

Disney, Richard; Palacios, Robert; Whitehouse, Edward

**Working Paper**

## Individual choice of pension arrangement as a pension reform strategy

IFS Working Papers, No. W99/18

**Provided in Cooperation with:**

The Institute for Fiscal Studies (IFS), London

*Suggested Citation:* Disney, Richard; Palacios, Robert; Whitehouse, Edward (1999) : Individual choice of pension arrangement as a pension reform strategy, IFS Working Papers, No. W99/18, Institute for Fiscal Studies (IFS), London,  
<https://doi.org/10.1920/wp.ifs.1999.9918>

This Version is available at:

<https://hdl.handle.net/10419/90869>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



IFS

INDIVIDUAL CHOICE OF PENSION ARRANGEMENT  
AS A PENSION REFORM STRATEGY

---

*Richard Disney*  
*Robert Palacios*  
*Edward Whitehouse*

# INDIVIDUAL CHOICE OF PENSION ARRANGEMENT AS A PENSION REFORM STRATEGY

by

Richard Disney, Robert Palacios and Edward Whitehouse\*

## Abstract

The paper examines social security (public pension) reforms in which the programme is partially shifted from a public unfunded basis to a private, pre-funded, basis. It focuses on reforms where individuals have a choice in switching from public funded to private unfunded programmes (as in the 'contracting out' scheme in the UK), or where some individuals are forced to join the funded scheme, or reforms which combine both these options. The welfare consequences of such reform strategies are analysed both from an individual and a macroeconomic perspective. The paper also examines whether individuals respond 'rationally' to the incentives inherent in such programmes.

JEL classification: G23 H53 J11

Keywords: Pension choice privatisation public finance

*Corresponding author:*

*Richard Disney*

*Department of Economics, University of Nottingham, University Park, Nottingham, NG7 2RD, UK*

*Email: [richard.disney@nottingham.ac.uk](mailto:richard.disney@nottingham.ac.uk)*

---

\* Respectively, Professor of Economics, University of Nottingham and Research Fellow, Institute for Fiscal Studies, London; Pension Economist, the World Bank, Washington D.C; Director of Axia Economics, London. Disney and Whitehouse acknowledges finance from the ESRC Centre for the Microeconomic Analysis of Fiscal Policy at the Institute for Fiscal Studies for preliminary research on the issues using UK data. Comments from Estelle James, Michal Rutkowski, Anita Schwarz, Sarah Tanner and from participants at a seminar at the World Bank are gratefully acknowledged. The views reflected here do not represent the official views of any organisation.



## INDIVIDUAL CHOICE OF PENSION ARRANGEMENT AS A PENSION REFORM STRATEGY

### 1. Introduction

For a variety of reasons, social security (public pension) programmes are in trouble around the world. In the rich OECD countries, projections of fiscal deficit and unsustainable rises in tax rates arise from the juxtaposition of the demographic transition and scheme maturation, against a background of rising generosity of treatment of successive cohorts of retirees. In the transition economies of Central and Eastern Europe, existing arrangements were predicated on a particular industrial structure and form of economic organisation that has disintegrated since the collapse of Soviet-style command economies. And many other economies, which face neither clear cut demographic transition nor the collapse of a particular economic model, nevertheless face recurring deficits in their public pension programmes arising from fiscal laxity, poor collection of taxes and imprudent commitments given the stage and pace of their economic development.

All this has led to attempts to introduce reforms designed to alleviate these problems.<sup>1</sup> An influential approach has been that of the World Bank (1994), which advocated a 'multipillar structure' comprising a redistributive element, a mandatory pre-funded earnings-related element, and scope for additional voluntary retirement saving. An alternative strategy places greater emphasis on what the International Monetary Fund has termed 'parametric' reforms, in which the unfunded social security programme is 'fixed up' by policies such as reducing the generosity of retirement benefits and postponing the first age of receipt of public pension benefits (Chand and Jaeger, 1996). The success, or otherwise, of such policies, depends on the behavioural response to programme changes of this kind.<sup>2</sup> And finally, other strategies, such as recent reforms in Italy and Sweden, have placed greater emphasis on promoting 'actuarially fair' unfunded social security through which an explicit link is made between marginal contributions and marginal pension benefit accrual, and in which scheme generosity is linked explicitly to demographics (e.g. increasing longevity). Implicitly, this last strategy assumes not only that welfare gains can be achieved by cutting back excess pension commitments to particular groups, or generations, but also that the closer link between pension accruals

---

<sup>1</sup> For overviews of reforms, see OECD (1996, 1998) and Disney (1999).

and contributions will generate favourable incentives that will prolong economic activity during the working life.<sup>3</sup>

However, while movements to an ‘actuarially fair’ basis for social security may thereby reduce the deadweight loss associated with microeconomic distortions of taxes and benefits (albeit at the cost of removing any desirable redistributive features in the system, as well as the undesirable), this is very much a second order gain (Feldstein, 1996). The potential first order gain in social security reform, according to Martin Feldstein, arises from replacing unfunded social security with funded social security, whether in the form of prefunded social security or privatised individual retirement accounts. This is because economies are in general dynamically efficient: the return on capital (the return on funded programmes) exceeds the implicit ‘return’ on unfunded social security – the rate of wage bill growth. Attempting to finance transfers by an inefficient mechanism (i.e. unfunded social security) generates real taxes with high deadweight losses.<sup>4</sup>

Nevertheless, although some ingenuity has gone into designing mechanisms which ameliorate or spread the transition burden of ‘clean break’ moves from unfunded to funded programmes (see, for example, World Bank, 1994, Chapter 8; Kotlikoff, 1998, Section 7.3), countries have in general been reluctant to follow the (misleadingly titled) ‘Chilean path’ to reform. They have preferred more tentative steps towards funding, such as top-up private accounts as an addition to reforms of the unfunded social security programme (as in Sweden), models in which only younger people can switch to the funded programme (examples are discussed below) and reforms in which individuals can choose whether to remain in the existing, unfunded programme, or to switch to a new, funded, programme (of which the most notable example among OECD countries is the United Kingdom). These ‘partial privatisation’ reform strategies have gained less attention among analysts although they are increasingly the prevalent reform strategies in a variety of countries. Countries may have undertake such strategies because they appear to provide less risk, promised some continued degree of benefit commitment, or because

---

<sup>2</sup> For example, will individuals respond to postponement of state pensionable age by working longer?

<sup>3</sup> This argument goes back to Buchanan (1968). For a favourable view of such a reform in the Swedish context, see Palmer (1999). An important question in such reforms is: who bears the burden of prediction error e.g on demographics or wage bill growth – is it the retiring cohort, workers, or the whole population via changes in the fiscal position of the government?

<sup>4</sup> Feldstein *ibid* p.3. Returns on unfunded programmes, especially for earlier generations, may ‘artificially’ exceed the Aaron-Samuelson return but this is simply due to the absence of credible pre-commitment mechanisms in public pension programmes, whether funded or unfunded – see Disney (1996) Chapter 10 for a development of this argument.

the transition problem can be sold more easily to interest groups by offering a degree of choice.

It is the object of this paper to analyse such strategies. The paper therefore suggests that a critical issue in designing the transition to a funded scheme is the extent to which choice of pension arrangement is offered to workers. From the government's perspective, the policy question to be answered is who should be allowed, encouraged or forced to join a funded scheme (which, for the purposes of the analysis, we assume to be a separate, privately-managed, scheme). The answer to this question has important implications for the success or failure of the entire reform.

The range of options open is described in the next section. It examines some actual reform strategies adopted by countries which can be characterised as partial privatisations and which, in some cases, embody voluntary choice of pension arrangement. We use the term 'switching' to denote the individual decision to shift between the unfunded and funded sectors of the pension scheme. Section 3 examines the microeconomic incentives faced by workers in regimes of this kind. To our knowledge, although the analysis is implicit in much previous analysis of the UK pension reform, the only formal simulation models are those provided by Gustman and Steinmeier (1998) and Kotlikoff, Smetters and Walliser (1998) to which we return below. An important issue for the policy-maker, also considered in Section 3, is whether individual switches, where there is a choice, reflect the incentive structure or whether a large amount of switching (and, in some countries, reverse switching) is unwarranted by the incentives. Quite apart from the deadweight costs of 'perverse' switching, such randomisation hinders the government in its desire to control the pace of the reform. The evidence presented here is novel and suggests that the switching process is indeed fairly predictable in a variety of countries.

Section 4 examines the issue of risk, and whether elements of 'partial privatisation' strategies, such as reversion procedures and combinations of funded and unfunded provision, provide improved insurance possibilities. Our judgement is that, while the insurance properties of mixed pension schemes are important, other considerations in practice outweigh this facet in determining the institutional set-up of such reforms. Section 5 examines the macroeconomic consequences of pension reform strategies. While Section 3 examined the individual incentives in choice-based pension reforms, the aggregate implications for government budgetary stance and long run scheme stability are important. The discussion encompasses mechanism design,

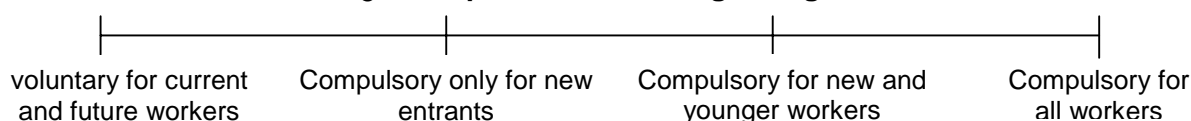
transition costs, and the problem of adverse selection in reform strategies where the transition is not mandatory. Finally, Section 6 provides a brief conclusion.

## 2. Policy Options in Pension Privatisation

### *Basic choices*

A typical pension privatisation involves the diversion of mandatory contributions by workers to a publicly-managed defined-benefit scheme into a privately managed defined-contribution scheme. A critical issue to be resolved in the reform strategy is the extent to which this new private element is offered as a choice or as a mandate to current and future workers. Figure 1 shows the range of possible choices of coverage in a privatised pension scheme.<sup>5</sup> At the left hand extreme is an entirely voluntary switch where all workers, including new entrants, are offered the option either of staying with the defined-benefit PAYG scheme or switching to a new, funded, defined contribution plan. At the other end of the spectrum is an entirely compulsory switch, where pension rights in the old PAYG scheme are frozen and all new rights are earned through the defined contribution funded plan. In between are various combinations. For example, current workers might be offered a choice between the new and old plans while new entrants are forced to switch. Or older workers might be excluded from the new plan, while younger workers are forced to switch. The policy choice in designing the coverage of the pension reform therefore involves choice among a spectrum of possible options.

Figure 1: **Spectrum of switching strategies**



### *Policy choices in practice*

The experience of 13 reforming countries is shown in Table 1 (taken from Palacios and Whitehouse, 1998; detailed references on individual countries are contained

<sup>5</sup> Schemes of this type generally maintain a 'floor' of unfunded income maintenance (the 'first pillar' in World Bank, 1994, terminology). Thus the reform process is assumed to cover choice of 'second pillar' strategy – the pillar in which provision is still mandatory but which can be either privately or publicly provided. It is, of course, possible to make second pillar coverage entirely voluntary, as in the original 'Beveridge scheme' in the UK. While this may be a rational strategy for a country with low levels of GDP per capita, most pension schemes that contain a first pillar 'floor' in the developed world do also have mandatory second pillar coverage – for example Australia, the Netherlands, the UK and – although the 'floor' is earnings-related – Switzerland).



there). The sample covers the whole spectrum of choices in Figure 1. Three countries – Bolivia, Kazakhstan and Mexico – would be at the right hand extreme of Figure 1. They have all forced workers to shift to the private scheme. At the other end of the spectrum are Argentina, Colombia, Peru and the United Kingdom. They allow all workers, including those yet to reach labour force age, to choose between the public and privately managed programmes for at least part of their mandatory pension component. Croatia, El Salvador, Poland and Uruguay compel workers below a certain age to switch. Finally, Hungary and Chile have allowed choice for those with rights in the old scheme but not for new labour market entrants.

Table 1: **Switching rules in selected pension reforms**

	<i>Switching for new entrants</i>	<i>Switching for current labour force</i>
<b>Latin America</b>		
(date of reform)		
Argentina (1994)	Voluntary	Voluntary
Bolivia (1997)	Mandatory	Mandatory
Chile (1981)	Mandatory	Voluntary
Colombia (1994)	Voluntary	Voluntary
El Salvador (1998)	Mandatory	mandatory < 35 voluntary 35-55
Mexico (1997)	Mandatory	mandatory
Peru (1993)	Voluntary	voluntary
Uruguay (1996)	Mandatory	mandatory < 40 & higher income
<b>Other</b>		
Croatia (2000)	Mandatory	mandatory < 40 voluntary 40-50
Hungary (1997)	Mandatory	voluntary
Kazakhstan (1997)	Mandatory	mandatory
Poland (1999)	Mandatory	mandatory < 30 voluntary 30-50
United Kingdom (1988)	Voluntary	voluntary

*Notes:* Uruguay's pension reform is mandatory only for those earnings more than 5000 pesos per month in 1996. The maximum switching age for women in El Salvador is 50.

#### *Pension guarantees*

The issue of differential risks attached to alternative pension schemes has been extensively discussed in the literature; public unfunded defined benefit plans and private funded defined contribution plans have very different risk characteristics.<sup>6</sup> Here the pertinence is in relation to the risks attached to pension reform strategies and to the

transition problem. In terms of risk alleviation in the context of switching, a key factor is whether individuals can leave, or revert to, the public programme at a later date, or indeed make multiple switches between the residual unfunded programme and the funded component. Unlimited reversibility of the switching choice and defined benefit type guarantees provide insurance against investment risk but can distort behaviour and certainly create a contingent liability to the government.<sup>7</sup>

This liability, often ignored in the reform debate, can be quite large. Its value depends on several unknown probabilities including the policy risk of unanticipated tax policies (for example, changes in the generosity of tax treatment of private schemes), the net expected rate of return to the private pension investment funds, and wage and employment patterns. These are in turn affected by the guarantee itself. For example, the incentive for individuals to monitor the investment performance of their funds is significantly reduced if it is likely that a significant public pension can be obtained as an alternative, regardless of the net returns to the funded account. Other things equal, the higher the guarantee, the greater the number of people that will switch and the greater the contingent liability which is created for the government.

Table 2 illustrates that reforming countries have adopted alternative guarantee strategies. Three countries allow individuals to switch indefinitely, three for a limited period, and six do not permit reversion. There are also variations within these categories: for example in Mexico, new entrants to the labour force cannot switch, whereas current workers can do so. On the other hand, flat government contributions to each individual defined contribution account, provide some insurance against low incomes in old age. In Colombia, workers can switch back and forth between the public and private schemes every three years. Lastly, it is important to note that switching and reversion rules are a separate issue from the issue of whether a 'floor' (minimum income guarantee) is provided; the 'defined benefit guarantee' in the last column refers to the scheme itself and not to any 'first pillar' additional provisions.<sup>8</sup>

---

<sup>6</sup> For some recent views, see Hemming (1998), Holzmann (1998) and Bohn (1999).

<sup>7</sup> In most countries, with the notable exception of the United Kingdom, switching back is retrospective, in that accumulated funds in the defined contribution account are surrendered in return for the promised defined benefit. The contingent liability to the government in this case is therefore the difference between the defined benefit right and the accumulated funds in the account.

<sup>8</sup> There are various other subtle forms of insurance in these reform strategies. For example, in the UK, the 1988 reform, which permitted individual retirement accounts known as Personal Pensions to 'contract out' of the public programme (see below) did not require full price indexation of the annuity. The government made up the difference between partial indexation of the annuity in payment and full indexation but on the basis of indexing the equivalent guaranteed minimum pension in a defined benefit scheme. Thus the annuity was overindexed if the equivalent DB plan outperformed the DC plan, and vice versa: see Dilnot *et al* (1994) pp.120-124 for further details.

Table 2: **Benefit guarantees in selected pension reforms**

	<i>Option to return to public scheme</i>	<i>Valuation of accrued rights</i>	<i>Defined benefit guarantee</i>
<b>Latin America</b>			
(date of reform)			
Argentina (1994)	yes, for 2 years	new DB formula	No
Bolivia (1997)	no	new DB formula	No
Chile (1981)	no	recognition bonds	No
Colombia (1994)	yes, indefinitely	recognition bonds	Yes
El Salvador (1998)	no	recognition bonds	No
Mexico (1997)	yes, indefinitely	not applicable	Yes
Peru (1993)	yes, for 2 years	recognition bonds	No
Uruguay (1996)	no	new DB formula	No
<b>Other</b>			
Croatia (2000)	?	?	?
Hungary (1997)	yes, for 2 years	new DB formula	yes
Kazakhstan (1997)	no	new DB formula	no
Poland (1999)	no	notional capital	no
United Kingdom (1988)	yes, indefinitely	new DB formula	no

*Note:* Benefit guarantees in Croatia not agreed at time of writing. See references in Palacios and Whitehouse (1998) for details of individual reforms.

### *Pension switching options in practice: three country illustrations*

#### *The United Kingdom*

The United Kingdom pension scheme offers the facility for individuals or companies to opt out of part of the social security programme. The genesis of the UK arrangements lies in the 1970s, when the government decided to supplement the existing 'first pillar' flat social security benefit (the Beveridge National Insurance scheme) with a 'second pillar' earnings-related social security benefit, which became known as the State Earnings Related Pension Scheme (SERPS). However, many individuals already belonged to company provided pension plans (occupational pensions) and the government was anxious to retain a flourishing private sector.

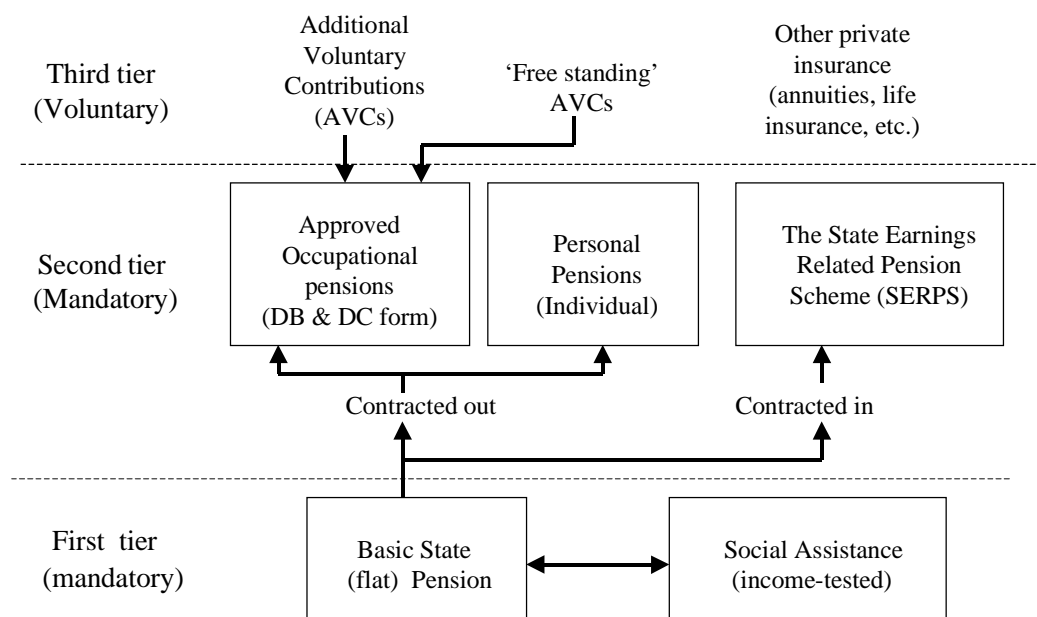
The scheme that evolved, known as *contracting-out*, allowed approved occupational pension schemes to contract out of part of the National Insurance contribution, which is the basic source of revenue for financing the public pension programme. Approval depended on the private schemes being of the defined benefit form. The difference between the full rate and the reduced rate is known as the *contracted out rebate*. In return for paying the lower contribution rate, occupational schemes would take responsibility

for paying a pension benefit on retirement to the individual at least equivalent to SERPS, this benefit was known as the *Guaranteed Minimum Pension* (GMP). The scheme has been likened to a loan from the public sector to the private sector that is repaid by taking on future public commitments (Hemming and Kay, 1982). However, the evidence suggests that the loan has been obtained on rather generous terms, in that the rebate has historically exceeded that needed to pay the GMP or later equivalent (Disney and Whitehouse, 1992, 1993). Other countries such as Japan adopted this contracting-out approach but, perhaps because the contracting-out terms were insufficiently generous, this did not lead to a corresponding development of the private sector..

By the mid-1980s, the UK government was anxious to reduce future public pension liabilities still further and in 1986 legislation was passed (implemented in 1988) by which the requirements for contracting-out were relaxed. Now defined contribution (DC) schemes as well as defined benefit (DB) schemes could contract out of SERPS. Since DC schemes could not provide a guaranteed DB equivalent, the GMP requirement has subsequently been dropped – the Government Actuary has to decide, given expected rates of return, what rebate will finance a benefit of roughly similar magnitude to the publicly-provided benefit, SERPS. This requirement has in fact become less onerous because the government has cut back the prospective value of SERPS benefits.

An important development post-1987 has been the growth of individual defined contribution private pension accounts known as *Personal Pensions*. The contracting-out structure works differently for these accounts, with the rebate being paid directly to the chosen private provider by the Department of Social Security. Individuals are, of course, free to contribute their own money to the account on top of the statutory element. The rebate is age-related, at a higher fraction of pay for older workers (unlike the rebate that is deducted from the contribution liability of members of private defined benefit plans, which is a fixed proportion of salary). Both company schemes and individuals can revert to contracted-in status at any time. Further details on the evolution of the UK pension programme can be found in Disney (1996), Disney and Johnson (1998) and Whitehouse (1998). A schematic illustration of the UK pension programme is given in Figure 1. It should be noted that in 1998 the government proposed further extensions of contracting-out and other changes to the public pension programme: details are given in Disney, Emmerson and Tanner (1999).

Figure 1: UK Pension Programme 1998



### Hungary

Hungary typified the problems of many transition economies, with an existing, overly generous PAYG scheme generating a rapidly increasing system dependency ratio and increasing projected deficits in the public pension programme (for a discussion, see Palacios and Rocha, 1998). A series of *ad hoc* measures were implemented prior to a more radical system overhaul, which took place in 1997 with implementation commencing in 1998. The reform had two strands: a retrenchment of benefits within the existing PAYG scheme coupled with an individual option of switching to a new multipillar scheme.

Under the latter scheme, workers can choose to stay in a reformed PAYG scheme or to switch part of their contributions to a new funded defined contribution component of the scheme. New entrants must join the new scheme.<sup>9</sup> Workers will be given two years to exercise their right to switch to the new system; optants to the new scheme also have the right to revert to the old scheme before September 2000.

<sup>9</sup> The original plans required mandatory switching for all those aged under 40, and a somewhat higher contribution share going to the new funded pillar. After objections were raised to the arbitrary age cutoff, it was dropped. However guarantees relating to the second pillar were made contingent on having contributed to the private scheme for at least 15 years. It was thought that this would discourage workers in their late 40s who were unlikely to meet this criterion.

The 'modernised' PAYG scheme gradually raises the retirement age to 62, reduces the generosity of indexation provisions and attempts to link contributions and benefits in a more explicit manner than the pre-reform PAYG scheme. Workers who decide to stay wholly in the PAYG scheme will have 30% of their gross wage transferred to the scheme (21% employer, 9% employee). Alternatively (for those who have a choice), 8% of the 9% employee contribution can be channelled into a mutual benefit pension fund where an individual (DC) retirement account is established. The remainder of the contribution remains in the PAYG scheme, and pays a proportionately reduced benefit. Accrued rights in the original scheme would be recognised by applying the accrual rates of the current first pillar. This is a reduction relative to the pre-reform system. It was possible to offer these terms to current workers precisely because the switch was voluntary. Simulations of the implications of this reform process for projected deficits and surpluses in the Hungarian system are contained in Palacios and Rocha (*ibid*).

### *Poland*

The Polish social security system operated on a similar basis to that of Hungary, with an even higher contribution rate (although this also included the finance of sickness and disability benefits). Under proposals introduced in 1997, which have been implemented from 1999, the previous PAYG scheme is replaced by an 'actuarially fair' scheme in which pension contributions are registered to individual accounts. However, the bulk of the contributions will be allocated to 'notional' (i.e. *unfunded*) individual accounts held by the social insurance fund. These contributions will then be uprated in line with a formula related to the growth of the price index and the growth of the aggregate wage bill. The sum of uprated contributions represents the bulk of the notional 'capital' of the individual, augmented by a capitalisation of accrued pension rights under the old system. The system will have a minimum pensionable age of 62, and, at this or a later date, the notional capital of the account will be converted to an annuity based on average life expectancy at the time of the award. This component operates in similar manner to the recent Swedish reform; for further details and justification in the Polish context, see Góra and Rutkowski (1998).

At the same time, however, as this 'first pillar' is reformed, an option is introduced, akin to the Hungarian reform. Automatically, for those aged under 30, and optionally between age 30 and 50, one fifth of the social security contribution (9% of

wages up to a ceiling) will be diverted to a private pension fund chosen by the participant. This fund must be annuitised at the same time as the first pillar ‘notional’ PAYG account. Individuals can switch between private providers, but cannot revert to the public scheme with this component. Thus, in steady state, the Polish reform envisages a scheme of wholly individual accounts, part of which is pre-funded and part of which is unfunded as with traditional PAYG schemes.

### 3. Voluntary switching: basic principles and evidence

#### *The individual decision where returns are riskless*

This section considers the incentives facing an individual to switch within choice-based programmes of the type described in the previous section. For the purposes of the analysis, we assume that the individual faces a choice between a generic unfunded defined benefit (DB) plan and a funded defined contribution (DC) plan, and that returns are known in advance. In the DB plan, the object is to obtain a *target Replacement Ratio* ( $RR^*$ ) as a fraction of average earnings. The accrual structure for pension  $p$  in the DB scheme can be written as:

$$P_{i\text{ PAYG}} = \alpha_i n_i \sum_{t=0}^{R_i} c_t w_{it} I_R \quad (1)$$

where  $I_R = \bar{w}_R / \bar{w}_t = (1 + \bar{\omega})^{R-t}$

$\alpha_i$  is a choice variable, determining  $RR^*$

where  $\alpha_i$  is the annual accrual rate specific to a member of the  $i^{\text{th}}$  cohort,  $n_i$  is the number of years service and  $R_i$  is the average retirement age of the cohort. Accrued rights are assumed to be indexed by a revaluation factor to retirement,  $I_R$ , related to average earnings growth,  $\bar{\omega}$ . The PAYG equilibrium contribution rate,  $c_t^*$ , of course requires that:

$$c_t^* = \sum_{i=1}^N P_{it} / \sum_{i=1}^N \bar{w}_{it} L_{it} \quad (2)$$

i.e.  $P$ , the sum of all pension payments to the members of  $N$  cohorts, is equivalent to the sum of contributions levied on workers ( $L$ ) in each cohort.

Alternatively, assume that the individual can choose to invest in a generic system of individual retirement saving accounts of the defined contribution form. The pension accrual structure for this scheme which can be written as:

$$P_{iDC} = a_R \sum_{t=0}^R c_t w_{it} (1+r)^{R-t} \quad (3)$$

where  $a_R$  is the annuity rate appropriate given the expected average mortality of cohort  $i$ , and  $r$  is the expected real rate of return on the accumulated fund. The individual is assumed to evaluate these accrual structures and to calculate which scheme, or perhaps which amount of time spent in each scheme (depending on the rules concerning switching) will maximise the pension.

The key parameters of the DB plan are the accrual rate, the number of years of service and the revaluation mechanism. In the DC plan, the key parameters are the rate of return on the fund and the annuity rate. In ‘actuarially fair’ DB plans, sometimes called ‘notional accounts’, the accrual rate should match closely the annuity rate in the funded DC plan, since the latter is determined by post-retirement indexation arrangements and (changes in) expected mortality. However, if dynamic efficiency holds, as is normally the case, then the funded account should have a higher expected fund value at annuitisation than the ‘notional DC account’. The two *caveats* to choice on this basis alone are differences in transactions costs, and relative risk. We return to the latter issue shortly.

Of course, a DB plan can adopt any accrual structure and some of these are illustrated in Figure 2, Panel A. These accrual rates need not generate the same replacement rate at retirement, although in fact the ‘average salary’ and ‘notional DC’ account schemes do generate almost identical replacement rates in the case illustrated here. Figure 2 Panel A provides *marginal* accrual rates by year of membership of each type of DB plan, as a percentage of real earnings *in that year*. Real earnings are assumed to grow at 1½% per annum. The area under any curve gives the total replacement rate of pension at retirement relative to average earnings. Under the *average earnings* plan, it is assumed that an individual accrues 1.25% of each year’s salary towards the final pension. We assume the individual enters the scheme at 30 and retires at 62. Each extra year’s earnings raises the real average earnings base and therefore the accrual structure rises mildly with age: the phenomenon of *backloading*. The backloading is stronger in the ‘final salary’ scheme because, as its name suggests, benefits are calculated on the final salary



achieved (by assumption, at the same 1.25% accrual rate for each year's service). Such schemes are typically much more generous (to long tenure individuals, at least) and imply significant intragenerational redistribution arising from differences in scheme tenure (Disney and Whitehouse, 1996). In contrast, accruals are invariant to age in the 'notional DC' account. This is because such schemes (as, partially, in Poland and in Sweden) revalue past notional contributions in line with earnings growth (here, for simplicity, we assume that individual and aggregate earnings growth occur at identical rates). The revaluation of the earnings base over time means that the *marginal* accrual simply arises from extra years in the pension scheme and is therefore a constant.<sup>10</sup>

In the present context, the point of these accrual structures is to show what an individual would gain by one (or more) extra years in a given scheme. It should therefore be noted for what follows, that, depending on the type of scheme, marginal accruals differ according to length of scheme membership, and that this impinges on potential switching behaviour. This is illustrated in Figure 2, Panel B where, depending on when the individual enters the scheme ('switches'), the marginal accrual profile varies. In fact in the 'average earnings' scheme, the marginal accrual structure is independent of the timing of entry because the impact of extra year's earnings on the average is constant (this is also, naturally, true in a notional DC scheme). However, the timing of entry matters in a final salary scheme as shown by taking accruals conditional on entry at ages 30, 40, 50 and 56 by way of illustration.

Contrast these accrual structures with those given by a funded DC account. Here, an explicit fund accumulates and contributions in the early part of the working life are intrinsically 'more valuable' than those in the latter part because of the simple process of compound interest. We can denote these schemes as *frontloaded* and such a pension plan is illustrated in Figure 2 Panel C for two different rates of return.

---

<sup>10</sup> In terms of equation (1), a final salary scheme as modelled here bases the pension solely on  $w_{R-1}$  – earnings in the year before retirement. The average salary plan depicted here does not revalue past earnings:  $I_R$  is omitted. The 'notional DC account' revalues past contributions in line with average earnings growth. In fact most 'average earnings' public pension schemes, such as the UK and the US, also revalue past earnings in line with earnings growth even if they maintain an explicit 'defined benefit' structure. In such circumstances, an 'average earnings' scheme and a 'notional DC' account scheme have identical accrual structures. Substituting 'notional DC' accounts for 'traditional' PAYG DB plans may have political resonance (not least as a means of cutting back the generosity of public pension programmes) but it is highly misleading to see 'notional DC accounts' as in some sense closer in spirit to real (i.e. funded) DC accounts. They are not.

### *Switching strategies*

The different accrual structures of these plans underpin the individual switching decision. Key questions are whether switching is a once-and-for-all decision, or whether the programme permits reversion and, if reversion is permitted, whether past accruals continue to accumulate in their original form or whether all accumulated funds are revalued in the scheme to which the individual reverts. Figure 2 Panel D, which superimposes Figure 2 Panels A and C, provides an illustration of the possibilities. Here the funded DC plan clearly dominates the various DB programmes, at both 3 and 4% real returns per annum.<sup>11</sup> However, if the individual were allowed to revert to the existing DB programme but maintain the existing DC account, (as in the United Kingdom), he or she would revert at or around age 56, where both the ‘average earnings’ and ‘final earnings’ annual accrual structures intersect the accrual rate in the funded DC plan. If the average expected return were 3%, reversion would come somewhat earlier, and would depend on the measure of salary used.

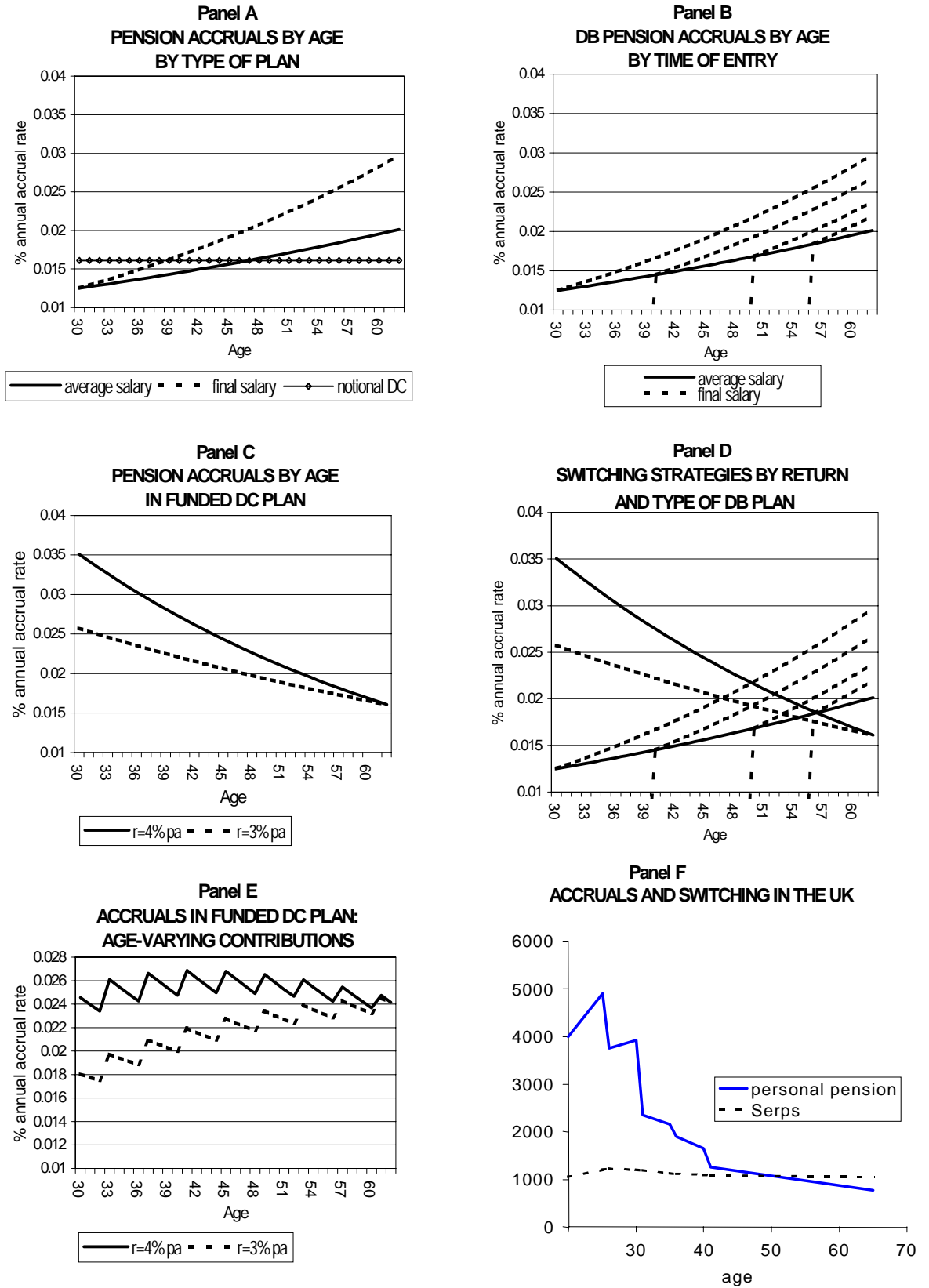
If, in contrast, all the contributions to the DC plan were on reversion reincorporated into the DB plan (i.e. the individual could retire either with a DB pension or a DC pension, but not both), then the relative slopes of the accrual curves would not be relevant; instead the areas under the curves, giving the overall replacement rate relative to average earnings at retirement, would be pertinent. Inspection of Figure 2 Panel D suggests that, under those circumstances, the individual would remain in the DC plan throughout the lifetime.

There are two further illustrations of note. First, the ‘frontloading’ of a public-sponsored funded DC plan can be altered by varying the contribution rate by age – raising the statutory contribution rate as the individual ages. This gives less incentive to young individuals to switch in, and less incentives for older individuals to switch out. This is illustrated in general terms in Figure 2, Panel E, where the contribution rate is varied at four year intervals in proportionate steps from –30% to +50% of the mean contribution rate (from age 30 to 62). Clearly, at the cost of some complexity, the government can ‘fine tune’ the contribution rate such that the accrual schedule is approximately flat. This policy has been adopted *vis-à-vis* the contracted-out rebate by the UK government since 1995.

Finally, in Figure 2 Panel F, we illustrate a switching regime in practice: the accrual structure in the UK for the period 1988 to 1995, in which individuals had a

Figure 2

Accrual Structures in Various Pension Plans



choice of remaining in the public DB plan, SERPS, or purchasing a funded Personal Pension account. The Panel gives the annual accruals of total pension Present Value (in £ sterling) from spending additional years in either a Personal Pension or SERPS; for this particular individual, the optimal strategy is clearly to start in the Personal Pension and revert to SERPS some time around age 50 if the total pension (area under the curve) is to be maximised.<sup>12</sup> It is apparent from this panel that switchers will be disproportionately young and we illustrate this in the next section for a variety of countries. In the UK itself, these age effects are less strong since 1995 given the switch to age-related rebates (contributions) as described in Panel E (for further details, see Disney and Whitehouse, 1992; Whitehouse, 1998).

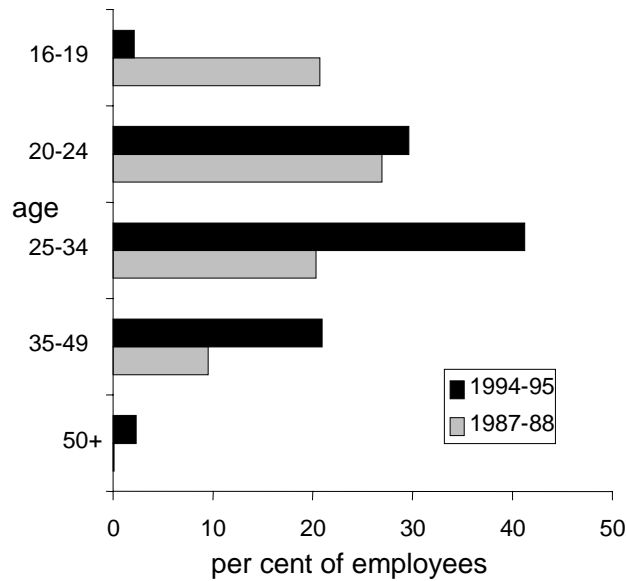
#### *Evidence on switching in practice*

So far, we have discussed the optimal switching decision in theory. Is there evidence that individuals respond to the incentives implied by accrual structures where there is choice within the pension programme? In fact, it is not even self-evident that there will be 100% switching where there is a mandatory component to the programme: these programmes are relatively novel, there may be administrative difficulties in implementation, and variations in participation between the PAYG programme and the funded programme. Typically, too, there are floors and ceilings in the programmes with eligibility perhaps dependent on hours and earnings thresholds and these, too, may differ across programmes. In the voluntary component, the strongest message of Figure 2 (especially Panel D) is that the probability of switching from an unfunded DB plan to a funded DC plan is negatively related to age. This is an interesting issue to test, since it is often argued that the young are most myopic towards pension provision and might not therefore be interested in pension accrual structures in different pension schemes.

To examine the issue, we have assembled a novel data set on switching outcomes in practice. The United Kingdom is a natural starting point, since switching out of an unfunded pension scheme (SERPS) into a funded individual account (a Personal Pension) has been permitted for over a decade. Note that, in the latter part of the period, the incentive structure was ‘flattened’, as in Figure 2 Panel E, to make the incentives structure relatively age-neutral, compared to, say, the situation as it applied from 1988 to 1995, as characterised by Figure 2, Panel C. Figure 3 therefore matches

---

<sup>12</sup> The non-linearities in the Panel arise from various extraneous factors: some time variation in the projected size of the contracted-out rebate, and ceilings on pension accruals in SERPS.

**Figure 3****Coverage of Personal Pensions in the UK, 1987-88 and 1994-95**

data on personal pension plan membership from the Department of Social Security with employment data from the *Labour Force Survey* in order to examine DC funded plan coverage in 1987 and 1995.

Figure 3 shows very high rates of take-up, especially among employees in their twenties and early thirties. The membership of Personal Pensions schemes has 'aged' over the period, which is why the median age of members in 1994-95 is somewhat older than 1987-88. The change to the rebate structure since that time will also have affected the age profile. Undoubtedly some young individuals were attracted into the scheme because contributions were paid into Personal Pension accounts automatically by the government without any need for supplementary contributions by the individual. Some therefore switched from existing private funded DB plans that required an additional individual contribution and these 'irrational switches' have landed the private pension industry with a large bill for compensation. However the vast majority of switching behaviour, from the unfunded public plan to funded DC accounts, was a rational response to the large incentives offered by the differential accrual structures (for further discussion, see Disney and Whitehouse, 1992; Whitehouse, 1998).

In other countries, voluntary switching behaviour has an even shorter time frame. Figure 4 presents the evidence from six countries with plans of this type, five of which are in Latin and Central America, the other being Hungary. The closest parallels to the

United Kingdom case are Argentina and Peru, where switching behaviour is entirely voluntary (see Table 1). It will be seen that rates of switching by age are very similar to those in the UK in 1987-88 and to each other, with the rate peaking in the late twenties and with similar proportions opting to switch in each age group.

In Chile and Hungary, where coverage is mandatory for new entrants and voluntary thereafter, the highest rates of coverage by the 'multipillar' scheme are seen among young individuals, with the coverage rate declining more or less monotonically by age. The Chilean case is interesting in that coverage of young groups is notionally greater than 100%, which may be due to changes in the labour force arising from the transition from unfunded to funded provision.<sup>13</sup> Again for the 'voluntary' age groups, rates of coverage of 50-60% are seen, as with Argentina and Peru.

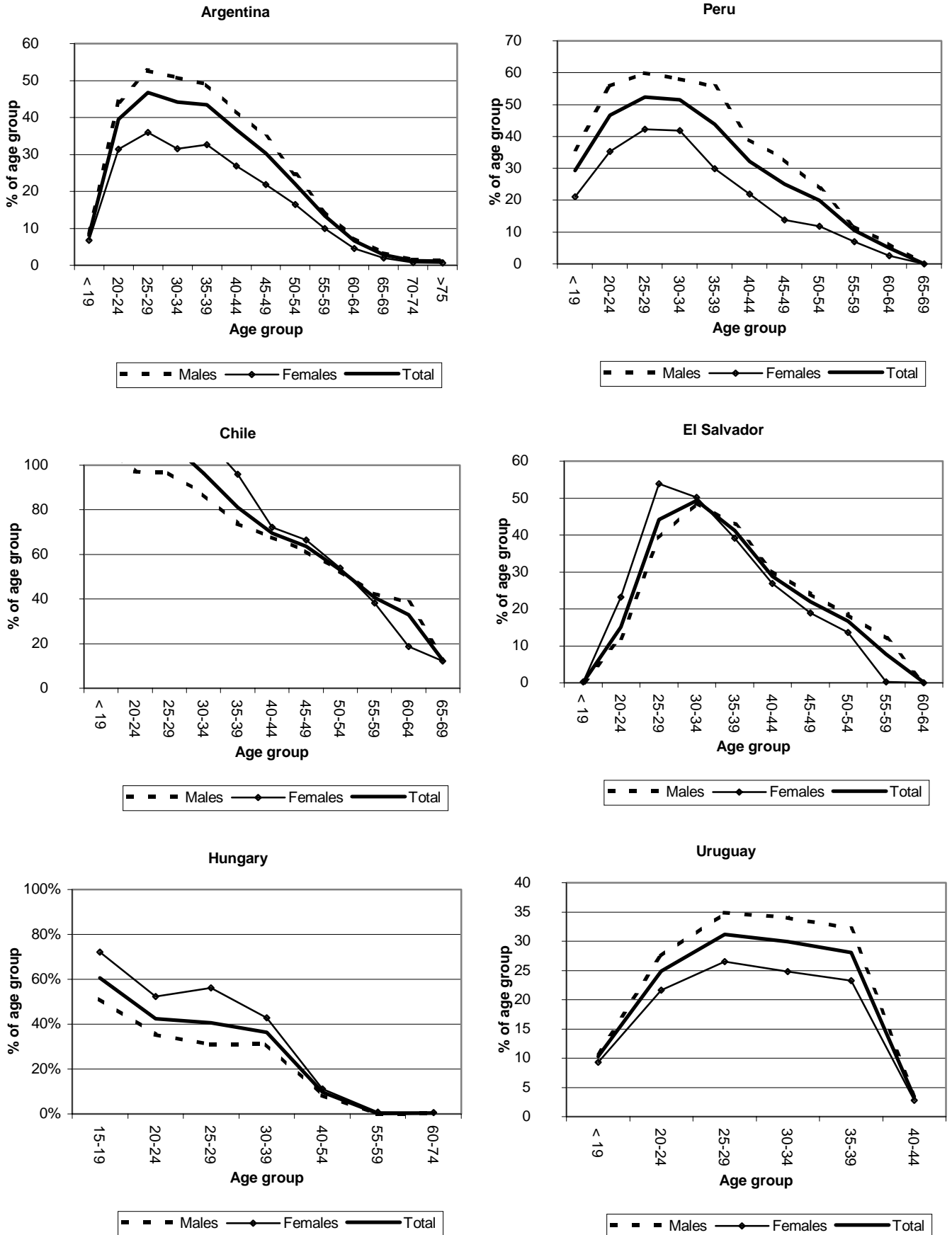
The El Salvador figures are provisional, since the scheme was only introduced in 1998. Given the mandatory component (see Table 1), one would expect, in equilibrium, a coverage age structure closer to that of Chile or Hungary rather than Argentina and Peru. In Uruguay, too, the scheme is only mandatory for workers earnings above a certain wage (Table 1) and thus the coverage rates may be telling us something about the age-income distribution as well as the switching decision. Overall, however, in four of the six countries at least, as well as the United Kingdom, individual behaviour is fully compatible with the model of incentives outlined in the previous sub-section and graphically described in the various panels of Figure 2.

---

<sup>13</sup> Indeed one argument raised in favour of greater funded provision in such countries is that high payroll taxes associated with unsustainable PAYG schemes generate a large informal sector. Eliminate the unfunded scheme and participation rates in the formal sector may actually increase.

**Figure 4**

**Percentage of the Labor Force that Switched to the Multipillar System  
by Age Group, First Years of Reform**



#### 4. Choice of pension plan in a risky environment

##### *Source of risk*

If expected return were the only choice criterion, it is apparent that for realistic parameter values an individual would always choose a funded programme over an unfunded programme so long as dynamic efficiency held and so long as the DB plan was not excessively favourable (i.e. from an actuarial perspective, given expected longevity). The issue of relative risk is however pertinent. In a funded scheme, the main source of risk is investment risk (including inflation risk if inflation generates negative real returns and there are no available indexed financial instruments). An additional source of risk arises from annuitisation risk if there is substantial uncertainty as to expected mortality improvement. This last risk, which affects both DC and DB plans, may be substantial in practice (see Lee and Skinner, 1999).<sup>14</sup> In 'notional DC' accounts, mortality risk may be borne by the government if the annuity rate is set in advance of retirement, but by scheme members if benefits are adjusted *ex post* in the light of revisions to forecasts of demographics and the other parameters determining system generosity.

In contrast, all unfunded DB plans, especially those with no explicit actuarial basis to benefit calculations, are susceptible to *policy risk* (what Bodie, 1990, terms *social insurance risk*) – that is, changes in the generosity of pensions arising from policy changes. Private pensions, in contrast, offer some insurance against policy risk. Governments are unlikely to confiscate private property directly, although there is some indirect policy risk via changes in the tax treatment of pensions, in the integration with public benefit systems or in pension guarantees. A strong regulatory environment is also required to guard against the risk of private expropriation and default. Nevertheless, it should not be assumed that policy risk is *a priori* lower than the investment risk associated with funded plans.

##### *Heterogeneous preferences*

Different workers have different preferences for risk and different perceptions of the degree of risk that particular choices entail. For example, age affects preferences for risk. Policy risk is a function of the time remaining until retirement; hence it affects

---

<sup>14</sup> Of course, if the insurer is risk neutral, they may bear longevity risk. Note, however, that mortality risk is not easily diversifiable and that the insurer may be reluctant fully to bear the risk. There may also be risks associated with market failures in the private insurance market.



younger workers more than it affects older workers. The tendency to phase in reform provisions and to protect existing rights to some degree for those close to retirement suggests that this perception is rational. In contrast, younger workers have few assets, except in the form of their own human capital. Some economists (such as Jagannathan and Kocherlakota, 1996) argue that these workers would find it advantageous to hold assets whose return have a low correlation with their projected wages. For the young, investing in equities is an optimal portfolio strategy and moving to a DC scheme would allow significant gains from diversification, particularly if young workers are liquidity constrained and therefore unable to purchase financial instruments. We return to the issue of portfolio diversification below.

A second issue is the relationship between switching and income. It is likely that higher income people are more likely to switch, since the absolute difference in expected pension values from switching to a DC plan is large for higher income groups. Furthermore, if there are transactions costs, including not just loading factors with a flat component, but also search and information costs in determining the best private option, the costs of switching may outweigh the improved expected return for low income individuals. In addition, policy risk may be smaller for low income people since policy reforms may well guarantee a 'floor' to public benefits with the explicit aim of protecting these individuals.

Finally, there is the issue of individual discount rates. If individuals of a given age vary in their discount rates, then a policy reform which permits individuals a choice of whether to switch or not may reduce the costs of pension reform. Such a model is developed in a partial equilibrium setting by Samwick (1997). Taking these factors together, therefore, the introduction of attitudes to risk as well as differences in expected rate of return into the calculus of whether to choose a mandatory or voluntary reform provides some individual arguments for a voluntary component. There are however counter-arguments at the aggregate level, and we return to these later.

*Is there a portfolio argument for mixed funded and unfunded provision?*

Although much of the argument has been presented as a choice between funded and unfunded provision, or mandatory versus voluntary switching, some have argued that combinations of funded and unfunded provision are superior. Such schemes, it is argued, contain superior portfolio diversification properties to schemes that are predominantly funded (this underpins the title of Góra and Rutkowski's (1998) account

of the Polish reform). The implication is that individuals might wish to have a pension scheme containing both components or that switching behaviour should be encouraged or circumscribed (for example, as to how much opting out of the unfunded plan is permitted) for portfolio reasons.

The rationale for a pension diversification strategy rests on assumptions concerning *portfolio risk*. From an individual perspective, a mix of funded and unfunded pension provision will increase welfare if the risk reduction property of the portfolio outweighs the loss of return given by sacrificing dynamic efficiency. This depends on the *covariance* structure of investment returns in the DC plan and the implicit 'return' in a DB plan (i.e. in an approximately actuarially fair plan, the rate of growth of the wage bill). Negative covariance is ideal; but positive covariance implies that there is little gain from diversifying across pension schemes. On intuitive grounds, positive covariance seems the more plausible outcome if, in the short run, profit *share* and productivity growth are both procyclical, while in the long run, a falling marginal product of capital is associated with declining labour force growth. Ultimately, this is an empirical issue. Palacios (1998) finds little evidence in various countries over time of covariance between investment returns and productivity growth. This results suggests that choice-based diversification between DB and DC plans can be justified if (and only if) unfunded DB plans contain a strictly lower variance than funded DC plans, given dynamic efficiency. A related question is whether there is not some financial asset, the return on which is perfectly covarying with the implicit return in an unfunded scheme, such as a bond yielding the riskless rate of interest. In this last case, there is no need for a residual unfunded component to income replacement irrespective of covariance structure.

## **5. Choice-based pension reform and social welfare**

### *Some general issues*

The previous discussion has taken reform strategies as given and simply analysed, both theoretically and empirically, the individual decision to switch to a funded DC scheme where such an option is available. In this section, the macroeconomic aspects of the issue are examined: for example, are there gains to be had from adopting a voluntary transition rather than a strategy of mandatory funded provision? What are the macroeconomic effects of 'partial' or 'voluntary' transitions of this kind and in particular, is overall social welfare maximised by adopting a strategy in which some individuals can 'opt out' of public provision while other individuals, whether by choice or not, remain in the public, unfunded, scheme?

A 'least resistance' rationale for reform strategies of this kind is that, by offering choice, they offer the scope for coalition-building to accelerate the reform process. Simulations of cohort-by-cohort 'gainers and losers' based on representative agent models can suggest that, for plausible parameter values, most cohorts existing at a point in time lose from a transition to a funded from an unfunded scheme – the real gainers are those generations who are yet to enter the labour market.<sup>15</sup> However, with 'voluntary' switching and heterogeneity of earnings and employment profiles *within* generations, coalitions of supporters for reform may be found among existing generations. The natural risks in such choice-based transitions to funded schemes are their potentially unpredictable budgetary cost and the possibility of adverse selection, to which we return.

Furthermore choice-based strategies offer various types of insurance against the collapse of the overall reform strategy (reversion possibilities, maintenance of a first pillar redistributive component, etc.). Palacios and Rocha (1998) describe how the voluntary element arose in the Hungarian reform as the outcome of continued opposition from some interest groups to any form of reform that involved an explicit reduction in the generosity of the unfunded component. Conversely, in the United Kingdom, opposition to the wholesale abandonment of SERPS, the earnings-related component of the public programme, was led by the Treasury in the early to mid-1990s. The Treasury (correctly) believed that the short run cost of paying extra rebates to those who switched to the funded scheme would be very large and exceed the present value of the future savings in pension payments (Whitehouse, 1998), and successfully negotiated that a residual unfunded scheme should remain.

A positive case for choice-based schemes of this kind might be that choice is a good thing *per se* and that individuals with different preferences to different types of scheme, and aversion to particular risks, could choose whichever scheme is appropriate. There are three counter-arguments. One is that individuals cannot assess relative returns and risks attached to different schemes. However, we have already suggested that individuals are pretty good at choosing between options on the basis of *expected returns*; the issue is whether this rationality is accompanied by rational choice in terms of higher moments of the distribution of pension outcomes. The perceived risk of the *unfunded* scheme is particularly hard to quantify as it is largely policy risk. This risk will differ between countries and over time. There is some attitudinal evidence that individuals

---

<sup>15</sup> For an illustration, see Miles and Iben (1998), Table 4. Of course, these results are parameter-

would trade their public pension promise for a government bond of equal present value. This suggests that the default premium for a PAYG pension promise would be higher than that for government bonds in part because, as has often been pointed out, workers cannot trade or borrow on PAYG pension promises.

A second objection is simply that the first order welfare loss from continuing *any* retirement earnings replacement via unfunded provision, given dynamic efficiency, makes 'choice' unnecessary and costly. This is a restatement of the Feldstein (1996) argument. Take a privatisation strategy that, for example, limits opportunities to join the funded scheme only to certain, later, generations. This has to be seen as a strategy for spreading the transition burden in a particular way.<sup>16</sup> But there is a natural difficulty in this proposal, as depicted in Figure 5. Suppose that we denote  $t$  as the point at which the first generation enters the new funded scheme. All generations before  $t$  will acquire rights only in the unfunded programme. With demographic ageing and growing fiscal unsustainability, we can assume that these rights are decreasing generation-by-generation from the old to the young. Conversely as generations after  $t$  spend a greater part of their working life in the new, funded, programme, their overall return will increase.

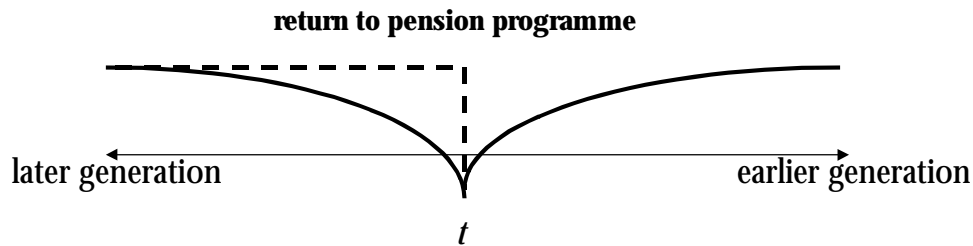
The path of net 'returns' to pension scheme membership, averaged by generation, may appear close to those in Figure 5, with the discontinuity at  $t$  even sharper if only new labour market entrants at  $t$  join the scheme, as illustrated by the dotted line. In this latter case, all existing labour market participants will earn the unfunded return and all new entrants will earn the funded return. With dynamic efficiency, the discontinuity at  $t$  may be large. Naturally, generations on the 'wrong' side of  $t$  will press to be in the new scheme and this arbitrage, which could take the form of voluntary switching, may ultimately lead to the transition occurring more rapidly than in a scheme of limited, mandated, privatisation. The subtle case for choice is that it is a vehicle which actually advances the transition at a more rapid pace than would be legislated through mandatory provision.

---

specific and country-specific: for a counter illustration, see Börsch-Supan (1998).

<sup>16</sup> For example, the 1997 Conservative administration proposed, just before the election, that each new generation of labour market entrants would not receive the flat Basic State Pension when they retired, but would instead immediately join a new, funded, pension scheme known as Basic Pension Plus. No previous generations would be able to acquire Basic Pension Plus rights and no subsequent generation

**Figure 5**  
**Discrepancies in rates of return and switching incentives**  
**across generations**



The third general argument concerning choice-based privatisation argues that choice is costly, not just because people make the wrong choices and therefore may have to be compensated (as in the Personal Pension ‘mis-selling’ scandal of the early 1990s in the UK), but also because the transactions costs of choice-based systems are very high. This argument continues to be stated as a case for retaining a substantial unfunded component, even though it seems to be a second order problem of system design rather than a first order problem of which system to choose. It is, for example, straightforward to run a scheme of individual funded accounts using public agencies at low cost; the issue of whether choice *among* private providers can be provided at low regulatory cost does not seem to be insurmountable. Nevertheless, it could be suggested that choice *per se* is not a desirable characteristic of pension provision as opposed to, say, purchase of motorcars or clothes. But this argument simply restates the case for looking at ‘fundamental’ issues such as consideration of dynamic efficiency.

#### *Macroeconomic considerations I: the speed of transition*

The key budgetary issues arising from the voluntary switching reform model are the target switching age and the treatment of accrued liabilities. Permitting only workers newly entering the labour force to enter the new scheme generates an extremely slow transition process and raises the kind of questions of intergenerational equity raised in the discussion of Figure 5 above. On the other hand, mandating older workers to join the new privatised scheme runs the risk that the financial infrastructure (in particular, the annuity market) is unprepared for new retirees in the funded scheme. Furthermore it is

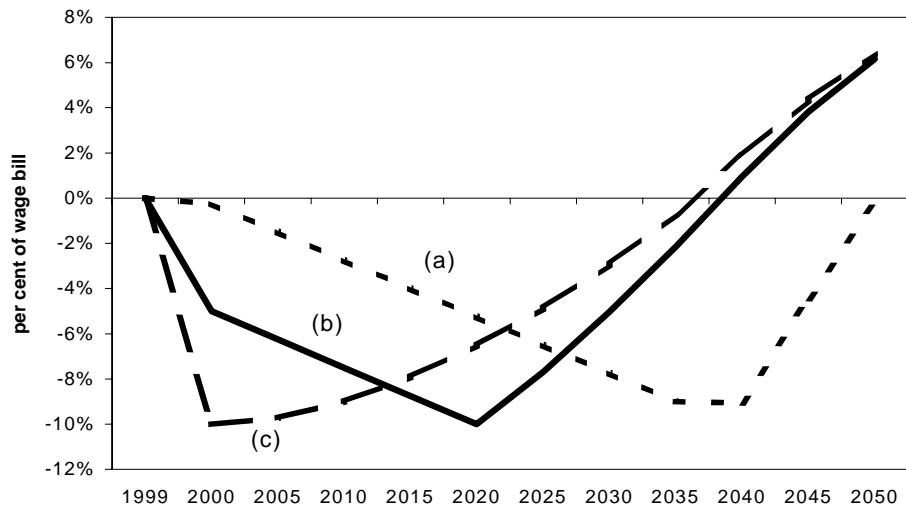
---

would be able to acquire rights in the existing unfunded programme. This proposal, two weeks before

likely to prove expensive if the funded DC plan is expected to provide the same sort of pension accruals in the last few years that were available under the original unfunded DB plan (see Section 3, and the discussion of Figure 2, in particular). The evidence from seven countries in Figures 3 and 4 provides some defence of the proposition that mandatory switching up to a certain age supplemented by voluntary switching beyond that age will generate a sensible ‘middle way’.

This is illustrated in Figure 6, which considers a basic simulation of three transition ‘routes’ for a country moving from unfunded DB provision to a privatised scheme. Under scenario (a), only new entrants join the new scheme. Under scenario (b), up to half of the workforce (presumed to be largely under 40) leave the unfunded scheme and join the new scheme. Under scenario (c), all the workers join the new scheme. Since the residual accrued liabilities of the DB plan are adjusted to a pre-reform path the deficits are identical, but the timing is different. The speed of transition can be changed in a voluntary system by adjusting the value of residual benefits or by offering additional benefits (such as extra tax reliefs) to ‘switchers’. This will change the magnitude of the deficit as well as its timing, and is discussed next.

**Figure 6**  
**Transition deficit path under different switching-age targets**



Note: Figure based on a hypothetical pay-as-you-go scheme with deteriorating demographics where contributions are constant and benefits reduced to maintain pay-as-you-go equilibrium. The funded scheme earns a rate of return two percentage points higher than wage growth. The residual public, defined-benefit pension is reduced to maintain the path of total (public plus private) benefits before reform.

---

the General Election, caused immense confusion. The Conservatives lost the subsequent election.

*Macroeconomic considerations II: Costs of transition and the value of accrued liabilities in the unfunded scheme*

A transition to a funded DC plan involves the valuation of accrued rights in the existing, unfunded, plan. These rights then constitute the main component of the transition cost. Since such transitions were not envisaged when the original PAYG plan was set up, there are no clear guidelines within these plans as to how such rights should be valued. Many strategies have been adopted in practice (see, for example, World Bank, 1994, pp.264-271), and in simulation models, both as to how to value these rights (for example, converting them into financial assets such as 'recognition bonds') and how to pay for them. The assumed transition strategies vary widely. We take three examples.

*Maintaining benefits and contribution rates*

In Gustman and Steinmeier's (1998) study of the 'first round' impact of a 'voluntary' privatisation in the United States, each year of 'opting out' of the unfunded DB plan reduces social security benefits, simply by reducing the number of years in the pre-privatised scheme. Accrued rights are therefore implicitly valued proportionately. The 'opted out' contribution is then invested in the funded, DC, plan. This is not dissimilar to the UK system of pension provision. Such a reform strategy of course encourages individuals to 'game' the system, given the different accrual structures in DB and DC plans described in Figure 2 above, and the individual could choose a 'mix' of schemes such as to maximise the total pension. The cost of such a transition will therefore be raised and the PAYG tax rate will of course rise as individuals opt out of the social security system. This transition burden is not measured explicitly by Gustman and Steinmeier, who adopt a partial equilibrium approach in order to examine worker heterogeneity.<sup>17</sup>

A clear problem with this transition strategy is that of adverse selection. Individuals opt out on the basis of relative returns in the two schemes. Assuming there is a redistributive component to the social security programme, those left in the social security system will be non-randomly selected. Given the discussion in Section 3, they are likely to be older and poorer. Unless some penalty is exacted from those who choose

---

<sup>17</sup> However there is an implicit 'penalty' in their transition that raises revenue. The 'penalty' arises because full social security benefits can be obtained with 35 years of contributions and an extra year's work provide payroll tax contributions 'for free'. In addition (as pointed out by David Cutler in his discussion of that paper), each year above 35 years of contributions in which the individual is opted-out also incurs a 'penalty' of one-thirty-fifth of the DB plan benefits. Presumably, these extra payroll tax

the funded 'route', or the social security scheme is wholly redesigned as an 'actuarially neutral' scheme (depending on how this is implemented, however, this may simply accelerate the privatisation process given dynamic efficiency), it will be hard to sustain a credible unfunded alternative, if that is the intention. Thus the stability (General Equilibrium) properties of a choice-based pension reform of this type must be considered, and whether there is a stable and optimal fraction of the population that chooses the funded 'route'.<sup>18</sup>

*Fixing the target Replacement Rate and varying the contribution rate*

An alternative simulation strategy takes account of the fact that, given dynamic efficiency, and the accrual structure over the life cycle, the contribution rate needed to generate PAYG equilibrium for a DC plan is not the same as that of an unfunded DB plan. That is,  $c^*$ , in equation 2 above, will normally differ in an unfunded scheme from the  $c$  required at any time to finance the outstanding liabilities of the PAYG scheme plus a benefit accrual of similar value within the funded DC plan. This calculation is straightforward to simulate in a 'clean break' privatisation. In the analysis of a transition to funded provision by Miles and Iben (1998), it is assumed that after some point in time, contributions are no longer made to the unfunded scheme by any workers. Miles and Iben then fix a common target replacement ratio across the funded and unfunded schemes in order to find the contribution rate that, over time, both covers the unfunded liabilities and permits the accrual of a similar pension in the new funded plan. Thus, unlike the implicit assumption in Gustman and Steinmeier, the contribution rate is allowed to vary rather than the replacement rate. Miles and Iben show that, not surprisingly, the combined contribution rate first rises above the original projected PAYG rate and then falls below it – the latter an outcome of the assumption of dynamic efficiency as accrued rights under the old PAYG scheme disappear.

By analysing a mandatory transition to a funded programme, and a 'representative agent' OLG model, this analysis by-passes the choice-based framework arising from worker heterogeneity. In terms of Figure 2, the government simply has to fix the contribution rate to the funded programme such that, on average, for each

---

receipts and benefit reductions are not enough to finance outstanding liabilities of the unfunded plan and payroll tax rates would likely be higher in a GE-type analysis to finance this 'transition burden'.

<sup>18</sup> This stability condition seems even more pertinent in the UK, where individuals can choose to contract-out into *either* a (normally funded) DB plan or a DC plan. With an ageing workforce and the ability of younger workers to contract out of company-run DB plans, it is hard to see how such plans will survive in the medium to long term: see the discussion in Disney (1996) Chapter 5.



generational representative, the Present Value of accrued benefits in the new funded scheme exactly matches the Present Value of unfunded benefits in the scheme that is being replaced. The *time path* of accrued benefits in the different schemes over the working life is irrelevant as the transition is mandatory. In a choice-based scheme, therefore, to ensure such ‘scheme benefit neutrality’, the government would have to vary the contribution rate over the working life (as in Figure 2, Panel E) such as to give just enough inducement for the individual continually to opt for the funded scheme, as is done in the UK. As in Figure 2 Panels C and F, this would suggest a *low* contribution rate for young workers, rising with age until the point where, in budgetary terms, it is probably less costly to maintain a residual unfunded scheme for the oldest workers. In similar vein, there are within any ‘generation’ some workers with, for example, interrupted career histories, for whom it is too costly to provide any funded scheme given their low incomes. Again this provides a rationale for a residual unfunded programme.<sup>19</sup> Who benefits or loses from such a reform strategy again depends on the contribution rate to the funded scheme plus the overall cost of financing the remaining unfunded liabilities. Thus the choice-based approach inevitably involves more complexity than the ‘clean break’ transition to a funded scheme, although it should perhaps be pointed out that simulations based on ‘representative agent’ OLG models themselves eliminate much of the complexity of a transition in practice by assumption.

*Treating accrued liabilities of optants differently: a solution to adverse selection?*

Yet another transition strategy allowing for voluntary switching is analysed by Kotlikoff, Smetters and Walliser (1998). They analyse a GE-type OLG simulation model with heterogeneous income groups and an approximation to the existing social security regime in the United States, which redistributes incomes both within and between generations. They analyse two scenarios: one in which transition is mandatory, and a second in which individuals can choose to opt out of the unfunded programme. In the latter case, individuals decide whether to opt out on the basis of marginal accruals, analysed on a somewhat similar basis to those in Figure 2 above. Since there is explicit heterogeneity within cohorts, and the unfunded social security scheme is redistributive, there is again a clear potential adverse selection problem in a voluntary privatisation, in

---

<sup>19</sup> This, too, has been the rationale for retaining SERPS in the UK. It is now proposed to replace this by a ‘Second State pension’, explicitly targeted on low earners, who are deemed unlikely ever to benefit from a funded scheme: see Disney, Emmerson and Tanner (1998) for further details.

that those remaining in the unfunded scheme will be those that benefit, relatively from the redistribution component (largely, older and poorer workers).

The implicit solution to the adverse selection problem used by Kotlikoff *et al*, which is also a potential solution to the ‘excess cost’ problem of voluntary switching described above, is to *treat the accrued pension rights of optants and non-optants differently*. Workers who opt for the funded scheme forfeit any accrued benefits in the unfunded system. Workers who remain in the unfunded scheme retain their accrued benefits. However, because of the self-selection of those who opt out, there is an extra cost of financing the unfunded liabilities of the pension programme. This is covered from some other source, such as income or consumption taxes, borne by everybody, whether or not they have chosen to switch. Kotlikoff *et al* show that, under alternative parameter values, simulated voluntary privatisations are sometimes preferable to mandatory privatisations, depending on how these uncovered liabilities are financed.

Why would workers opt to switch if they lose their accrued pension rights? Again the answer arises from dynamic efficiency. Presumably, too, those most likely to opt for the funded scheme will be those with the lowest accrued rights, who will typically be young (see Figures 3 and 4). In effect, an outcome can be calibrated, as in the Miles and Iben model, where the target Replacement Ratio is equalised across the funded and unfunded programmes. However, instead of the contribution rate to the funded scheme being adjusted, the value of residual unfunded rights of those who opt to switch are adjusted such as to fix the overall replacement rate.<sup>20</sup> The political difficulty is simply in persuading individuals overtly to give up any accrued pension rights as the ‘price’ of a transition strategy when such rights are explicitly retained in other circumstances. It would, however, be possible to think of ways of treating accrued rights in effect differently between optants and non-optants so as to minimise the budgetary impact of the transition and offset the potential impact of adverse selection.

## 6. Conclusion

This paper has analysed pension reform strategies that involve a transition to a funding system, but which contain a voluntary component, or which mandate some workers to switch but not others, or combinations thereof. It shows that, in practice,

---

<sup>20</sup> There is also a potential endogeneity in that factor prices (the wage rate and rate of return) may be affected by the residual accrued rights of those that choose *not* to opt out and the factor prices in turn affect the switching decision. These effects should however be of only second order importance, at least in an open economy.

pension reforms which involve a transition to funding have typically involved components of this kind. But there has been very little discussion in the pension literature of the economics of transitions of this type: whether of the individual incentives involved, the insurance properties of such strategies, or of their macroeconomic consequences. The intention of this paper has been to remedy that deficiency, providing both evidence on the basis of case studies and some basic analytical principles with which to study them.

Some analyses of transitions from unfunded to funded pension schemes utilise representative agent OLG models to examine 'gainers' and 'losers'. This leads to the familiar finding that, despite the long run superiority of funded programmes given dynamic efficiency, the losing 'generations' may block any reform. There is some case study evidence that 'voluntary' privatisations are a means of resolving this dilemma. Indeed voluntarism may permit the government to accelerate the pace of reform over and above a limited, mandated, reform. The analysis of the incentives implicit in differing pension accrual structures, which is basis to the analysis of individual switching strategies contained here, however suggests that the *heterogeneity* of agents is a key issue that requires analysis. If, for example, individuals differ in their preferences (for example, in their attitude to investment risk versus policy risk), a choice-based element to the reform strategy may also be individually optimal. The new evidence presented here for a number of countries suggests that individuals do respond to the incentives implicit in different incentive structures in a sensible manner.

However, individual optimality and macroeconomic stability are not necessarily consistent. Choice-based reform has to deal with the problem of adverse selection, and also with the possibility that individuals will 'game' the system to take full advantage of incentives, perhaps thereby increasing the budgetary cost of the reform. Such risks are inherent in reforms of this kind and have indeed been present in the United Kingdom, which has the longest experience of choice-based reform. The paper therefore also suggests mechanisms that might minimise these costs and these should provide lessons for the increasing number of countries that seem likely to follow this type of reform strategy in the future.

## References

- Bodie, Z. (1990) Pensions as retirement income insurance, *Journal of Economic Literature*, 28, March, 28-49.
- Bohn, H. (1999) Social security and demographic uncertainty: The risk sharing properties of alternative policies, *Working Paper 7030*, Cambridge: National Bureau of Economic Research, March.
- Börsch-Supan, A. (1998) Germany: A social security system on the verge of collapse, 129-160, in H. Siebert (ed) *Redesigning Social Security*, Institut für Weltwirtschaft an der Universität Kiel, Tübingen: Mohr Siebeck.
- Buchanan, J. (1968) Social insurance in a growing economy: A proposal for radical reform, *National Tax Journal*, 21, December, 386-39.
- Chand, S.K. and Jaeger, A. (1996) *Aging Populations and Public Pension Schemes*, Occasional paper 147, Washington D.C.: International Monetary Fund.
- Dilnot, A., Disney, R., Johnson, P. and Whitehouse, E. (1994) *Pensions Policy in Britain: An Economic Analysis*, London: Institute for Fiscal Studies.
- Disney, R. (1996) *Can We Afford to Grow Older?* Cambridge: MIT Press.
- Disney, R. (1999) Crisis in public pension programmes in OECD: What are the reform options? *Economic Journal Features*, November, forthcoming.
- Disney, R., Emmerson, C. and Tanner, S. (1999) *Partnership in pensions: An Assessment*, Commentary 78, London: Institute for Fiscal Studies.
- Disney, R. and Johnson, P. (1998) The United Kingdom – A working system of minimum pensions? 207-232 in H. Siebert (ed) *Redesigning Social Security*, Institut für Weltwirtschaft an der Universität Kiel, Tübingen: Mohr Siebeck.
- Disney, R. and Whitehouse, E. (1992) *The Personal Pension Stampede*, report Series, London: Institute for Fiscal Studies.
- Disney, R. and Whitehouse, E. (1993) Contracting-out and lifetime redistribution in the UK pension system, *Oxford Bulletin of Economics and Statistics*, 55, February, 25-41.
- Disney, R. and Whitehouse, E. (1996) What are occupational pension plan entitlements worth in Britain? *Economica*, 63, May, 213-238.
- Feldstein, M. (1996) The missing piece in policy analysis: Social security reform, *American Economic Review*, 86, May, 1-14.
- Feldstein, M. (ed) *Privatizing Social Security*, the University of Chicago Press, for National Bureau of Economic Research.
- Góra, M. and Rutkowski, M. (1998) The quest for pension reform: Poland's security through diversity, *Discussion Paper 9815*, Washington D.C.: The World Bank, October.

Gustman, A.L. and Steinmeier, T.L. (1998) Privatizing social security: First-round effects of a generic, voluntary, privatized US social security system, 313-357 in Feldstein (ed) (1998).

Hemming, R. (1998) Should public pensions be funded? *Working Paper 98/35*, Washington D.C., International Monetary Fund, March.

Hemming, R. and Kay, J.A. (1982) The costs of the state-earnings related pension scheme, *Economic Journal*, 92, June, 300-319.

Holzmann, R. (1998) Financing the transition to multi-pillar, *Discussion Paper 9809*, Washington D.C.: The World Bank, June.

Jagannathan, R. and Kocherlakota, N. (1996) Why should older people invest less in stocks than younger people? Federal Reserve Bank of Minneapolis *Quarterly Review*, 20, 3, Summer.

Kotlikoff, L.J. (1998) Simulating the privatization of social security in general equilibrium, 265-306 in Feldstein (ed) (1998).

Kotlikoff, L.J., Smetters, K.A. and Walliser, J. (1998) Opting out of social security and adverse selection, *Working Paper 6430*, National Bureau of Economic Research, Cambridge, February.

Lee, R. and Skinner, J. (1999) Will aging baby boomers bust the Federal budget? *Journal of Economic Perspectives*, 13, Winter, 117-140.

Miles, D. (1999) Modelling the impact of demographic change upon the economy, *Economic Journal*, 109, January, 1-36.

Miles, D. and Iben, A. (1998) The reform of pension systems, Winners and losers across generations in the UK and Germany, *mimeo*, Imperial College, London, July.

OECD (1996) *Policy Implications of Ageing: A Critical Policy Challenge*, Social Policy Studies No.20, Paris.

OECD (1998) *Maintaining Prosperity in an Ageing Society*, Paris.

Palacios, R. (1998) A note on diversification between funded and PAYG schemes, *mimeo*, HDSP, the World Bank.

Palacios, R. and Rocha, R. (1998) The Hungarian pension system in transition, *Discussion Paper 9805*, Washington D.C.: The World Bank, March.

Palacios, R. and Whitehouse, E. (1998) The role of choice in the transition to a funded pension system, *Discussion Paper 9812*, Washington, D.C.: The World Bank, September.

Palmer, E. (1998) The Swedish pension reform model – Framework and issues, *mimeo*, National Social Insurance Board, Stockholm.

Samwick, A.A. (1997) Discount rate heterogeneity and social security reform, *Working Paper* 6219, Cambridge: National Bureau of Economic Research, December.

Whitehouse, E. (1998) Pension reform in Britain, *Discussion Paper* 9810, Washington D.C.: The World Bank, June.

World Bank, The (1994) *Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth*, New York: Oxford University Press.