
Inflation	1.54	1.15	0.77	0.38
Discount Rate	3.30	2.48	1.65	0.83
Annuity Factor	-1.00	-1.00	-1.00	-1.00

Table 6.2: Elasticities of incoming service credits with respect to actuarial discretion.

The effect of actuarial discretion depends naturally on the age of the worker as well as the years of service. The elasticities are summarized in Table (6.1). Table

$$\eta_\pi = -(t - t_N)\frac{\pi}{1+\pi}$$

$$\eta_r = (t - t_N)\frac{r}{1+r}$$

$$\eta_A = 1.0$$

(6.2) presents similar similar elasticities with respect to incoming service credits.[4]

These tables show that the discount rate, annuity factor, inflation rate and wage growth rate assumptions are crucial in actuarial calculations. Thus, different actuaries making different assumptions about these values can produce dramatically different calculations for outgoing transfer values and added years of service. For example, if the actuary for the leaving scheme deviates by 11% from the MFR norms so that, for example, s/he uses a discount factor of 10% instead of the MFR basis of 9% for a worker aged 35 with 30 years to retirement, Table (6.1) indicates that the transfer value the worker receives will be reduced by about 27.5%. If the actuary for the receiving scheme then uses a real wage growth assumption of 3.0% instead of the MFR assumption of 2.0%, Table (6.2) suggests that the worker's years of service credited will be reduced by 29.5%. With just these two variations in actuarial assumptions (and assuming the actual real wage growth rate is the MFR norm of 2.0%), the pension the worker receives at retirement is only about 57% of the pension that would have been received had the actuaries not made these variations. We emphasize that these losses from unfavourable actuarial variations from the MFR norms are *in addition* to the portability losses analyzed in Chapter 4 above. Having demonstrated the significance of actuarial discretion, we proceed to analyze specific factors involved in actuarial discretion in more detail.

6.1 Discount Factor

The old version of GN11 stated in sec. 3.2:

[4]The elasticities for years of service credited are:

$$\eta_g = (t - t_N)\,\frac{g}{1+g}$$

$$\eta_\pi = (t - t_N)\,\frac{\pi}{1+\pi}$$

$$\eta_r = -\,(t - t_N)\,\frac{r}{1+r}$$

$$\eta_A = -1.0$$

> ... actuarial value should be assessed having regard to market rates of interest. One of the ways in which a market value assessment may be made is on the basis of market redemption yields on British Government Stocks of appropriate duration and type at the time of transfer with allowance for investment of future interest receipts at such rates as the actuary considers reasonable. In valuing benefits which are subject to revaluation in accordance with the general index of retail prices, yields on index-linked gilts will be an appropriate criterion.

When the yield is higher, the discount factor used in computing transfer values is higher and the transfer value is correspondingly lower. By using longer-term bonds and thereby higher yielding bonds, transfer values are thus reduced more for younger members. Transfer values would be reduced yet further if yields of securities with even higher returns such as equities were used. GN11 now permits the yields on these higher yielding securities to be used in computing transfer values:

> It is a fundamental requirement, stemming from legislation, that a cash equivalent should represent the actuarial value of the benefits which would have otherwise have been preserved. Such actuarial value should be assessed having regard to the market rates of return on equities, gilts or other such assets as the actuary considers appropriate...

The direct consequence of the new version of GN11 and the use of higher discount factors is therefore the lowering of transfer values. The discount rate enters the calculation of the transfer value in two ways: it affects the annuity factor since a rise in the discount rate reduces the discounted value of future pension payments, and it changes the rate at which the deferred pension is discounted to the date on which the transfer value is paid.[5] A rise in the discount rate reduces both, but there is no requirement for actuaries to use the same discount rate in the technical computation of the annuity factor. They can (and we do the same in the following analysis) treat the annuity factor as constant.

The MFR norms for equity and gilt yields are 9% (10% post-MFR retirement age) and 8% respectively. Although GN11 allows the actuary more discretion, we will assume one discount rate for the period up to 10 years to retirement and another one for the ten year period prior to retirement. The results as shown in Table (6.3) are striking. Consider someone who is thirty years from retirement. If the actuary uses the gilt discount rate (8%) for the whole period, the transfer

[5] While an actuary will normally apply a Market Value Adjustment (MVA) such as reviewed in Appendix D, s/he has discretion over which assets are used in discounting; given the wide range of available 'market rates of return', the actuary has enormous discretion over the discount rate.

Years to Retirement	Discount Rate #1	Discount Rate #2	Discount Factor
	First Period	*Last Ten Years*	
40	12%	12%	0.01075
40	10%	8%	0.02654
40	9%	8%	0.0349
40	8%	8%	0.04603
30	12%	12%	0.03334
30	10%	8%	0.0689
30	9%	8%	0.0826
30	8%	8%	0.0994
20	10%	8%	0.179
20	9%	8%	0.196
20	8%	8%	0.2145
10	10%	8%	0.46319

Table 6.3: Dependence of the transfer value on actuarial assumptions.

value is 20.2% higher than if the actuary had used the equity discount rate (9%) and then switched to the gilt discount rate 10 years to retirement.[6]

The 9% figure is a reasonable one to use in computing equity yields. It is difficult to estimate accurately the mean growth rate of equities; however, the average annual return on equities between 1955 and 1995 was about 14% with an annual standard deviation of about 30% (Barclays de Zoete Wedd 1996). The figure of 14% however should be adjusted downwards to capture a risk adjustment for holding equities and 9% is not an unreasonable risk-adjusted figure. Similarly, the average gilt yield between 1955 and 1995 of 8.05% is very close to the MFR assumption. Although the MFR assumptions concerning discount rates appear reasonable, the actuary is left free by GN11 to choose alternative assumptions which might as shown in Table (6.3) have significant effects on the discount rate applied to the transfer value. For example, the discount factor 30 years from retirement can differ by a factor of 3 under plausible assumptions concerning the discount rate.[7] However, it is unclear that the equity discount rate (instead of that on indexed bonds) is the most appropriate one to use since deferred pensions also contain an element of insurance over inflation.

[6]The ratio of discount factors is: $\left[\frac{1.09}{1.08}\right]^{20}$ since the last ten years are discounted at the same rate.

[7]The formula for the discount factor in this case: $(1 + \text{Discount rate \# 1})^{-20}\,(1 + \text{Discount rate \#2})^{-10}$.

Years to Retirement	Inflation Rate (%)	Transfer Value as % of MFR Value
40	4.0	100 %
40	3.0	67.94 %
40	2.0	45.99 %
30	3.0	74.84 %
30	2.0	55.85 %
20	3.0	82.43 %
20	2.0	67.82 %
10	3.0	90.79 %
10	2.0	82.35 %

Table 6.4: Dependence of transfer value on inflation rate assumptions.

6.2 Inflation Revaluation Factor

The law requires that the deferred pension is uprated using LPI, i.e., the minimum of the rate of inflation and 5% p.a. compound. Hence, if the average rate of inflation exceeds 5% p.a. compound between the leaving and retirement dates, the deferred pension is not fully indexed. Before the mid-1970s, there were no indexing requirements and early leavers lost much of the value of their pension due to high inflation. The historical average annual appreciation of the RPI in the U.K. between 1955 and 1995 was 6.74% but inflation appears to have slowed down in the past decade. The MFR norm stated in GN27 is 4% per annum. However, the actuary is not required to use the MFR norm. Table (6.4) shows the dependence of the transfer value on the actuarial assumption used.[8] For example, if the actuary decided to use an inflation rate of 2% per annum instead of 4% for a worker ten years from retirement, the worker would immediately lose nearly 18% of his/her retirement income independent of any other areas of discretion.

6.3 Annuity Factor

For older workers, transfer values are most sensitive to the actuarial calculation of the annuity factor. The annuity factor is the present value of an annuity of $\pounds 1$ per annum beginning at the retirement age, taking into account survivorship probabilities and any uprating of the annuity over time to account for inflation. The relevant formula is:

[8]This table is computed using the formula: $\left[\frac{(1+\pi)}{1+0.04}\right]^R$ where π is the actuary-assumed inflation rate and R is the number of years to retirement.

Age	Life Expectancy	Annuity Factors		
	(years)	$\tilde{\rho} = 8\%$	$\tilde{\rho} = 4.35\%$	$\tilde{\rho} = 3.85\%$
Men				
58	21.3	9.23	12.81	13.48
59	20.5	9.06	12.49	13.13
60	19.7	8.89	12.17	12.79
61	19.0	8.72	11.86	12.44
62	18.2	8.55	11.55	12.10
63	17.5	8.37	11.23	11.75
64	16.8	8.19	10.91	11.40
65	16.1	8.00	10.59	11.05
Women				
58	26.4	10.25	14.78	15.66
59	25.5	10.11	14.48	15.33
60	24.6	9.97	14.18	14.99
61	23.7	9.82	13.87	14.64
62	22.9	9.67	13.55	14.29
63	22.0	9.51	13.23	13.93
64	21.2	9.34	12.91	13.57
65	20.3	9.16	12.57	13.20
		$\tilde{r} = 8\%$	$\tilde{r} = 8\%$	$\tilde{r} = 8\%$
		$\tilde{\pi} = 0\%$	$\tilde{\pi} = 3.5\%$	$\tilde{\pi} = 4\%$

Table 6.5: Life expectancy and annuity factors at retirement age based on PA90.

$$\begin{aligned} A(t_N) &= \sum_{s=1}^{\infty} \left[\frac{1+\tilde{\pi}}{1+\tilde{r}}\right]^s {}_sp_{t_N} \\ &= \sum_{s=1}^{\infty} \left[\frac{1}{1+\tilde{\rho}}\right]^s {}_sp_{t_N} \end{aligned} \tag{6.2}$$

where:

${}_sp_{t_N}$ – survivorship probability from age t_N to $t_N + s$.

$\tilde{\pi}$ – the annual uprating factor.

$\tilde{r}$ – the nominal discount rate.

$\tilde{\rho}$ – the real discount rate (defined as $\frac{1+\tilde{r}}{1+\tilde{\pi}} - 1$)

The MFR rules require that survivorship probabilities are based on the mortality tables PA90 downrated two years (to account for the improvements in mortality

since these tables were constructed). The PA(90) tables are suitable for the type of people taking out private pension annuities at retirement age in the sense that such people are likely to enjoy greater longevity than the population as a whole (for which another set of mortality tables such as the English Life Tables No. 14 might be more appropriate).

Table (6.5) lists the annuity factors for men and women at different retirement ages; they also show the life expectancies of these individuals (these were found using Eq. (6.2) with $\tilde{\rho} = 0$). The calculations were made using the Standard Tables Programme (Continuous Mortality Investigation Bureau 1994). The nominal discount rate $\tilde{r}$ used was 8% which is the same as the MFR basis for retired workers (namely, the yield on gilts). Three different assumptions concerning uprating were made, namely 0%, 3.5% and 4.0%, to assess the sensitivity of the annuity factor. For a 65 year old man, the effect of a 0.5% absolute change in the inflation assumption is a 5% change in the value of the annuity factor, demonstrating the sensitivity of transfer values to assumptions underlying the annuity factor.

6.4 Real Wage Growth Rates

In addition, while the outgoing transfer is not required to take into account real wage growth (since it uses the CUM), the incoming transfer will normally be valued using the projected unit method which accounts for future wage growth. GN11 contains a clause (3.6) which says that:

> In calculating benefits in respect of transfer values received by a retirement benefit scheme the actuary should use methods and assumptions which are reasonable and consistent with the methods and assumptions (including any allowance for future discretionary benefits) normally used for outgoing cash equivalents from that scheme.... Appropriate adjustment would be required, in respect of incoming transfers, to take account of expected salary increases in cases where 'added years' are to be credited...

Consider a worker with 10 years of service in a scheme with a salary of $£20,000$ who is 30 years from retirement and who accepts a job at another firm with exactly the same wage. Then, if the actuary of the new scheme projects wage growth at the MFR norm of 2% and the old and new schemes are similar in all other respects, the worker will receive only 5.52 years of service credit.[9] Since

[9] If inflation is less than 5% (the maximum indexation under LPI), the relative loss to the worker is $(1+g)^{-R}$ where g is the (compound) growth rate assumption for wages used by the actuary and R is the number of years to retirement (c.f., Eq.(4.3) above).

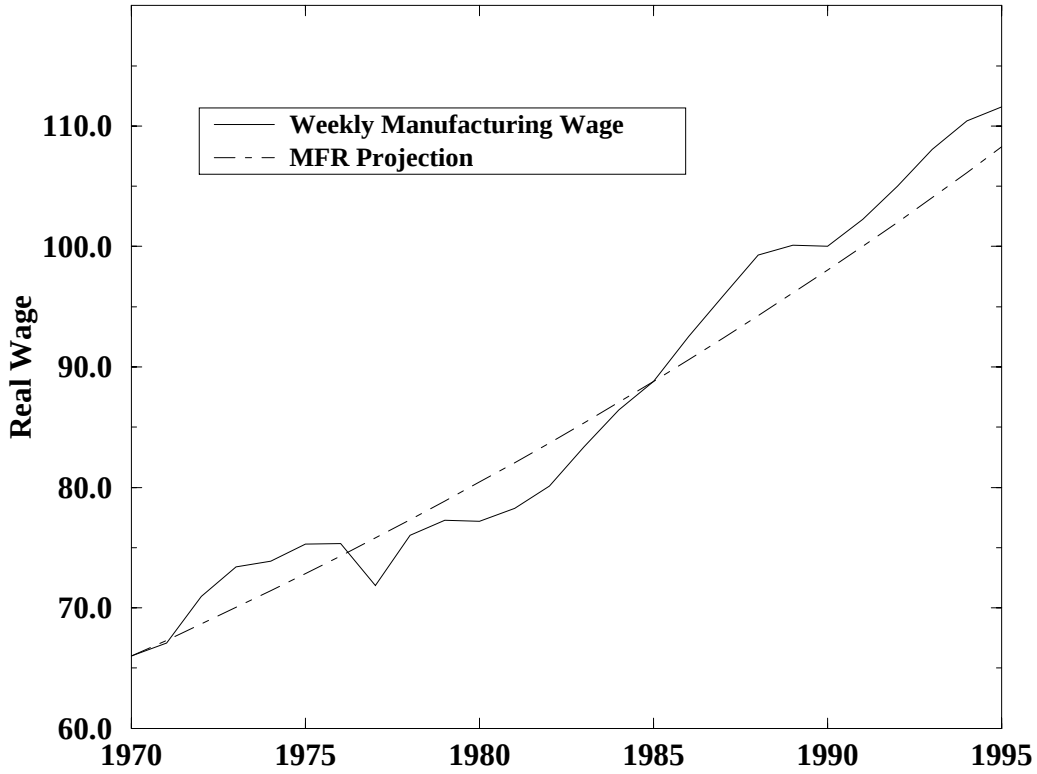

Figure 6.1: Average weekly real manufacturing wage in the UK versus MFR norm (Source:OECD Main Economic Indicators, real wage, $1990 = 100$).

this wage growth rate is compounded, the loss for younger workers is the most severe but a worker 5 years from retirement will still lose nearly 10% of accumulated service credits using the MFR assumptions. We have seen above in Table (3.2) the size of these penalties and that they are sensitive to wage growth. When a worker opts for a frozen, deferred pension, s/he loses subsequent real wage growth. In taking a transfer value to a new scheme, a worker loses future wage growth *in excess of* the rate assumed by the actuary. Thus, the actuarial assumptions on real wage growth used in inward transfers are crucial in assessing portability loss.

Adopting the MFR assumption of a constant real wage growth ignores the following variations:

- **Real wage growth differs between men and women.** Real wages in manufacturing have grown at approximately 2% as shown in Fig. (6.1). The median real wage growth for men for 1984-1996 was 1.7% per year and the median real wage growth rate for women for 1984-1996 was 2.6%. The mean real wage growth for men for 1984-1996 was 2.07%, whereas for

women it was 2.90%.[10]

- **Real wage growth varies across industries and occupations.** The median manual male worker only had average real wage growth of 1.1% between 1984 and 1996, whereas the average non-manual male worker had double this growth rate. Even among manual workers, there is an industry-specific dispersion in growth rates. For example, the average male manual worker in paper and tobacco, printing and publishing (1980 SIC 47) exhibited average nominal wage growth of 5.5% p.a. whereas in construction (1980 SIC 50), it was approximately 6.5% p.a.

- **Typical wage profiles do not have constant growth rates but rather are likely to have higher real wage growth at the beginning of a career and lower or even negative real wage growth near retirement.** Furthermore, wage profiles differ between men and women. According to the New Earnings Survey, the average gross weekly pay of those aged 50-59 in 1996 was about 6% lower than that of those aged 40-49, whereas the gross weekly pay of those aged 30 to 39 was 22% higher than that of those aged 25 to 29. These figures, taken at a single point of time, do not take into account the fact that the worker who is in the age range 25 to 29 will very likely be earning even more than his colleagues who are currently aged 30 to 39 when he reaches that age range because of real wage growth. These issues are reflected in the 'typical' wage profiles we used in our analyses.

6.5 Summary

In this chapter, we have reviewed the discretion available to actuaries in making their calculations of cash equivalents. We have computed elasticities of actuarial discretion which measure the ratio of the percentage change in the computed pension to the percentage change in the actuarial assumption. We have evaluated these elasticities at the MFR norms and have found that small changes in actuarial assumptions can have relatively large effects on the value of the pension in payment. We then proceeded to examine the following actuarial discretionary parameters in detail: discount rates, inflation rates, annuity factors, and wage growth rates. With the exception of the annuity factor, the impact of changes in different assumptions depends on the time to retirement. We also identified a number of other areas (such as the valuation of discretionary benefits) over which the actuary

[10]The source for these calculations is the New Earnings Survey (1984 data from(Department of Employment 1985), 1994 data from (Office of National Statistics 1994). The price index used was the average for the year.

also has discretion but on which is not possible for us to comment in the absence of published documentation as to standard practice. We have also reviewed, using the example of wage growth rates, how individual circumstances can vary tremendously and why either actuarial discretion or more complex rules (beyond the MFR assumptions) might be needed to determine transfer values.

Chapter 7

International Comparisons

The UK is not the only country where the issue of pension portability has been the subject of public debate. Pension portability losses also arise in other countries with well-developed private sector pension schemes. In this chapter, we review the nature of portability losses that can arise in private-sector schemes in the U.S., Canada, the Netherlands and Japan ((Turner 1993), chs 7 and 12) and ((Turner and Watanabe 1995), ch 7)).

In the U.S., most defined benefit pension schemes are noncontributory and workers leaving jobs lose all their pension rights if their pension has not vested by the time they leave. Before the 1974 Employee Retirement Income Security Act (ERISA), many workers had to stay until retirement to vest, while most schemes granted vesting when the sum of age and years of service exceeded 40. Accrued benefits could be lost if there was a break in service, if workers were guilty of misconduct, or if they moved to a rival company. ERISA standardized vesting conditions and prohibited divesting once vesting had been granted. The 1986 Tax Reform Act shortened the vesting period specified in ERISA. Two methods of vesting are permitted. With 'cliff vesting', an employee jumps from zero to 100% vesting after 5 years' service. With 'graded vesting', an employee jumps from zero to 20% vesting after 3 years, and thereafter the degree of vesting increases by 20% per year until the employee is fully vested after 7 years. However, the deferred vested benefits of early leavers are not protected against inflation in most defined benefit schemes in the U.S. Vesting is immediate in respect of an employee's own contributions to a defined benefit scheme or to a defined contribution scheme operated on behalf of an individual employee by an employer, such as a 401(k) plan. Nearly 90% of employer-provided pension schemes in the U.S., covering more than 50% of employees who are members of pension schemes, are now of the defined contribution type.

Service is portable between schemes in the U.S. if they have a reciprocity agreement. This is common in multi-employer plans which cover employees in

an industry or craft within a particular geographical region (e.g., trucking and coal mining). It is also fairly common amongst related employers in a 'controlled group' (a group of firms with more than 80% common ownership). It is much less common in single-employer plans unless they happen to be in certain industries such as finance, insurance, or real estate. There are two types of reciprocity: the 'money follows the worker' agreement and the 'pro rata' agreement. With the first type, the employee has a 'home' plan and any service accrued by the employee while working temporarily for another employer is credited to the home plan according to the rules of that plan. With the second type, the total pension is based on the combined service in all schemes, with each scheme providing a proportion of the total pension on a pro rata basis. An extension of the multi-employer arrangement is the portability network or clearing house which runs the pension schemes of all the firms in a single industry and allows full portability of service between schemes. The largest network is TIAA-CREF, the Teachers Insurance and Annuity Association and the College Retirement Equity Fund. The networks are organized either as trusts or as life assurance companies. Where the worker has a defined contribution scheme, the worker's vested account is transferred between employers. Where the worker has a defined benefit plan, service in one plan counts towards vesting in the next plan.

It is possible in the U.S. for workers to receive lump sum cash distributions representing the present value of their accrued rights when they leave an employer's scheme. This is fairly common when the lump sum is small, since schemes wish to avoid the costs of administering the small accounts of former members. However, the Tax Reform Act of 1986 imposes a 10% tax if the lump sum is not transferred (or 'rollovered') to an Independent Retirement Account (IRA) or to another employer-sponsored plan within 60 days, thereby providing a weak incentive not to take pre-retirement distributions. However, rollovers into employer-sponsored plans are limited, because new employers will generally not accept rollovers; even with 401(k) plans, only 50% of participants are in plans that accepted rollovers from previous employers.

The second Clinton administration plans to increase pension portability and security in a new Retirement Savings and Security Act. Workers will be able to join a pension scheme as soon as they begin working for a new employer (and this includes federal employees who join the Thrift Savings Plan), rather than having to wait for up to a year or more as they do now. They will also have the right to roll over their accrued benefits into a new employer's scheme. The Act will increase the numbers eligible to open tax-deductible IRAs (such as middle-income workers), make IRAs available for job-related purposes such as training, first home purchases, major medical expenses and support during extended spells of unemployment (without incurring the 10% early withdrawal penalty tax), and allow small businesses to start new, simplified 401(k)-type plans (called National Em-

ployee Savings Trusts (NESTs)) that are fully portable. The Act will also increase the security of pension assets, especially in 401(k) plans where it is currently possible for employers to 'borrow' the contributions made by employees before they are transferred to plan trustees, and there is also currently no requirement for plan administrators or auditors to report a problem that they have identified until the annual report is filed. Under the Act, employers will have to restore any delinquent contributions, there will be broader audits, and administrators and auditors will be required to report any suspected fraud to the Department of Labor immediately. The Act will also uprate the maximum level of benefits in multi-employer plans guaranteed by the Pension Benefit Guaranty Corporation for inflation since 1980, the year that the maximum level was last reset. Finally, the Act will protect the pensions of state and local government employees by placing their pension assets in trust (so removing such employees from the risk faced by bankruptcy of the employer as happened in Orange County in California). These measures should go some way towards enhancing the pension rights of U.S. workers, and also of bringing their position somewhat closer that enjoyed by workers in the U.K., following the passage of the 1995 Pensions Act there.

Defined contribution schemes are much less common in the Canada, Netherlands, and Japan than they are in the U.S. Almost all the schemes in the Netherlands and Japan are defined benefit (indeed personal pension schemes are not currently available in Japan); many of the schemes in Canada are also defined benefit and while there are individual defined contribution schemes (known as Registered Retirement Savings Plans (RRSPs) and similar to IRAs), there are much fewer of these than in the U.S. The vesting period is much shorter in these three countries than in the U.S.: 2 years in Canada, one year in the Netherlands, and, in practice, there is fairly rapid vesting in Japan (typically less than 2 years), although there are no formal rules covering vesting.

The deferred vested benefits of early leavers in the Netherlands are generally indexed to inflation, although this is not a mandatory requirement. Similarly, it is not mandatory to uprate pensions in payment, although it is common practice, and early leavers and long stayers must be treated in the same manner. In Canada, the indexation of deferred vested benefits is as uncommon as it is in the U.S. In Japan, Tax-Qualified Pension Plans do not provide for the indexation of deferred vested benefits: instead, early leavers receive their accrued benefits as a cash lump sum when they leave such schemes.

Portability clearing houses operate in the Netherlands and Japan. Most large pension schemes in Holland participate in one of five portability clearing houses, known as 'transfer circuits'. These deal with the transfer of deferred vested benefits. They were established in 1987 following government threats to introduce legislation to improve portability if a suitable private-sector alternative was not forthcoming. Early leavers can keep their vested rights in the scheme they are

leaving, or transfer them to their new employer's scheme using a clearing house. This transfer procedure is simplified by the fact that most defined benefit schemes in Holland have identical accrual rates based on average final salary and years of service and that all schemes must use a common discount rate for valuing liabilities of 4%. One important consequence of the portability clearing house system as operated in Holland is that full service (ie the full number of added years) is credited on transfer. This means that early leavers do not lose out from career progression when they change jobs, as they do in the UK, where typically less than full service is credited in the new employer's scheme. It should be noted, however, that the Dutch system of transfer circuits works largely because of the high degree of uniformity in benefit structures across different schemes.

Japan also has a clearing house for schemes contracted-out under the Employees' Pension Fund. The clearing house is operated by the Pension Fund Association (PFA), to which all contracted-out pension schemes belong. The accrued benefits of early leavers with less than 10 years' service are automatically transferred to the PFA (unless the early leaver requests a cash lump sum distribution), while those of early leavers with between 10 and 15 years' service can also be transferred to the PFA if the leaving scheme requests it. The sum transferred is the present value of benefits based on nominal career average earnings up to the point of leaving, using a discount rate of 5.5%. Once a transfer has been made, the employer faces no further obligation. When a Japanese worker eventually retires, the pension is paid in a lump sum.

There are no portability clearing houses in Canada and statutorily-vested pension benefits cannot be converted into a preretirement cash distribution. Deferred benefits in this case can only be paid at retirement in the form of a pension annuity. However, scheme-vested benefits (in the case where a scheme vests more rapidly than under the statutory minimum) can be refunded if scheme rules permit, as can employee contributions which do not give rise to a deferred pension when an employee leaves. Transfers can, however, be made to an RRSP, but assets in an RRSP cannot be withdrawn before retirement. Transfers can also be used to purchase a deferred annuity from a life assurance company. In theory, transfers can also be made to a new employer's scheme, but in practice few employers will accept such transfers.

7.1 Summary

Holland appears to have done the most to reduce the portability losses incurred by early leavers, and the U.S. the least. The U.K., Canada and Japan come somewhere in the middle. The U.K. has twice the vesting period of Holland, only limited price indexation of the deferred pension and the pension in payment com-

pared with full indexation in Holland, and a transfer system (except for those in the public sector Transfer Club) that in practice gives less than full service credits in a new employer's scheme in contrast with the full service credits that operate within the Dutch clearing house system. However, the UK has much earlier vesting than the U.S. and Canada, a much more flexible transfer system than the U.S., and at least partial indexation of deferred benefits compared with none at all for the U.S., Canada and Japan. In addition, the UK (along with Holland and Canada) prohibit pre-retirement distributions of accrued pension benefits. Such distributions are common in the U.S. and Japan, and because they are in many cases not reinvested in a pension scheme, this can lead to a substantial reduction in the retirement incomes of early leavers in these countries. It should not be a surprise to discover that most U.S. workers currently receive the majority of their retirement income in the form of social security payments rather than in the form of private sector pensions.

Chapter 8

Policy Options

In this study, we have reviewed the costs that workers face in changing jobs due to the incomplete portability of their pensions and the general backloading of pay. Although there have been dramatic improvements in portability in the UK over the past twenty years, the Pensions Act of 1995 and its implementation will have the effect that, for the average worker, cash equivalents are reduced because of:

- **The use of higher discount rates**. Equity yields can now be used instead of bond yields, with some corrections for older workers. For a typical worker such as Mr. Low in Chapter 5 who lost his job at age 45, this had the effect of reducing his transfer value in 1995 prices from $£47,985$ to $£41,902$ or by over 10%. These are nontrivial losses resulting from a piece of legislation that was intended to *improve* the portability of pensions.[1]

- **The use of lower revaluation factors.** The Guaranteed Minimum Pension has disappeared with the Pensions Act of 1995. The GMP part of a pension was uprated with the growth in national average earnings. The GMP has been replaced with the Minimum Cash Equivalent which is subject to only limited price indexation. The result is that transfer values are smaller, especially for low wage workers. Assuming Mr. Low's pension is all GMP (not unreasonable since Mr. Low is a low earner), the transfer value he receives when he leaves his job at age 45 would only be 67.3% of what he received before the Pensions Act of 1995. The net effect is that his transfer value is reduced from $£62,265$ to $£41,902$.

Given that there were substantial portability losses *before* the Pensions Act of 1995, it is useful to consider what could have been done to improve portability.

[1]This loss is before taking into account Market Value Adjustments which currently have the effect of raising transfer values (see Appendix D).

Given existing expectations about final salary pensions and also the huge size of pension fund assets, it might not be realistic to introduce radical change instantaneously. In addition, the changes in the calculation of transfer values following the 1995 Pensions Act have clear rationales. Given the difficulty of estimating future real wage growth at the industry level and the risks to schemes of liabilities linked to real wages growth, it was quite sensible to eliminate real wage uprating. In addition, given that pension funds invest heavily in equities, it was sensible to change the discount rate to reflect more accurately the weighted returns on the composition of pension fund assets.

Nevertheless, the net effect of these changes is to reduce the transfer values workers receive. In Chapter 7 above, we considered how other countries deal with portability. Some, such as Chile and Australia, have opted for portable defined contribution schemes. These schemes involve mandatory worker contributions to one of a set of managed funds. There are no portability losses or losses due to backloaded pay, but workers bear all asset market risk. This structure has also been proposed for the U.K. in (Blake 1992).

In this chapter, we propose a policy that is *targeted* specifically at early leavers. It has the additional advantage of being adjustable over time so that it approaches a portable defined contribution scheme. Consider a portable defined contribution scheme. This provides early leavers with a transfer value which is equal to total accumulated contributions. Although with defined benefit schemes, there is no hypothecated pot of money that is attached to an individual, the firm and employee have both made contributions which have generated an investment return. It therefore seems reasonable to provide workers with a transfer value that depends on *both* the investment performance of the fund's assets and the accrued pension benefit calculated by standard actuarial methods. This policy proposal will involve early leavers receiving higher transfer values but also bearing more asset market risk on the additional transfer values they receive.

Specifically, our policy proposal is that the transfer value should change from Eq. (4.2) to:

$$P_{TV}(t_{k-1}, t) = \alpha(t) P_{CUM}(t_{k-1}, t) + (1 - \alpha(t))\, P'_{DC}(t_{k-1}, t) \qquad (8.1)$$

where:

$\alpha(t)$ – a set of age-dependent weights between 0 and 1.

P_{CUM} – the transfer value formula based on current practice (c.f.,Eq. (4.2))., t – the current age of the scheme member,

t_{k-1} – the age of entry into the scheme,

and:

$$P'_{DC}(t_{k-1}, t) = \sum_{s=t_{k-1}}^{t} c_s W(s)(1 + r_{s,t})^{t-s} \tag{8.2}$$

is a modified version of Eq. (4.7) which reflects actual contribution rates c_s and realized fund returns $r_{s,t}$. Incoming transfer values would be valued in exactly the same manner except that Eq. (4.7) would be used instead of P_{CUM} in calculating service credits.

When $\alpha(t) = 1$ for all ages t, Eq. (8.1) gives the transfer value an early leaver is currently entitled to today. When $\alpha(t) = 0$ for all ages t, Eq. (8.1) gives the transfer value a worker would receive in a fully portable defined contribution scheme. Our proposal involves selecting a value of α between 0 and 1 and, in particular, choosing α closer to 1 for young workers and closer to 0 for older workers. Our policy proposal would, therefore, not affect the structure and level of retirement benefits of workers who work their entire career in the same job. It would also be simple to implement and could potentially even be implemented as an actuarial Guidance Note.[2]

On the other hand, this proposal would protect workers and increase job mobility in the U.K. and it would not impose additional risks on firms because Eq. (8.2) depends only on realized values instead of future expectations about variables such as wage growth rates about which there is much uncertainty. Workers would receive additional transfer values because, as we have seen, the contribution rates implicit in Eq. (4.1) are backloaded, so that the marginal increase in pension benefit when a worker is young is smaller than the actual contributions made.

One possibility is to set:

$$\alpha(t) = \frac{t - t_0}{t_N - t_0} \tag{8.3}$$

where t_0 is the age of entry into the labour force and t_N is the retirement age. Thus, just before retirement, the transfer value is close to the level as currently calculated. However, when young, the transfer value received is close to the value of invested contributions.

To illustrate how our proposal would work, we consider again the typical MFR worker who satisfies all the actuarial assumptions to be used in computing the Minimum Funding Requirement. In other words, we assume that all wage and

[2]Eq. (8.2) is simple enough to calculate but, in practice, actuaries might provide tables which calculate Eq. (8.2) approximately in terms of starting and final salary, average contribution rates, realized asset returns, and years of service.

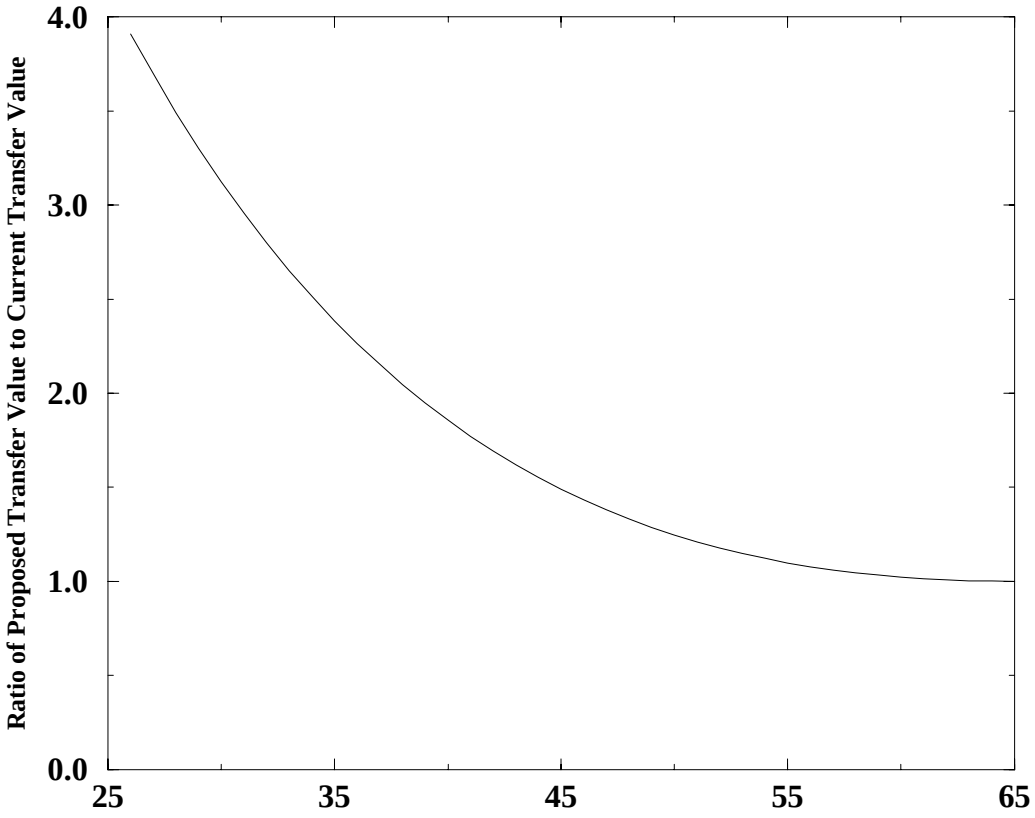

Figure 8.1: Proposed transfer value relative to current transfer value calculated assuming MFR assumptions are realized

market interest assumptions are realized and equal to MFR norms. In Fig. (8.1) we plot the ratio of the proposed transfer value to the transfer values as currently computed by actuaries using MFR norms. The worker who leaves at age 45 will get a transfer value which is approximately 50% higher than today. The actual transfer values will, of course, differ from those based on MFR norms that may not be realized. For Mr. Low, the transfer value of $\pounds 41,902$ (1995 prices) he receives after losing his job at age 45 becomes under our proposal $\pounds 57,783$. That is more than the $\pounds 47,985$ he would have received before the implementation of the 1995 Pensions Act allowed the use of equity yields in discounting, but still less than the $\pounds 62,265$ which the actuary attached to his accrued pension rights before he lost his job and much less than the $\pounds 73,665$ value of (accumulated) employer and employee contributions.

Although the transfer value ratios in Fig. (8.1) may appear high, the sums that would be paid out are nevertheless *smaller* than the accrued contributions because of the backloaded accrual structure of defined benefit schemes. In Fig. (8.2), we

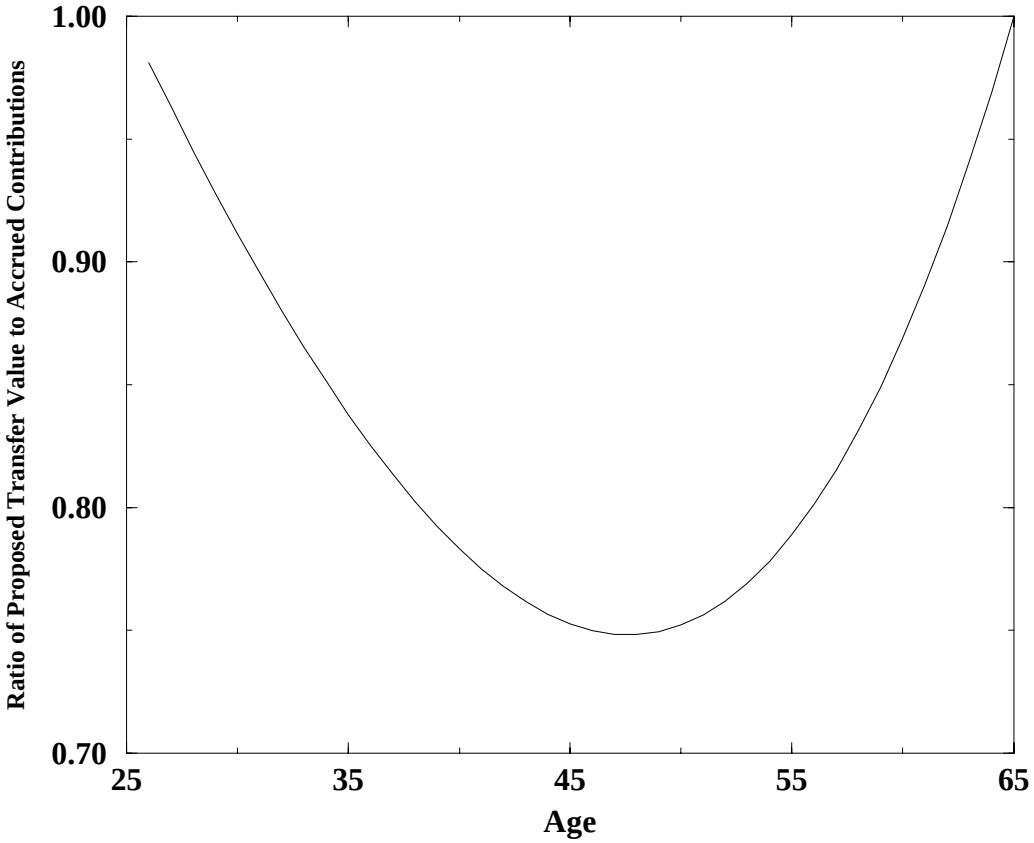

Figure 8.2: Proposed transfer value relative to accrued contributions with MFR assumptions realized

plot the ratio of the transfer value to the accumulated contributions. The middle-aged worker aged 45 is relatively the worst off (at least if the weighting system in Eq. (8.3) is used), but he is still receiving a much higher transfer value under our proposal. There would still be portability losses to workers who change jobs, but the degree of loss could be adjusted as a matter of policy by changing the age-dependent weights $\alpha(t)$.

8.1 Summary

In this chapter, we have presented a policy proposal that would not require major changes in legislation but would still improve dramatically the treatment of early leavers. It involves early leavers receiving some of their accrued contributions back when they leave a scheme in addition to a proportion of the accrued service

credits calculated according to current actuarial methods. This proposal could either be a stopgap measure or one component of the transition to a fully portable defined contribution scheme.

If a policy proposal similar to this is not adopted, then the only apparent ways of improving portability within the system of defined benefit schemes as operated in the UK are: (1) to give full service credits on transfer, and (2) to uprate deferred pensions in line with the growth rate of earnings rather than prices.

Chapter 9

Conclusions

Only a small proportion of UK workers in defined benefit occupational pension schemes can expect to receive a full service pension when they retire. The reason for this is that the vast majority of scheme members change jobs at least once during their careers and on average more than five times, and they will suffer portability losses each time they switch to a different pension scheme. They will be offered a cash equivalent of their accrued pension benefits, and this must be used to buy service credits (or some other entitlement) in their new employer's scheme, to keep a deferred pension in their leaving scheme, or to buy into a personal pension scheme. On the basis of the actuarial methods used to determine both the size of the cash equivalent from the leaving scheme or the number of added years in the new scheme, early leavers experience various types of penalties which reduce their retirement income.

In this study, we have investigated these penalties in detail, and in particular, have identified two principal types of losses:

- **Cash equivalent losses** arise because the early leaver's salary is revalued to retirement age at a less favourable rate than used to determine the projected final salary. In computing transfer values, actuaries use the 'current unit method with revaluation' to revalue early leaver salaries, while they use the 'projected unit method' to project final salaries. These different methods lead to fewer 'added years' credited in a new scheme than are earned in the leaving scheme. The cash equivalent loss is largest in *absolute* terms for workers who leave schemes in middle age, but is *relatively* the highest for the youngest early leavers.

- **Backloading losses** due to the implicit backloading of contributions in defined benefit schemes cause additional losses to those who switch to schemes (such as money purchase or defined contribution schemes) which do not backload contributions. This loss particularly affects older workers since

employers face higher marginal pensions costs for such workers. The back-loading loss becomes increasingly relevant with the growing importance of money puchase schemes in the U.K.

In addition to the losses mentioned above, we have also analyzed **actuarial discretion** as a key source of potential variability in determining cash equivalents. In principle, actuarial variations can lead to quantitatively larger penalties than the losses mentioned above.

Non-portable defined benefit pensions were originally designed as a reward for long service and employee loyalty. The use of a pension scheme in an attempt to influence and regulate worker behaviour over their working lifetimes was always going to be a fairly blunt instrument. This instrument has been made even blunter as lifetime service with the same employer is no longer a common feature of employment relationships. In addition, economic justifications for non-portable pensions have become weaker with the emergence of alternative devices for rewarding employee loyalty.

To increase pension portability within the context of the existing framework of defined benefit schemes, we have developed a policy proposal which would not require major changes in legislation but would still improve dramatically the treatment of early leavers. It involves workers receiving some of their accrued contributions back when they leave a scheme as well as a fraction of their accrued service credits calculated according to current methods.

This proposal does not eliminate the portability losses of early leavers, it only reduces them. Full portability requires either the complete transferability of service credits or the complete indexing of deferred pensions to real wage growth. In the absence of these changes to current practices, full portability in the context of private sector schemes can only be achieved using defined contribution schemes. The perceived drawback to such schemes is that the employee now bears all the asset market risk, but it has been shown elsewhere (Blake 1996) that so long as adequate contributions are made to such schemes over a sufficiently long period, this risk is minimized and a pension close to that available from the best available defined benefit scheme can be replicated with appropriate financial instruments.

Appendices

Appendix A: MFR Norms

This appendix contains the MFR norms exactly as the appear in the appendix: 'Current Factors for Use in MFR Valuation' in Guidance Note 27 of the Faculty and Institute of Actuaries ((Institute and Faculty of Actuaries 1996), B27.11-12)

A. The current gilt yields to be used for valuing pensioner liabilities should be the gross redemption yield on the FT-Actuaries Fixed Interest 15 year Medium Coupon Index or the FT-Actuaries Index-linked Over 5 years (5 % inflation) Index, as appropriate. In the case of LPI pension increases, either fixed-interest gilts with 5% pension increases or indexed-linked gilts assuming pension increases 0.5% less than inflation should be used, whichever gives the lower value of liabilities. Similar principles should be applied for other pensions which are index-linked but subject to a cap other than 5%.

B.1. The long-term financial assumptions to be used are as follows:
Rate of inflation – 4 % per annum
Effective rate of return on gilts – 8 % per annum
Effective rate of return on equities - pre MFR pension age – 9 % per annum
Effective rate of return on equities - post MFR pension age – 10 % per annum
Rate of increase of GMP under Limited Revaluation – 5 % per annum
Rate of statutory revaluation for deferred benefits – 4 % per annum
Rate of LPI increase in payment – 3.5 % per annum
Rate of increase in post 1988 GMPs – 2.75 % per annum
Rate of increase in S148 Orders – 2 % per annum
The real rate of return on index-linked stocks is i where $(1 + i) = \frac{1.08}{1.04}$.

B.2. An additional assumption needed for the projection calculations for the Schedule of Contributions.

Real rate of salary growth – 2 % per annum.

C. Market Value Adjustments (MVAs)

C.1. The MVA in relation to equities should be the ratio of 4.25% to the gross dividend yield on the FT-SE Actuaries All-Share Index.

C.2. The MVA in respect to gilts should be the value at the annualised yield on the FT-Actuaries Fixed Interest 15 year Medium Coupon Index or the FT-Actuaries Index-linked Over 5 years (5% inflation) Index, as appropriate, of a 15 year stock with coupon equal to the relevant long-term assumption, payable annually in arrears.

C.3. For liabilities which when in payment might be valued using either the yield on a fixed-interest gilt basis or that on an index-linked gilt basis, the MVA should be that which produces the lower liability.

C.4 If the liability includes a retirement lump sum payment, for the lump sum liability the market value adjustment on the proportion (g) of that part of the liability deemed invested in gilts (e.g. 0.3. if seven years from MFR pension age) should be:

$$\{1 - (1 - g) \cdot (1 - \text{gilt MVA})\}$$

D. Demographic assumptions

D.1. Mortality (before and after retirement) – PA90 rated down two years.

D.2. In the case of schemes which have a pensioner liability (assessed on the gilt basis) of at least $\pounds 100$ million, the mortality basis to be adopted should be that which the actuary considers appropriate for that scheme in respect of current pensioners and other members who have reached MFR pension age. In the case of all other schemes, and for non-pensioners below MFR pension age, the standard mortality table specified above should be adopted.

D. 3. Proportions married. For pensioners, the assumption should be consistent with 80% (men) or 70% (women) at age 60. For non-pensioners, the assumption should be, at the assumed date of retirement or earlier death, 80% (men) or 70% (women).

D. 4. Age difference between husband and wife – 3 years.

E. Expenses.

E. 1. The allowance to be made for expenses connected with closure of the scheme, continuation as a closed scheme and eventual wind-up should be 4% of the value of the accrued liabilities for the first $\pounds 50$ million of such liabilities, 3% of the value of the accrued liabilities for the next $\pounds 50$ million of such liabilities and 2% of the remainder of the value of accrued liabilities.

Appendix B: Calculation of Cash Equivalents

In this appendix, we present a general formula for calculating the cash equivalent which includes survivorship probabilities to the retirement age, discretionary ben-

efits, death-in-service as well as spouse's benefits. With these additional factors, Eq. (4.2) for valuation of cash equivalents becomes:

$$\mathcal{P}_{CUM}(t_{k-1},t) = {}_{t_N-t}p_t P_{CUM}(t_{k-1},t)\left[1 + S(t,t_N)\frac{A_S(t_N)}{A(t_N)}\right] + DS(t,t_N) \tag{9.1}$$

with:

$$P_{CUM}(t_{k-1},t) = a(t-t_{k-1})W(t)\,(1+\bar{\pi})^{t_N-t}\,A(t_N)D(t,t_N) \tag{9.2}$$

${}_sp_t$ – survivorship probability from age t to $t+s$.
a – the accrual rate (typically $\frac{1}{60}$),
t_{k-1} – the age at entry into the scheme,
t – the current age of the scheme member,
t_N – the normal retirement age of the scheme member,
$W(t)$ – the pensionable salary at age t,
$\bar{\pi}$ – revaluation rate for the deferred pension (the MFR norm is 4% p.a.),
r – the discount rate (MFR norm $8\% - 10\%$),
$D(t,t_N)$ – the discount factor ($\left[\frac{1}{1+r}\right]^{t_N-t}$ if the discount rate r is constant),
$A(t_N)$ – the annuity factor (the present value of a pension annuity of $£1$ per annum) at retirement age t_N (typically lies between $12-16$),

$S(t,t_N)$ – the spouse's pension as a fraction of the total pension multiplied by the probability married. The MFR norms assume that 80% of men and 70% of women are married when they reach the MFR pension age. The MFR reference scheme in the Pensions Act of 1995 does not include a spouse's pension but does include a widow's/widower's pension of half the member's pension. As an example, if the 80% rate is applied to all spouses, $S(t,t_N) = 0.80 \times 0.50 = 0.40$. GN11 allows the actuary to use the actual marital status of the member (GN11, 4.5).

$A_S(t_N)$ – the annuity factor for the spouse. The MFR norms state that $A(t_N)$ and $A_S(t_N)$ are to be calculated according to PA(90) downrated two years. However, some variation is permitted such as assuming that $A(t_N) = A_S(t_N)$. The MFR norm specifies an age difference between husband and wife of three years. The spouse's actual age may be used for Minimum Cash Equivalent purposes only where the pension would be payable to the current spouse (GN11, 4.5). The MFR norms permit large schemes (with liabilities in excess of $£100$ million) to use other mortality bases (e.g., English Life Tables, etc.).

$DS(t,t_N)$ – value of discretionary benefits, death-in-service, and disability benefits. For death-in-service benefits, the MFR reference scheme in the Pensions

Act of 1995 (sec. 136(12B)) provides the spouse with a pension of 50% of the pension due to the member if s/he had been a deferred pensioner at the retirement age of the spouse. GN11 directs that discretionary benefits be taken into account in computing cash equivalents unless the trustees direct otherwise.

A market value adjustment (MVA; c.f., Appendix D) is applied to the value of Eq. (9.1) to arrive at the cash equivalent P_{CE}:

$$P_{CE}(t) = \mathcal{P}_{CUM}(t_{k-1}, t) MVA_t \tag{9.3}$$

Appendix C: Calculation of Added Years of Service

In this appendix, we present the general formula for calculating added years of service to account for such factors as survivorship probabilities to retirement age, discretionary benefits, death-in-service and spouses' benefits. With these factors, Eq. (4.1) for the value of pension benefits:

$$\mathcal{P}_{PUM}(t_{k-1}, t) = {}_{t_N - t}p_t P_{PUM}(t_{k-1}, t) \left[1 + S(t, t_N) \frac{A_S(t_N)}{A(t_N)}\right] + \tilde{D}S(t, t_N) \tag{9.4}$$

where:

$$\begin{aligned} P_{PUM}(t_{k-1}, t) &= a\,(t - t_{k-1})\, W(t)\, R(t, t_N)\, A(t_N)\, D(t, t_N) \\ &= a\,(t - t_{k-1})\, W(t)\, \left[(1+g)(1+\pi)\right]^{t_N - t} A(t_N)\, D(t, t_N) \end{aligned} \tag{9.5}$$

where:

a – the accrual rate (typically $\frac{1}{60}$ but the MFR reference scheme has $\frac{1}{80}$),

t_{k-1} – the age at entry into the scheme,

t – the current age of the scheme member,

t_N – the normal retirement age of the scheme member,

$W(t)$ – the pensionable salary at age t,

$R(t, t_N) = \left[(1+g)(1+\pi)\right]^{t_N - t}$ – the revaluation factor describing how benefits are uprated between ages t and t_N,

g – the growth rate of real wages (MFR norm 2%),

π – the inflation rate (MFR norm 4%),

r – the discount rate (MFR norm $8\% - 10\%$),

$D(t, t_N)$ – the discount factor ($\left[\frac{1}{1+r}\right]^{t_N - t}$ if the discount rate r is constant),

$A(t_N)$ – the annuity factor (the present value of a pension annuity of $£1$ per annum) at retirement age t_N (typically lies between $12 - 16$),

$S(t, t_N)$ – the spouse's pension as a fraction of the total pension multiplied by the probability married. The MFR norms assume that 80% of men and 70% of women are married when they reach the MFR pension age. The MFR reference scheme in the Pensions Act of 1995 does not include a spouse's pension but does include a widow's/widower's pension of half the member's pension. As an example, if the 80% rate is applied to all spouses, $S(t, t_N) = 0.80 \times 0.50 = 0.40$. GN11 allows the actuary to use the actual marital status of the member (GN11, 4.5).

$A_S(t_N)$ – the annuity factor for the spouse. The MFR norms state that $A(t_N)$ and $A_S(t_N)$ are to be calculated according to PA(90) downrated two years. However, some variation is permitted such as assuming that $A(t_N) = A_S(t_N)$. The MFR norm specifies an age difference between husband and wife of three years. The spouse's actual age may be used for Minimum Cash Equivalent purposes only where the pension would be payable to the current spouse (GN11, 4.5). The MFR norms permit large schemes (with liabilities in excess of $£100$ million) to use other mortality bases (e.g., English Life Tables, etc.).

$\tilde{DS}(t, t_N)$ – value of discretionary benefits, death-in-service, and disability benefits. For death-in-service benefits, the MFR reference scheme in the Pensions Act of 1995 (sec. 136(12B)) provides the spouse with a pension of 50% of the pension due to the member if s/he had been a deferred pensioner at the retirement age of the spouse. GN11 directs that discretionary benefits be taken into account in computing cash equivalents unless the trustees direct otherwise. We use $\tilde{DS}$ to refer to the value of discretionary, death-in-service and disability benefits instead of the DS which was used in Appendix B because calculation of $\tilde{DS}$ will incorporate earnings growth factors whereas that of DS will not.

To calculate the number of years of service for a transferring member, we want to solve the equation:

$$\mathcal{P}_{CE}(t) = \mathcal{P}_{PUM}(\tilde{t}_{k-1}, t) \tag{9.6}$$

for $\tilde{t}_{k-1}$ where $P_{CE}(t)$ is the cash equivalent received at age t from the previous scheme. The number of added years is then $t - \tilde{t}_{k-1}$ where t is the age when entering the new scheme:

$$t - \tilde{t}_{k-1} = \frac{P_{CE}(t) - \tilde{DS}(t, t_N)}{{}_{t_N - t}p_t \, a \left[1 + S(t, t_N)\frac{A_S(t_N)}{A(t_N)}\right] W(t) \, [(1+g)(1+\pi)]^{t_N - t} \, A(t_N) \, D(t, t_N)}. \tag{9.7}$$

Appendix D: Market Value Adjustments

This appendix reviews the Market Value Adjustments (MVA) that are applied to a calculated transfer value. These provide adjustments to the transfer value to account for current asset market conditions. For example, if bond yields are currently relatively high, a middle-aged worker will be able to buy a medium-term indexed-linked bond relatively cheaply. If asset prices are currently above fundamental values as captured by the dividend yield, then the transfer value paid should be correspondingly higher to reflect the likelihood that asset market conditions will deteriorate in the future.

The MVA to be used for members more than ten years from MFR pension age is the equity MVA. For those less than ten years before retirement, the MVA used should be calculated by a linear combination of equity and gilt MVAs assuming a progressive switch to a 100% gilt investment from a 100% equity investment (GN27, 3.11).

Equity MVAs

For equities, the MVA is the ratio of 4.25% to the gross dividend yield on the FT-SE Actuaries All-Share Index on the date that the MVA is calculated: Fig. (9.1) plots this MVA from 1976 to 1996. Fig. (9.2) plots the equity MVA for 1990 to 1996. The arithmetic mean from 1976 to 1996 was 0.9147, the minimum was 0.513 and the maximum was 1.49. Thus, over this period, the average effect of the MVA was to reduce transfer values paid out. On the other hand, from 1990 to 1996, the average was 1.002, so that on average the MVA was neutral; the minimum over this period was 0.725 and the maximum was 1.32. From 1994 to 1996, the average was 1.1099, so that transfer values were higher over this period.

According to GN11, the actuary has discretion over when and how often the MVA is calculated, but the MVA cannot be recalculated less frequently than once a month. Typically an actuary will calculate the MVA on the same day each month and all transfers during the month will be calculated using this MVA.

Gilt MVAs

For gilts, the MVAs are the annualized yield on the FT-Actuaries Fixed Interest 15 Year Medium Coupon Index or the FT-Actuaries Index-linked Over 5 year (5 % inflation) Index. The first MVA is calculated as:

$$G_{MVA;1} = 0.08\frac{1-\left(\frac{1}{1+i}\right)^{15}}{i} + \left(\frac{1}{1+i}\right)^{15} \tag{9.8}$$

where i is the annualized yield on the FT-Actuaries Fixed Interest 15 Year Medium Coupon Index; it is plotted in Fig. (9.3). The mean MVA calculated in this way

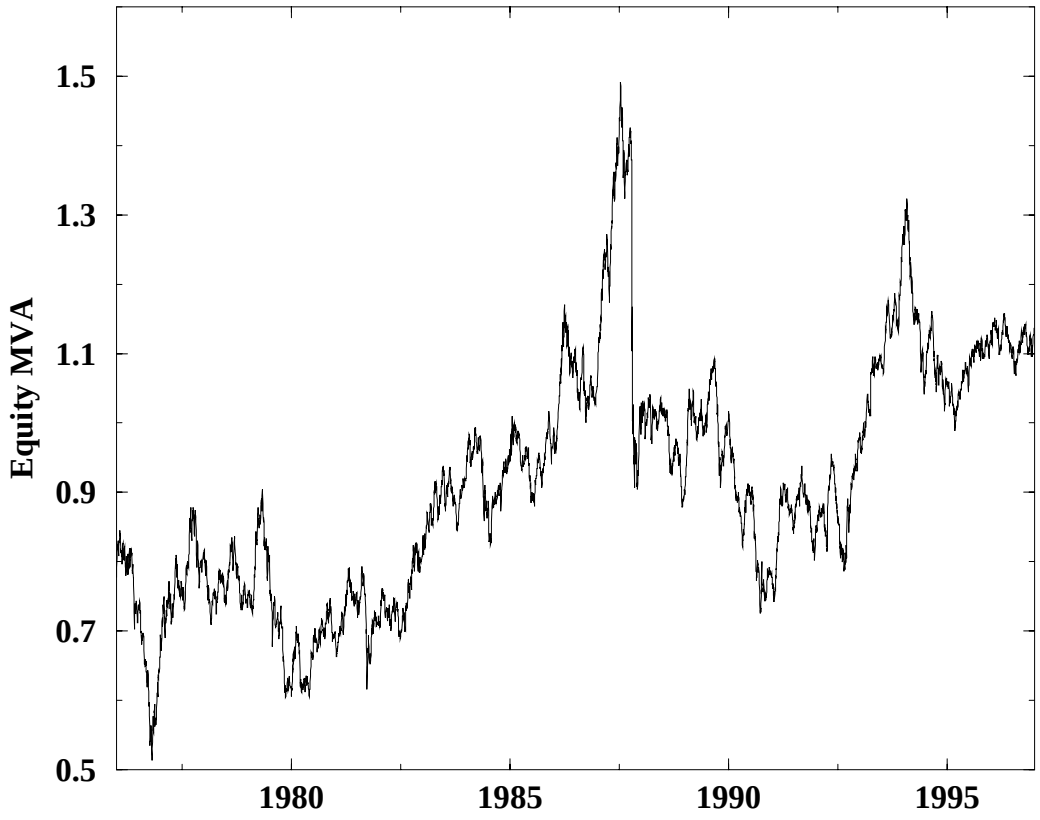

Figure 9.1: Market value adjustment on equities, 1976-1996.

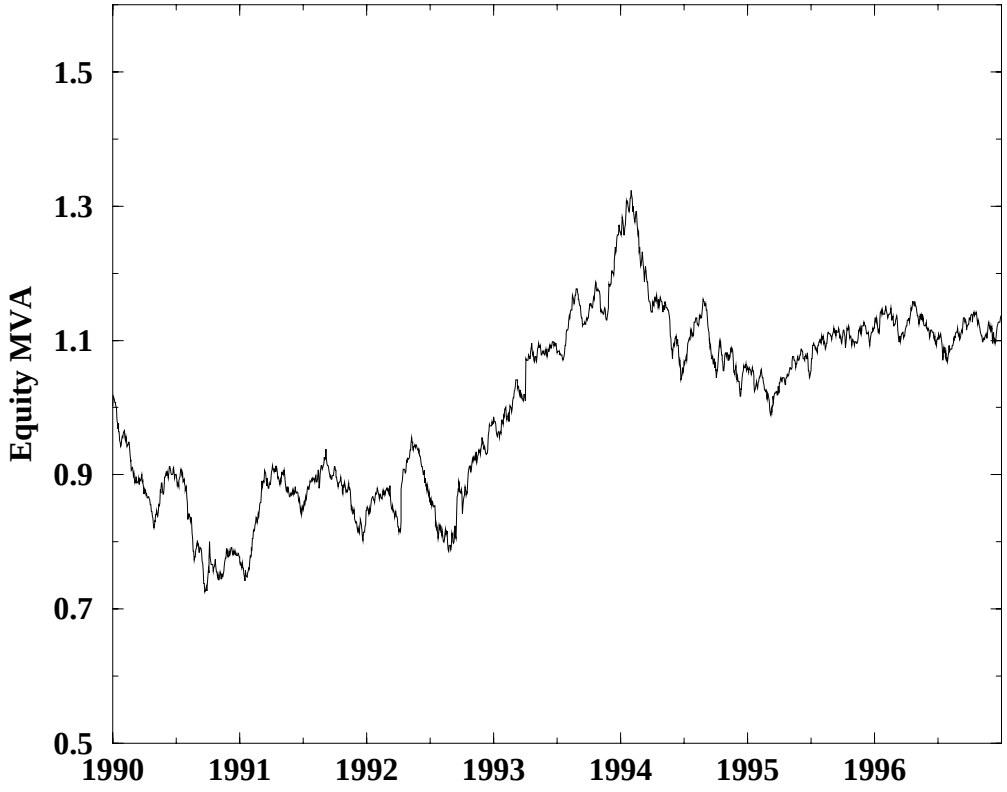

Figure 9.2: Market value adjustment on equities, 1990-1996.

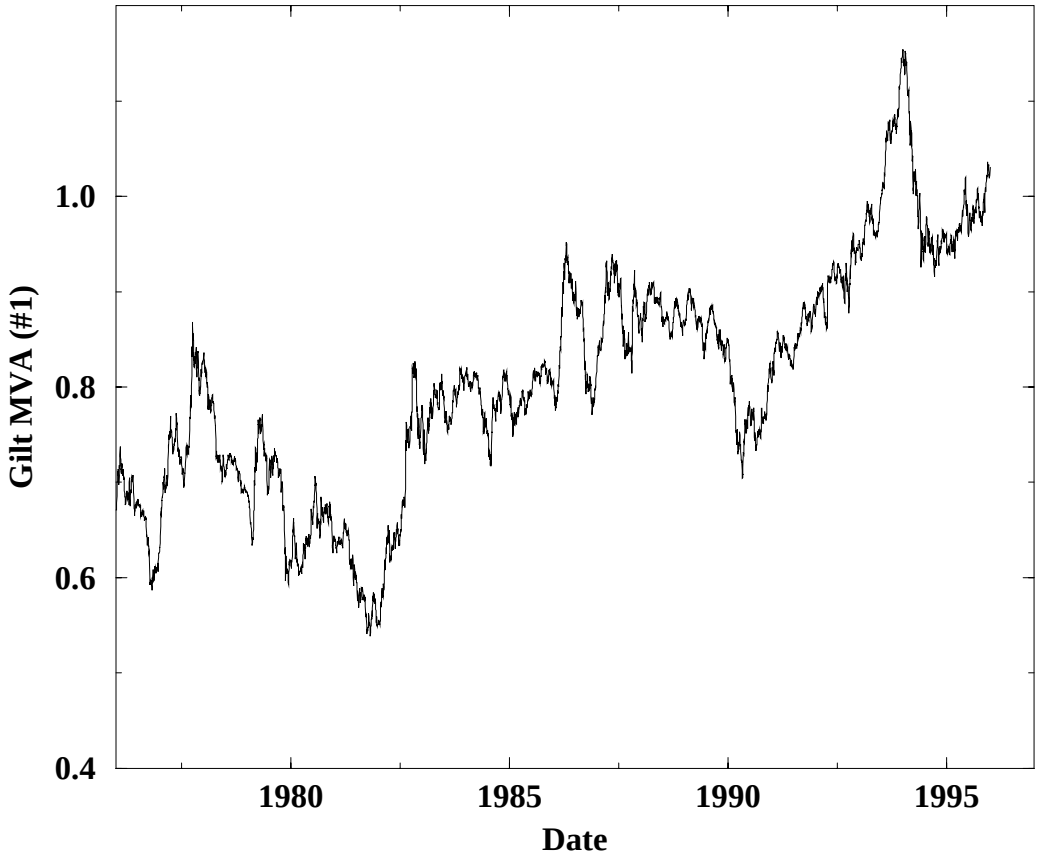

Figure 9.3: Market value adjustment on gilts (method # 1), 1976-1996.

over the period 1976 to 1996 is 0.816, from 1980 to 1996 is 0.84 and from 1990 to 1996 is 0.93, with a minimum of 0.70 and a maximum of 1.15.

The second MVA is calculated as:

$$G_{MVA;2} = 0.0385\frac{1-\left(\frac{1}{1+i}\right)^{15}}{i} + \left(\frac{1}{1+i}\right)^{15} \tag{9.9}$$

where i is the annualized equivalent of the real yield on the FT-Actuaries Index-Linked Over 5 years (5 % Inflation) Index. It is plotted in Fig. (9.4). This has a mean of 1.005 from 1986 to 1996 and a mean of 0.999 from 1990 to 1996. Between 1990 and 1996 the minimum was 0.904 and the maximum was 1.12. On average then, use of gilt MVAs may lower transfer values. In particular, the impact of this is to lower the transfer values received by older members. For gilts, actuaries have the choice of which gilt MVA to use ($G_{MVA;1}$ or $G_{MVA;2}$) as well as discretion over the evaluation dates for Minimum Cash Equivalent calculations.

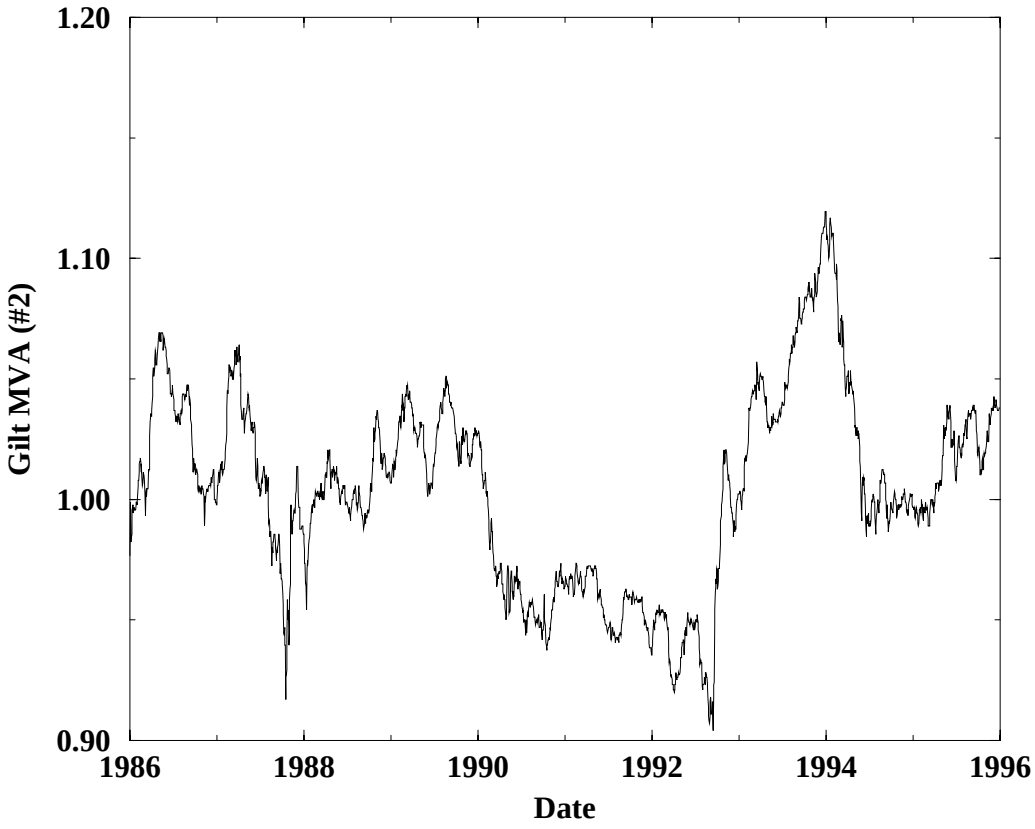

Figure 9.4: Market value adjustment on gilts (method # 2), 1986-1996.

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