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CRISES IN PUBLIC PENSION PROGRAMMES IN OECD: WHAT ARE THE REFORM OPTIONS

by

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Abstract

Public pension programmes in many OECD countries are in difficulties. With an ageing population, and declining participation of working age men in paid work, existing pension arrangements are far too costly in many countries, both now and in the future. This paper examines the evidence as to whether programmes are indeed in need of major surgery, focusing in particular on the issue of fiscal sustainability. It then considers *why* programmes have got into financial difficulties. The paper then examines the strengths and weaknesses of some reform strategies.

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1. INTRODUCTION

Public pension programmes in many OECD countries are in difficulties. With an ageing population, and declining participation of working age men in paid work, existing pension arrangements are far too costly in many countries, both now and in the future. Some countries have taken steps to tackle the pension reform issue but there is inevitably conflict over who bears the burden of this retrenchment: whether it be current taxpayers, current pensioners, or future generations of taxpayers and pensioners. There are also major differences in philosophy over the nature of pension reforms, both proposed and as implemented. Blueprints exist for reform (such as the framework provided by The World Bank, 1994) but countries have in practice followed a variety of different paths. An interesting question is whether economic theory gives any guide as to which type of reform will succeed. It may be however that countries are too idiosyncratic in their existing systems and in their political structure as to permit a common approach to reform.

This paper considers three issues. It examines the evidence as to whether public pension programmes in some OECD countries are indeed in need of major surgery, focusing in particular on the issue of fiscal sustainability. It then considers why programmes have got into financial difficulties. Consideration of this issue provides some clues as to what type of reform process is likely to be viable and credible. The paper then examines the strengths and weaknesses of some reform strategies. A central issue considered there is whether pension programmes should be funded or unfunded.

2. The problem of financing pension schemes in OECD countries

The problem of financing pensions in Europe is largely one of financing *public* pension programmes: by which I mean the contribution-based universal scheme of provision of public benefits for the elderly (what is termed 'social security' in US parlance). Currently, public pension programmes are largely *unfunded*, that is, current pension payments are financed by current contributions, usually levied as payroll taxes, but sometimes paid directly out of general revenues.[1] Future obligations are conditioned on current rules concerning eligibility and accrual rates and, it is hoped, will be met by future generations of contributors. Significant private provision of pensions is uncommon in Europe; the key countries where such schemes are important are the UK and the Netherlands, where private pension fund assets have been accumulated to a value of, respectively, 75% and 87% of GDP in 1996 (OECD, 1998). Switzerland also has a funded component, as do Sweden and Denmark which have significant private funds, but in other countries private schemes are marginal or largely 'top up' public schemes.

Although private and 'top up' schemes are generally treated as peripheral to the financing debate (indeed, as we shall see, greater private provision is commonly advocated as a solution to the problems of public programmes), existing private schemes may not be immune from difficulties. These difficulties can be considered briefly before moving to the more pressing question of the liabilities of public programmes.

One problem is where supplementary pension commitments over and above the explicit social security programme are unfunded. In particular, pension schemes

[1] A subsidiary debate therefore concerns whether public pension programmes should be financed by an earmarked 'insurance' contribution, so emphasising the 'actuarial basis' of the programme, or out of general taxation, implicitly giving weight to the redistributive aspect. There is also the implicit issue of the transparency of a contribution-based scheme relative to a tax-financed scheme.

for public sector workers are often unfunded and, like other unfunded pension liabilities, not measured explicitly in the national accounts. This is largely true of the pension schemes of civil servants in the UK, France and Germany, for example (Bovenberg and Petersen, 1992). Efforts to measure the liabilities of public schemes often ignore these additional liabilities.

Second, the future values of private pension funds are subject to some of the same pressures that are likely to affect public programmes. For example, the maturation of these funds will accompany the demographic transition resulting from the baby boom generation reaching retirement age, and at that point funds will be net sellers, rather than buyers of financial assets. Whether this affects global asset values depends on the future path that other countries take in *their* pension arrangements and the extent to which portfolios are globally diversified: at present less than 20% of the pension assets of the major OECD countries are held in assets outside OECD countries. Falling or stagnant asset values would make it that much more difficult for funded pension schemes to provide an adequate value of pensions. The general issue is whether there is a positive covariance across countries and time between the rate of return in capital markets (which determines the payoff of funded schemes) and the implicit potential rate of return on unfunded schemes (which is the rate of growth of the wage bill, or some similar measure). If, for example, falling labour force growth is associated with falling returns in the capital market, then funded schemes will not be immunised from the problems of existing, unfunded, schemes

3. The liabilities of public pension programmes

A number of projections have been made by international institutions and individual governments of the future liabilities of public pension programmes, and of

the consequences of these liabilities for fiscal balances. Such projections rely on assumptions that are not always explicit and, on past evidence, are subject to large errors once outcomes are observed. On the 'over-pessimistic' side, projections often ignore policy feedbacks, which have tended in the past to impose restraints on the liabilities of programmes. On the 'over-optimistic' side, countries have generally been systematically too optimistic in understating longevity improvements and overstating the labour force participation of older workers. In addition, different projections seem to rank different OECD countries quite differently in terms of the financing 'crises' associated with pension programmes.

Table 1 presents some recent projections from OECD itself for a range of countries. Column (2) is a memo item, showing that there is a fair degree of uniformity in ages of entitlement for a full public pension across countries, although there are some interesting outliers such as Japan, Italy and New Zealand on the one hand, and the Scandinavian countries on the other. However it should be noted that official pension ages give little guide to cross-country variations in retirement behaviour. Many countries, including the United States but not the United Kingdom, have explicit actuarially favourable early retirement options within the public pension programme. A number of countries bordering the Mediterranean also have devices such as 'seniority pensions', which allow individuals to retire on a full pension after a certain number of years' service, whether or not they have reached the official state pension age.[2] In contrast, in the countries of northern Europe, retirement through disability benefit schemes and other special early retirement 'windows' (within the public programme) have been popular, especially in periods of recession.

[2] For example, in Italy, until the recent reform, 35 years of contributions would automatically entitle an individual to a full pension; however public servants could originally receive a full pension after 20 years' service. In Turkey, 25 years of contribution would entitle the individual to a full pension as

The remaining columns are derived from an OECD-based simulation model of pension liabilities for individual countries. The underlying procedure is standard: it projects earnings growth based on an aggregate model of earnings, utilises existing contribution rates and projects benefit 'rules' (taking account of any prospective reforms) in order to calculate future pension liabilities and contribution receipts. Participation rates are held constant in the OECD case, where it is also assumed that the age-earnings profiles, presumably derived from cross sections, are 'augmented' by 1½% productivity growth per annum and where GDP growth is assumed to be on a 'medium term growth path'. These assumptions are sufficient to calculate columns (3) and (4), which show the cost of public pensions as a proportion of GDP and the Present Value of the difference between projected benefits and currently legislated contribution revenues, to the time horizon of 2070.[3]

It should be noted in passing that there is not a close correlation between the current GDP cost of pension provision and the ratio of the population of 65 and over to the working population (the 'aged dependency ratio'- ADR); see Figure 1. In 1990, for example, the highest ADRs, in descending order, among the countries cited here for which there are data were Sweden, Norway, the UK and Denmark. Yet three of these countries are among the lowest in terms of pension payments as a proportion of GDP in 1995. Of course, given the simulation methodology, the increase in public pension payments to 2030 will be much more closely related to demographic change, and it is no surprise to see countries where the demographic transition to an aged society is dramatic, such as Italy, Japan and the Netherlands, exhibiting rising ratios. It is hard to know what is an acceptable upper limit on pension payments as a % of GDP and it will partly depend on the country-specific demographic transition. If,

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would being 55 (a man) or 50 (a woman). In Greece, there is a complicated formula linking days of contributions to first age of receipt, but men could in principle retire at 58 and women at 50.

however, as a rule of thumb, we were to believe that a 10% ratio of public pension payments to GDP should be an effective ceiling on public pension commitments, then some countries already exceed this fraction, and many more will do so by 2030.

Column (4) indicates starkly that pension contributions will have to rise if large deficits are not to be incurred. Contribution increases are, in fact, often automatically projected by government actuaries in order to ensure that there is no projected deficit. Whether such projected contribution increases are implemented in all countries is quite a different matter, and already in several countries existing pension commitments are being partly funded by borrowing.

Given the pension calculations, the next stage in such calculations is to take the existing fiscal stance and to factor in the extra pension expenditures to examine future 'net financial liabilities', so as to project the future overall fiscal balance. These will look larger, of course, if the budget is already in deficit. The calculations in column (5) also includes the projected costs of health care, assuming that underlying health costs will rise in line with GDP (despite the fact that in most countries they have risen considerably faster in recent years) and adjusting *levels* of health care costs to the evolving demographic profile (since the very young and the elderly tend to incur more health expenditures than other age groups).[4]

These numbers, accompanied by those in column (6), are those that give politicians and central bankers heart attacks. Projected increases in financial liabilities in countries such as Austria, Japan, Italy and Germany look alarming, and increases in tax/GDP ratios, some as high as 10-15% by 2030, are not seen as electoral vote winners. An important *caveat*, however, is that we have little means of

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[3] This is the terminal date chosen by OECD.

[4] An important issue is whether increased longevity is associated with better health Ia reduction in morbidity). There is some evidence that age-specific morbidity rates have declined, but future progress will depend on medical advances.

judging the reliability of such projections. For example, Canada, although it has recently implemented a pension reform, has a rapidly rising costs of health care and one of the most rapid demographic transitions among these countries, yet it is shown as having an improvement in its financial position over the period. Variations in the range of projections based on alternative assumptions as to demographic and economic variables of course 'fan out' as we project further into the future.

As a check on these numbers, Table 2 contains some comparable simulations from the IMF. These do not allow for the additional costs of health care. They are calculated on similar assumptions to those of the OECD study, with 1½% productivity growth. Although there appears to be no explicit attempt to model the evolution of wages, the simulations appear to allow for cohort-specific variation in labour force participation rates. The basic message of Table 2 is similar to that of Table 1, but there are important country-specific differences. The increases in debt liabilities are not as dramatic as in the OECD calculations, perhaps because additional health care expenditures are ignored. It is also noticeable that the IMF method of calculation places a heavy emphasis on *current* fiscal stance. For example, Italy is shown to have a positive primary balance in 1995 and thus the net adjustment required appears to be much lower than, say, Sweden (in contrast to Table 1, and common sense).

A further reservation concerning financial simulations of this type is that they make only limited attempts to model the underlying economic structure. Increases in financial liabilities are typically assumed to raise real interest rates, but there is little attempt to model the impact of this increase on the capital stock. In addition, the underlying determinants of the capital stock and labour productivity may in turn be related to the structure of the working population and the savings rate. The most obvious feedback mechanism is that the age structure affects the aggregate saving

rate, which in turn affects the rate of capital accumulation and thus output growth. Models which embody life cycle relationships of this kind have been constructed, but it is generally hard in GE-type model simulations also to calibrate the country-specific complexities of pension accruals and contribution structures across cohorts.[5]

Whatever the limitations of the modelling procedures, Tables 1 and 2 convey a clear picture of growing fiscal imbalances and implicit liabilities that are not usually transparent in national accounts data.[6] For some countries, these prospective liabilities look quite alarming. How then did public pension programmes get into this position? Is, it, for example, simply a consequence of the ageing of the OECD population? The next section suggests that this is not the only, or indeed the primary, factor.

4. Why have pension liabilities got out of control in so many OECD countries?

The demographic transition

The standard explanation for the rise in financial liabilities of pension programmes is the ageing of the OECD population. Table A1 at the end of the paper provides three measures of dependency for most OECD countries: the aged dependency ratio (ADR) discussed previously, the total dependency ratio (TDR) which also includes children aged 0-14, and the 'needs weighted support ratio' suggested by Cutler *et al* (1990), which takes account of the fact that the resources spent on an elderly person may differ from those spent on a child.

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[5] For dynamic GE models of this type, see, for example, Auerbach and Kotlikoff (1987). See also Cutler *et al* (1990). For the UK in particular, see Miles (1998, 1999).

[6] At the risk of relying on anecdotal evidence, in a middle-income country visited by the author on a World Bank mission, published financial statistics contained figures of contribution revenues which were obtained by calculating notional employee and employer contribution liabilities. In practice, actual contribution receipts were, in one scheme, only 20% of these liabilities, and many state managed enterprises (SMEs) had not paid employee or employer contributions for years.

All countries, with the exception of Ireland, saw a rise in the ADR between 1960 and 1990 and all countries, including Ireland, exhibit further ageing until 2030. However total dependency ratios, when children are included, generally declined between 1960 and 1990 although they will rise between 1990 and 2030. A mixed picture is observed in terms of the adjusted support ratio (where a decline in the ratio indicates a deterioration). A few countries saw a sharp rise from 1960 to 1990, such as Canada and Iceland, because of the fall in the share of children in the population. However, many see double digit declines in the ratio in the 1990-2030 period.

Do these changes in dependency and support ratios tell us anything the growth of pension commitments, and of future pension liabilities? Figure 1 provides a simple scatter plot of the share of public pension payments in GDP in 1995 against the ADR in 1990. The polynomial drawn through the points indicates a weak positive relationship but there is a good deal of variability in the pension burden relative to the ADR that is unexplained by demographic structure. Ageing does not seem to be the sole explanation of which countries have accumulated larger pension obligations through their public pension programmes.

It might be expected that a stronger (negative) relationship would be observed between future financial liabilities and projected changes in the weighted support ratio, since demographic trends are a key factor underpinning the simulated pension obligations. Figure 2 cross-plots the OECD projections of the growth of net financial liabilities between 1995 and 2030 on the IBRD/World Bank estimated changes in the needs-weighted support ratio from 1990 to 2030. As suggested, there appears to be a negative relationship but, as the labelling illustrates, this is driven by three countries: Ireland with an improvement in the support ratio and no growth in pension liabilities and, on the other hand, Japan and, to a lesser extent, Finland, where a rapid

deterioration in the support ratio is associated with a rapid rise in financial liabilities. For the remaining countries, large differences in the demographic projections are associated with a wide variation in the financial trajectory: ageing *per se* does not explain the cross-country variation in current pension programme commitments and the future deterioration of the fiscal positions.[7]

The early stages of unfunded pension programmes

For an augmented explanation of the deterioration of the fiscal status of public pension programmes up to the present time, we have to look at other factors. The first explanation lies in the initial development of programmes. Although many countries, especially in Europe and Latin America, developed public pension programmes in the inter-war period, the full introduction of comprehensive and universal social security took place after 1945. In the 'life cycle' of public pension programmes (as described in The World Bank, 1994, 315-317), the early years of schemes should be the years in which contributions are accumulated, assuming that pension entitlement is based on contributions rather than financed by transfers from the general budget. 'Sound' actuarial practice involves the initial accumulation of a fund, to be dissolved at the maturation of the scheme, even in a scheme which in 'steady state' will be unfunded, in order to avoid rapid rises in contribution rates as the scheme reaches maturity. Given, too, that the first 'full' members of the contributory scheme were members of a large 'baby boom' generation, simple foresight would have strengthened this policy conclusion to avoid the simultaneous consequences for contribution rates of both programme maturation and population ageing.

[7] A more sophisticated approach might be to break down the changes into the support ratio into the impact of fertility (size of the cohort entering the labour market), longevity and labour force participation.

Although some public pension programmes did initially accumulate funds, and some of these remain, notably the US Social Security Trust Fund, foresight played little part in pension policy from the start. Initial trust funds either lost their real value through dubious investment decisions, or were invested in government securities, so acting as a cheap source of public credit, or were used to finance higher real pension commitments. Many governments decide to pay benefits out of the system to existing people reaching pensionable age even though such people had paid little or nothing in to the programme. While such intergenerational redistributions could be justified on welfare grounds - the recipients of such generosity had after all lived through two world wars and a cataclysmic world recession – such policies destroyed any notional link between contributions and pension payments across generations, and thus any form of fiscal responsibility within the programmes.

Falling labour force participation of older men

A pervasive and well known trend across OECD countries has been the decline in labour force participation of older men (illustrated in OECD, 1996, Charts 4.1 and 4.2).[8] The implications of this for the support ratio have been concealed in many countries by a rise in the participation in paid work of married women. While participation after state pensionable age is declining largely as a result of pension programmes themselves, employer and government policies have encouraged such declines by the use of disability income schemes, relaxation of the rules governing work seeking behaviour as a condition for receipt of unemployment benefit, the 'seniority pensions' described previously, and various other 'special measures' (OECD, 1995).

[8] For the UK, see Disney *et al* (1994) and Tanner (1998).

Forecasting errors

A somewhat surprising occurrence is that many governments have systematically underpredicted improvements in longevity and overpredicted future fertility rates. It is not clear whether these errors arise as a result of incompetence or are politically motivated. The example of the United Kingdom is interesting, although it should be emphasised that I select this case merely on the grounds of proximity and particular knowledge.

Unlike most other OECD countries, the UK has broadly maintained a scheme of flat benefits since 1946, supplemented by private pension schemes. In 1978, however, after a long political wrangle, the State Earnings Related Pension Scheme (SERPS) was introduced, to provide a comprehensive earnings-related pension for individuals who did not belong to private occupational schemes. Government Actuary projections of the additional costs of SERPS were only extended to the year 2005 when, with the 'baby-boom' generation yet to retire, the scheme looked affordable. Subsequent projections by Hemming and Kay (1982) and the Department of Social Security (1984) however took the forecast up to the year 2025, at which point it became apparent that the scheme would cost a large amount of additional money. For example, with earnings indexation of the Basic State Pension, the DSS projected the combined employee and employer contribution rate to rise from 15.9% in 1985 to 23.2% in 2025 as the scheme matured and the 'baby boom' generation retired. These findings played a large part in the subsequent policies of downgrading SERPS benefits and encouraging individuals to opt out of SERPS by buying Personal Pensions (Disney and Whitehouse, 1992).

It is remarkable enough that a major pension programme was introduced without a proper assessment of the costs of the scheme either at its own maturity or at the maturation of the demographic transition. What is equally interesting is that, since that time, the official forecast of the number of retirement pensioners in the early part of the next century has steadily risen, even normalising for changes in the benefit regime since then. For example, in 1981, the number of retirement pensioners forecast for the year 2020 was 10.6 million. By 1990, the forecast had risen to 13.4 million. By 1995 (ignoring the equalisation of pension ages for men and women during the decade 2010 to 2020, which is projected to reduce numbers by 2 million, in order to keep the calculations on a comparable basis), the figure had risen to 14.4 million; an increase of 36%.[9] Thus, had SERPS continued at its existing level of generosity, the required contribution rate might now be projected to be as high as 31.5%, not 23.2%!

The 'Ponzi Game' nature of unfunded social security

The past and projected build up of the financial liabilities of the public pension programme has in large part depended on the political process underpinning the accrual of pension commitments by successive generations. To examine this factor in general terms, it is useful to start by considering the economic analysis that is normally applied to the problem of how to finance public pension schemes.

A good deal of analysis of the relative merits of funded and unfunded social security has rested on the scheme satisfying the so-called 'Aaron-Samuelson' condition, named after seminal articles by Aaron (1966) and Samuelson (1958). Samuelson considered an economy where goods were perishable and where people

[9] These projections are taken from the successive Quinquennial Reviews of the Government Actuary's Department. The original costings for SERPS are contained in the Report by the

sought to retire from producing their own consumption goods later in life. His point was that individual lifetime utility could be maximised if a 'social contract' could be arranged, so that each generation paid a 'pension' to each preceding generation, such that the implicit return on the contract was equal to the rate of population growth. Since the return on storing perishable goods was negative and population growth was likely to be positive, such an 'unfunded' scheme could be socially optimal. Aaron's generalisation of this 'rule' linked the equilibrium 'return' on unfunded social security to the rate of growth of earnings, being the sum of earnings growth per head and the growth of population. The mechanical application of the 'condition', in a world with capital, would simply compare the rate of return on capital (the return on a funded scheme) with the return on an unfunded scheme, as derived above. Where the latter was high, an unfunded scheme was superior to each generation simply relying on its own saving.

Samuelson's paper bears careful re-reading, not least where he discusses the issue of how such a 'social contract' can be maintained. It is extremely hard to think of practical mechanisms by which such contracts can be replicated and implemented by successive generations, without imposing assumptions about the nature of transactions costs (Esteban and Sákovics, 1993), or the behaviour of agents (Hansson and Stuart, 1989). The key point of unfunded social security is that the financing of accruing liabilities is left to future generations. In that case, it bears much the same character as the schemes of Charles Ponzi, an originator of the use of chain letters to raise money.[10]

In particular, if the initial generation in an unfunded scheme obtains a 'return' on its contributions in excess of the Aaron-Samuelson 'rule', later generations will

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Government Actuary on the financial provisions of the 1975 bill to introduce SERPS.

[10] See Blanchard and Fischer (1989), note 23, p.84.

have to accept lower returns to preserve the stability of the scheme. But it is tempting for subsequent generations to attempt to maintain the high initial rates of return by legislating over-generous benefit accruals for themselves, the liabilities for which will in turn be passed on to subsequent generations. The only constraint on this ratcheting up of programme liabilities is where a generation believes that a subsequent generation will simply renege on future commitments made by a prior generation. Ageing, by making such reneging behaviour more likely given the extra burden it imposes on workers, may actually make pension reform more likely.[11]

There is a parallel in all this with the 'initial conditions' problem in the public choice literature, which suggests that 'excessive' government spending levels will be passed on generation by generation, unless credible mechanisms exist to forestall the build-up of public commitments such as various kinds of policy rules, including 'balanced budget' measures, tax ceilings or money supply rules. It is, however, hard to think of rules of this kind that can induce consistent behaviour in unfunded public pension programmes. Thus, differences in the build-up of pension obligations in unfunded schemes across countries largely reflect the presence or absence of mechanisms which enforce constraints on this short run optimising behaviour.[12]

5. A Typology of Pension Reforms

Although there are a plethora of reform options on offer for public pension programmes from different international institutions and governments, it is possible to construct a basic typology of such reform proposals. Key distinctions are between

[11] For an extended argument along these lines, and numerical illustrations, see Disney (1996), Chapter 9.

[12] For example, election platforms in some countries often include promises to increase the generosity of benefit levels, lower the retirement age, and so on. These promises take little account of the future extra liabilities incurred by such promises, which are rarely explicit in national accounts. A natural requirement to inform public debate would be to require that all reform proposals contained explicit accounts of their impact on future liabilities, and of *the generational incidence of such changes*.

proposals which maintain a strong unfunded element, and those which emphasise the virtues of a transition to a funded programme. Mixed schemes which contain funded and unfunded elements, such as the pension programme in the United Kingdom, may of course offer a plausible 'half way house'. Indeed, it is hard to find a funded proposal which does not contain, at the very least, a residual publicly-financed safety net. Similarly even the harshest critic of fully funded programmes generally accepts that individuals should have the right to engage in supplementary saving for retirement in financial assets if they so choose.

A mixed tier or 'multi-pillar' approach is central to the reform option advocated by The World Bank (1994). However, the risk of mixed strategies is that the pension programme becomes excessively complicated: the United Kingdom, for example, in which individuals can choose in their second tier mandatory provision between a public pension benefit (the State Earnings-Related Pension, SERPS), a company-provided occupational pension, or an individual retirement saving account (a 'Personal Pension'), is a case in point. Such choice based systems require a high degree of transparency and individual knowledge of pension accrual structures (net of transactions costs) if the risk of people choosing unwisely is to be avoided.[13]

In what follows, four generic reform strategies are considered. The first two involve retaining a strong unfunded component. These are denoted a 'parametric' reform strategy (after Chand and Jaeger, 1996) and a strategy based on 'actuarially fair' public pension programmes respectively. The second two strategies involve a strong funded private component and are denoted as a 'clean break' privatisation and a 'partial' privatisation. In the latter case, where not all individuals join the privatised

[13] As the Personal Pension 'mis-selling' scandal has illustrated.

programme, a key issue is whether it is the government or individuals themselves that decide who can join the private funded scheme.

A 'parametric' reform of the unfunded programme

Chand and Jaeger denote a reform of this type as 'parametric' because, presumably, the key choice variables of an unfunded scheme can indeed be written down as a function of a few parameters. In the standard approach to financing an unfunded pension programme, define B = number of beneficiaries, L = number of workers, w = average wage rate, p = average pension and c = contribution rate. Then, equilibrium requires that $c = (B/L)(p/w)$ where (B/L) is the inverse of the support ratio and (p/w) is the average replacement rate. Clearly to reduce c (or to avoid growing debt if c is fixed by, say, law at below its equilibrium level) requires any of, or a combination of, reducing p or B, or raising w or L.

Increasing the support ratio requires either reducing B, for example by raising the state pensionable age or reducing entitlements for dependents, or raising L by, for example, increasing the proportion of the working age population that is economically active (this may include cutting back early retirement and other 'routes' to inactivity such as disability benefits). Reducing the replacement rate means either reducing benefits directly or indirectly by reducing the generosity of post-retirement indexation procedures, or raising eligible wages by for example increasing the fraction of the wage, or the wage bill, that is liable to pay contributions.

Various simulations of 'parametric' reforms of this type, for a number of OECD countries, have been carried out by international organisations, such as in Chand and Jaeger (1996), with a view to examining their impact on fiscal liabilities. They are (or should also be) standard in projections carried out by official actuaries

when estimating the sensitivity of the future costs of pension programmes to changes in baseline assumptions. Most such simulations find that the key parameter in determining fiscal liabilities is the state pensionable age (often equated with the 'retirement age' in such calculations). Raising state pensionable age, or perhaps more specifically linking it explicitly to expected longevity, is generally a key policy in 'parametric' reforms to the problem of financing public pension programmes. Such policies are increasingly being adopted in a number of OECD countries.[14]

Although such policies are uncontroversial from an economic point of view (although rarely so from a political perspective), the problem lies in modelling gains from them. A key objection to analyses of the gains, in terms of the projected reductions in fiscal liabilities, is that retirement behaviour is rarely modelled explicitly in such simulations (as indeed in the equating of 'retirement' with the first age of receipt of benefits from the public pension programme). While raising state pensionable age does indeed reduce the denominator of the support ratio directly, the indirect impact on the number of beneficiaries is far from clear. Employment rates in the years prior to reaching state pensionable age are well below 100% in most OECD countries, and simply raising state pensionable age still further may not necessarily increase participation rates, let alone employment rates, among older workers. If these extra people below pension age thereby end up on unemployment or disability benefits, or other forms of welfare support, these costs will offset in budgetary terms the 'gain' in the reduction in the number of explicit beneficiaries of the public pension programme. Estimates of the benefits of 'parametric' reforms which do not model these behavioural effects directly are systematically biased in favour of finding large

[14] In the UK, for example, state pensionable age for men and women will be equalised at 65 between 2010 and 2020. In the US, the age of full entitlement is to be raised to 67 years by 2020, and Italy is increasing its male retirement afe to 65 in the year 2000. Other examples are given in OECD (1998), Figure IV.1.

reductions in fiscal liabilities from such reforms precisely because they treat as parameters what are, in fact, behavioural variables.

An 'actuarially fair' unfunded programme

A second broad strategy for reform of an unfunded programme which leaves the financing strategy intact, is to explicitly link benefits and contributions, by generation, to the Aaron-Samuelson sustainable 'return' to an unfunded scheme. Such a strategy, in general terms, calculates what is the sustainable implicit 'rate of return' on the contributions of each cohort of contributors, given the projected growth or decline in the real contribution base, and then sets the accrual rate of pensions such that this return is, on average, realised. This policy lies behind the so-called 'Dini reform' of the Italian programme in the mid-1990s, and behind the public assertion that such a reform puts the programme on an 'actuarially fair' basis.

Since 'actuarial fairness' also involves questions of redistribution *within* generations, or cohorts, such a reform has to include subsidiary but important modifications of plans: towards, for example, an average lifetime basis for calculating pension entitlements rather than a 'final salary' basis (which will obviously induce some variation in outcomes if earnings profiles are subject to volatility). At its 'logical' extreme, in the so-called 'notional accounts' variant of this strategy, each individual pension is supposed to be explicitly based on contributions such as to minimise inter-individual variation in returns. In the current Swedish reform, and in similar reforms elsewhere, such as Latvia, each individual is given a 'notional account' within the public pension programme, just like a funded retirement saving account (with the important difference, of course, that the accounts are not funded) and, with linear accrual structures, the incremental accrual of pension benefits should

be transparent. Post-retirement indexation arrangements are linked explicitly to changes in demographics (such as any improvement in longevity) and to other changes in the growth of the wage bill.

Implicit in a reform of this type is that the failures of unfunded programmes up to now arise because of their lack of transparency and from their inability to apply a rigid formula linking returns to the Aaron-Samuelson condition. These policies would have minimised arbitrary redistributions arising from the vagaries of the benefit formula and political processes, it is argued. Since this reform strategy is currently rather fashionable, a few difficulties need to be pointed out. First, there are still no plausible enforcement mechanisms to guarantee that the 'Aaron-Samuelson' condition for equilibrium in an unfunded programme will be satisfied in the future. In the Italian reform, much of the generational burden of shifting to this formula-based approach falls on younger generations. There has been a conspicuous lack of success in the Italian reform in cutting back pension benefits in the immediate future, whereby the burden would fall on prime age and older generations. In the Swedish or Latvian-style reform, ingenious adjustment of the pension indexation formula will be used to keep the fiscal outcome 'on track'. Suppose, however, that an improvement in longevity is combined with a temporary recession such that the real wage bill growth becomes zero. Irrespective of, say, inflation, nominal pensions will be held constant. Politically, such an outcome seems unlikely - even the UK automatically indexes benefits to inflation. There is likely to be a ratchet effect by which, when the wage bill rises faster than trend, pension are raised more rapidly but, where wage bill growth falls below 'headline' indicators such as the rate of inflation, pensions are raised in line with inflation. As a result, fiscal liabilities will continue to grow relatively rapidly.

Finally, by attempting to eliminate much of the redistribution inherent in unfunded schemes, so as to make the benefit-contribution link 'transparent', much of the rationale for the public programme is destroyed. Public programmes inherently redistribute: from poor to rich (because the poor die younger), from men to women, from married couples to widows, and from the rest to the very poorest through benefit 'floors'. Moreover, explicit 'returns' to such accounts can automatically be compared by participants with the much higher returns to be obtained in marketed private savings accounts. Will individuals be willing to contribute to a programme which may well explicitly offer a negative return on contributions to later generations (see, for example Disney and Whitehouse, 1993) while observing possible double digit nominal returns on private saving accounts? It is not overly cynical to suggest that it is the *lack* of transparency of unfunded public pension schemes, coupled with their undoubted insurance-based and redistributive component, that encourages people to contribute to such programmes. Greater 'transparency' only makes their inadequacies more transparent, and the programmes less attractive.

'Clean Break' Privatisation

The alternative strategy to 'fixing up' the unfunded pension programme is to replace all or part of it with a funded programme. Such an approach has not been implemented explicitly in OECD countries – the nearest variants being the introduction of mandatory superannuation in Australia in 1992, and the 1986 reform in the UK, which downgraded SERPS and allowed individuals to 'opt out' of that part of the programme into an individual retirement savings account known as a 'Personal Pension'. The latter reform is however more appropriately considered under the next sub-heading.

While in principle the government can introduce or extend its own managed funded component to the public programme, a generic transition to a funded programme is almost certain to include a private component, and thus I refer to this as a privatisation option. The big objection to allowing the government to organise the funded programme itself is that it is extremely difficult to 'ring fence' the public pension fund from other components of the government budget. Suppose, for example, as in the United States, that the assets of the public pension programme's 'trust fund' are held in the form of government securities. Insofar as the purchase of government securities by the fund permits the government to increase its own liabilities by, for example, increasing its spending uncovered by tax receipts, then the growth of government liabilities matches the growth of government assets held by the fund. The funded and unfunded programmes are then equivalent in their generational incidence (Kotlikoff, 1992).[15] For this reason I consider only a funded option which is combined with privatisation.

The most well-known full scale privatisation of a public pension programme is that which took place in Chile in November 1980 (see Edwards and Edwards, 1991; Edwards, 1998), which has been copied in a number of Latin American countries and elsewhere. Some influential commentators are advocating reforms of this kind in OECD countries (Börsch-Supan, 1998; Feldstein, 1996, 1998).

The attractions of full funding of the programme are as follows. First, the real return on funding almost always exceeds the 'Aaron-Samuelson' return on unfunded schemes (see Table 1 in Blake, this issue), even if one can argue over the appropriate

[15] This is of course a whole sub-debate in the literature. What would happen, for example, if we let the government pension fund hold equities and other private sector assets? This would imply that other private asset holders would own a greater fraction of government securities while the government would hold a greater share of the equity market. The effect of this on portfolio values depends on what we assume about financial markets. There is also the rather obvious question of whether the government is a better fund manager than the private sector.

private rate of return to use.[16] Second, a funded scheme is transparent, not in the rather artificial sense of 'notional accounts', but in the real sense that benefits are explicitly related to contributions and capital market performance rather than to some formula of the public programme. In contrast, contributions to an unfunded public pension programme inevitably contain a tax component, which distorts labour supply and savings behaviour relative to saving in a funded programme. Note that this tax distortion has two dimensions: first, individuals are forced to buy a given level of longevity insurance (pensions) at an excessive cost given the low return to the unfunded scheme and second, benefits do not match contributions across individuals and thus there are arbitrary transfers of income across contributors. Feldstein (1998, 'Introduction') has estimated the former loss at 1% of GDP in the United States, which is very large relative to most 'welfare triangles' that have been calculated for related exercises.

In a 'clean break' privatisation of the pension programme, no further contributions are made into the existing unfunded programme. All new contributions after privatisation are made to the insurance companies or group providers and are assigned to individual pension accounts. In contrast, the liabilities of the unfunded programme, which comprise both existing and projected payments to current pensioners and the accrued pension rights of those who have not yet retired within the unfunded programme, have then to be financed by some means. This is the crux of the funding transition problem: the implicit liabilities of the existing programme then become explicit and are supplemented by the additional liabilities arising from the transfer of all future contributions to the new, funded, scheme. Of course, the assets of the new funded programmes may match, or be less than or more than, the

[16] For example, the rate should account for transactions costs in establishing funded accounts, net out the risk premium and adjust for tax liabilities.

additional liabilities arising from the future cessation of contributions to the unfunded programme. As in Chile, one of the main purchasers of the extra liabilities of the government may be the new pension funds so the 'extra' financing liability is offset, at least partially. Nevertheless, the immediate impact of privatisation is an explicit jump in the liabilities of the public sector and, to those that do not like large public sector liabilities, such as the IMF, this issue seems to be the insurmountable hurdle of privatisation (Chand and Jaeger, 1996).

There are, however, several ways of handling the transition issue. One is simply to accept the extra explicit burden of public liabilities and a higher perpetual burden of interest payments on the debt. Chand and Jaeger (1996), Table 18, estimate the increase in pension liabilities from this strategy in a range of industrial countries to be on average 152% of 1995 GDP, of which 60% would arise simply from making explicit existing unfunded liabilities which are not currently covered by legislated contribution rate increases. It would be possible, in principle, to model heroically the implications of this for real interest rates under various assumptions.

The second alternative is to have an explicit transition finance strategy that effectively involves establishing a generational incidence of the transition burden. For example, Kotlikoff, in Feldstein (1998), uses the Auerbach-Kotlikoff (1987) GE model to examine a transition to full funding in the US economy which contains three transition-financing 'scenarios': 'lump sum' transfers to compensate losing generations, a transition funded by a rise in income tax rates, and a consumption (expenditure) tax-financed transition. The latter gives the strongest aggregate welfare gain in the model simulations. Another transition strategy, where the generational incidence is less clear, is where the liabilities are in part financed by higher budget surpluses over a substantial period. These are achieved by, say, cutting public capital

spending or by privatisation of public assets. In the long run, the economy will have a higher stock of private assets in the pension funds and a lower stock of public assets; the welfare consequences of such a transition are more difficult to evaluate without knowledge of the incidence of the benefits from publicly-owned assets.

Another common objection to a funded solution is that it rules out any explicit redistributional component to the public pension programme. While elimination of arbitrary redistribution may be desirable between generations, it reduces the equity component of such programmes *within* generations. A particular problem is that, in the face of transactions costs, persistent low income earners may be able only to earn very low pensions with their contributions. An obvious solution is for the government to provide a safety net or some explicit minimum pension guarantee within the funded programme. However the costs of the safety net have to be added to the fiscal liability of the programme, and generous guarantees may encourage low income contributors to opt out (either formally, if permitted, or informally, if the scheme is compulsory). Such non-participants may reason that the returns on their contributions, less the deduction of the public guaranteed payment that will obtain if they can raise their pension by saving, make continued contribution to the programme unprofitable. This is a trade-off which has to be evaluated explicitly in the privatisation route.

A third argument often presented against funded schemes of this kind is that they subject participants to investment risk. I would rather restate this as suggesting that funding replaces potential political risk with potential investment risk. Evaluating the relative importance of different types of risk of this kind is problematic. It can be argued, for example, that an explicit funded strategy allows the individual to *diversify* risk: the observation that equity markets are ‘risky’ is an irrelevance to the debate.

The key questions are: whether, by adding a portfolio of market assets to his or her pension 'portfolio', the individual can thereby reduce the prospective 'riskiness' attached to his or her future pension and, additionally, whether the market can provide types of insurance against annuity risk arising from the volatility of markets. Simply asserting that a funded pension is 'risky' because it may be (in part) invested in equities is an erroneous form of reasoning.

There are, however, more plausible difficulties associated with investment risk, which need, at the very least, low cost technical solutions. One is the process of annuitisation itself, which will imply a change in the portfolio holding of the individual as the accumulated fund is converted into an annuity stream. If the point of conversion is simultaneous with an adverse outcome arising from market volatility, the annuity stream will be of lower value. However, deferral of annuitisation in such circumstances raises a real problem of adverse selection. In general, the annuity market itself, which may have been rather thin prior to the decision to privatise a component of the pension programme, may have more general adverse selection problems and may need careful regulation. These issues are further discussed in David Blake's paper in this issue.

Partial Privatisation

A proposal which has gained recent attention is to privatise the programme partially. 'Partial' in this context means not just the possibility of maintaining an unfunded component to the programme as a whole. Other possibilities include only allowing certain individuals to join the funded scheme, or alternatively of allowing individuals the choice of joining a funded or unfunded programme. The latter is illustrated by the current UK scheme, in which individuals can choose to remain in

SERPS (the unfunded component of the programme) or to invest part of their National Insurance contribution in a Personal Pension. The former is illustrated by 'Basic Pension Plus', proposed by the Conservative administration before the 1997 General Election, by which the basic state pension was to be replaced by a funded programme for each new cohort entering the labour market. Other countries that have used partial privatisations, which either include a voluntary element, or a cohort-specific transition, include Argentina and Hungary.

The essential point of such a reform is that it reduces or spreads the transition costs more widely. If only younger workers enter the funded programme (whether through compulsion or choice), they can obtain reasonable pensions on retirement by the simple effect of compound interest on their accumulating fund. At the same time, if earnings rise with age, the initial transition cost of their foregone contributions to the public unfunded programme is low. Over time, the value of foregone contributions rises but, of course, the fiscal liability will also peak. In contrast, in a 'clean break' privatisation, the cost of attempting to replicate the generosity of the 'defined benefit' programme for all participants may involve an immediate large increase in financial liabilities, as has been shown previously**.**

A different problem emerges with partial privatisation if there are large within-generation variations in funded returns, for example due to transactions costs, or differences in individual entitlements in the unfunded programme. Suppose participation is voluntary. It is possible, for example, that all rich people within a cohort might opt to join the private programme while all poorer people opted to stay in the unfunded scheme, especially if the unfunded programme contained various explicit redistributive elements such as benefit ceilings or non-linear benefit accrual rates with income (the extreme example of which is a flat component to benefits).

This generates a standard adverse selection problem, and in addition the existence of the funded option limits the capacity of the unfunded scheme to redistribute within generations. On the other hand, mandating that only certain individuals can join the funded scheme (differentiated for example by age) may lead to conflict, especially if it becomes apparent that returns to the funded scheme are well in excess of those to the unfunded scheme, so making the funded option attractive to a much wider group of people. There is also the simple point in voluntary privatisations, such as the UK, that many people misunderstand accrual structures and therefore make 'incorrect' choices.

6. Conclusion

The preceding discussion has suggested that public pension programmes have generated excessive financial liabilities for a number of reasons, of which the ageing of the population is only one among several reasons. There are a number of solutions on offer but, not surprisingly, they all have weaknesses. There are some obvious reforms that can be carried out within existing unfunded schemes, although a switch to a scheme of 'notional accounts' would seem to be an unnecessary complication and, ultimately, a dead end. The long run solution seems to involve a strong funded element, but the transition costs have to be handled carefully and partial strategies need to take particular care as to their distributional consequences and potential for complexity.

The UK has not been treated as a specific case study in this analysis, although it will be apparent both from the calculations of fiscal liability and reference to funded reforms in the last section that the fiscal status of the public pension programmes in the UK is not a cause for concern. This low fiscal liability arises because benefits in

the UK's unfunded scheme are predominantly flat benefits, indexed to inflation, and because the UK has gone a long way down the funded route given its strong occupational pension sector and the introduction of Personal Pensions. However, the cost of this transition has been to deliver an over-complicated scheme of choice-based funded and unfunded provision that probably needs to be rationalised. Thus reform of pension provision remains a controversial issue in the UK, as in many other countries, and is likely to be so for the forseeable future.

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(1) Country	(2) Standard age of Entitlement to pension (men/women)		(3) Public pension payments as % of GDP		(4) Present value of contributions less pension expenditure as % of GDP	(5) Net financial liabilities as % of GDP		(6) Increase in tax/GDP ratio required to keep net debt constant	
			1995	2030		1995	2030	2005	2030
United States	65	65	4.1	6.6	-23.0	51	95	-0.3	5.3
Japan	60	58	6.6	13.4	-70.0	11	317	3.5	9.6
Germany	65	65	11.1	16.5	-61.6	44	216	2.8	9.7
France	60	60	10.6	13.5	-102.1	35	165	0.8	7.1
Italy	60	55	13.3	20.3	-59.7	109	234	1.8	11.4
United Kingdom	65	60	4.5	5.5	-23.8	40	137	1.7	3.5
Canada	65	65	5.2	9.0	-100.7	70	-27	-3.2	3.6
Australia	65	60	2.6	3.8	-96.7	28	10	-1.3	2.4
Austria	65	60	8.8	14.4	-92.5	50	317	3.8	15.4
Belgium	65	60	10.4	13.9	-152.6	128	77	-2.0	5.9
Denmark	67	67	6.8	10.9	-234.5	46	34	-1.9	3.8
Finland	65	65	10.1	17.8	-64.8	-7	98	-1.4	8.8
Greece	65	60	..	..	..	..	..	..	..
Iceland	67	67	2.5	4.2	-66.2	35	69	-0.3	4.3
Ireland	66	66	3.6	2.8	-17.8	86	83	-0.3	1.8
Luxembourg	65	65	..	..	..	..	..	..	..
Netherlands	65	65	6.0	11.2	-53.3	43	185	0.8	9.0
New Zealand	61	61	5.9	8.3	-212.8	..	..	..	..
Norway	67	67	5.2	10.9	-124.1	-26	-57	-2.7	3.8
Portugal	65	62	7.1	13.0	-109.2	71	170	0.5	8.2
Spain	65	65	10.0	14.1	-108.6	50	159	0.9	7.4
Sweden	65	65	11.8	15.0	-132.3	28	78	-0.6	4.0
Switzerland	65	62	..	..	..	..	..	..	..

Table 1: OECD Estimates of financial liabilities of public pension programmes 1995-2030

Key to Table 1:

(2) Standard age of first entitlement to state pension, in 1992, Source OECD(1996).
(3) Source: Roseveare *et al* (1996) Table 3; OECD (1998), Table 2.3.
(4) The net present value of employer and employee contributions to 2070, net of future pension liabilities and less existing assets. As % of 1994 GDP. Assumed productivity growth 1.5% p.a.; at discount rate of 5% p.a.
Source: Roseveare *et al* (1996) Table 1; OECD (1996) Table 2.2.
(5) Existing revenues and expenditures held constant as % of GDP; scenario in (3) and (4) for pension expenditure; health care costs assumed to grow in line with GDP but health care cost-age ratio *maintained* as at present. Net interest payments are then added, and the real interest rate is assumed to reflect (and track) GDP growth. Source: Roseveare *et al* (1996).
(6) Source: Roseveare *et al* (1996), Table 6; OECD (1996), Table 5.3.

	Net Public Debt at End 1994	Net Pension Liability 1995-2050	Combined Net Debt Liability	Primary Balance 1995	Sustainable Primary balance required to:		Adjustment needed in primary balance for fiscal sustainability
					Stabilise net public debt in 1995	Stabilise net public debt and prevent build-up of public debt	
United States	63.3	25.7	89.0	0.4	1.1	1.9	1.5
Japan	33.2	106.8	140.0	-0.2	0.3	3.6	3.8
Germany	52.5	110.7	163.2	2.4	1.1	4.5	2.1
France	42.4	113.6	156.0	-0.3	0.7	4.0	4.3
Italy	112.9	75.5	188.4	3.3	2.1	4.6	1.3
United Kingdom	37.7	4.6	42.3	0.4	0.7	0.8	0.4
Canada	71.6	67.8	139.4	0.2	2.7	4.7	4.5
Sweden	54.5	20.4	74.9	-5.1	0.1	1.0	6.1

Table 2: Net Pension Liabilities and Sustainability of Fiscal Stance *(as % of GDP)*

Source: Chand and Jaeger (1996) Table 8

(1) Country	(2) Elderly dependency ratio					(3) Total dependency ratio					(4) Needs-weighted support ratio				
	1960	Δ60-90	1990	Δ90-30	2030	1960	Δ60-90	1990	Δ90-30	2030	1960	Δ60-90	1990	Δ90-30	2030
United States	15.4	*+3.7*	19.1	*+17.7*	36.8	67.4	*-15.7*	51.7	*+16.3*	68.0	63.7	*+4.0*	67.7	*-8.5*	59.1
Japan	9.5	*+7.6*	17.1	*+27.4*	44.5	56.6	*-13.1*	43.5	*+30.0*	70.5	68.5	*+2.6*	71.1	*-14.1*	57.0
Germany	16.0	*+5.7*	21.7	*+27.5*	49.2	47.4	*-2.1*	45.3	*+29.8*	75.1	70.0	*-0.8*	69.2	*-14.0*	55.2
France	18.8	*+2.0*	20.8	*+18.3*	39.1	61.3	*-10.2*	51.1	*+18.8*	67.9	64.7	*+2.8*	67.5	*-8.8*	58.7
Italy	13.3	*+8.3*	21.6	*+26.7*	48.3	47.9	*-2.4*	45.5	*+27.2*	72.7	70.5	*-1.4*	69.1	*-13.2*	55.9
United Kingdom	17.9	*+6.1*	24.0	*+14.7*	38.7	53.7	*-0.8*	52.9	*+15.1*	68.0	67.3	*-1.2*	66.1	*-7.4*	58.7
Canada	13.0	*+3.7*	16.7	*+22.4*	39.1	70.5	*-23.0*	47.5	*+21.5*	69.0	63.3	*+6.6*	69.7	*-11.3*	58.4
Australia	13.9	*+2.1*	16.0	*+17.0*	33.0	63.2	*-14.3*	48.9	*+13.7*	62.6	65.3	*+4.1*	69.4	*-8.2*	61.2
Austria	18.6	*+3.8*	22.4	*+21.6*	44.0	52.1	*-3.9*	48.2	*+23.2*	71.4	67.7	*+0.3*	68.0	*-9.0*	57.0
Belgium	18.5	*+3.9*	22.4	*+18.7*	41.1	55.0	*-5.8*	49.2	*+19.7*	68.9	66.7	*+1.0*	67.7	*-9.6*	58.1
Denmark	16.5	*+6.2*	22.7	*+15.0*	37.7	55.8	*-7.9*	47.9	*+19.1*	67.0	67.0	*+1.0*	68.0	*-8.8*	59.2
Finland	11.7	*+8.0*	19.7	*+21.4*	41.1	60.6	*-12.2*	48.4	*+22.5*	70.9	66.6	*+2.0*	68.6	*-11.0*	57.6
Greece	12.3	*+8.9*	21.2	*+19.7*	40.9	52.0	*-2.4*	49.6	*+16.9*	66.3	69.3	*-1.4*	67.9	*-9.2*	58.7
Iceland	14.1	*+2.5*	16.6	*+15.5*	32.1	75.0	*-19.8*	55.2	*+8.0*	63.2	61.8	*+5.4*	67.2	*-5.9*	61.3
Ireland	18.6	*-0.2*	18.4	*+6.9*	25.3	70.6	*-9.2*	61.4	*-6.9*	54.5	62.1	*+2.7*	64.8	*+0.5*	65.3
Luxembourg	15.9	*+4.0*	19.9	*+24.3*	44.2	47.4	*-2.6*	44.8	*+28.9*	72.7	70.0	*-0.2*	69.8	*-13.2*	56.6
Netherlands	14.7	*+4.4*	19.1	*+26.0*	45.1	63.9	*-19.4*	44.5	*+28.7*	73.2	64.9	*+5.4*	70.2	*-13.9*	56.3
New Zealand	..	..	16.7	*+13.8*	30.5	..	..	50.9	*+10.7*	61.6	..	..	68.6	*-6.5*	62.1
Norway	17.3	*+7.9*	25.2	*+13.5*	38.7	58.2	*-3.8*	54.4	*+13.9*	68.3	66.1	*-0.8*	65.3	*-6.6*	58.7
Portugal	12.7	*+6.8*	19.5	*+14.0*	33.5	59.1	*-8.4*	50.7	*+9.1*	59.8	66.9	*+1.0*	67.9	*-6.0*	61.9
Spain	12.7	*+7.1*	19.8	*+21.1*	41.0	55.1	*-5.8*	49.3	*+15.5*	64.8	68.2	*+0.1*	68.3	*-9.2*	59.1
Sweden	17.8	*+9.8*	27.6	*+11.8*	39.4	51.8	*-3.5*	55.3	*+15.1*	70.4	68.0	*-3.5*	64.5	*-6.5*	58.0
Switzerland	15.5	*+6.5*	22.0	*+26.6*	48.6	51.5	*-5.6*	46.1	*+30.9*	77.0	68.7	*+0.1*	68.8	*-13.9*	54.9

TableA1: Dependency and Support Ratios, 1960-2030

Source: Bos *et al* (1994)

Figure 1

Aged Dependency Ratio and Public Pension Payments as % of GDP, 1990/95

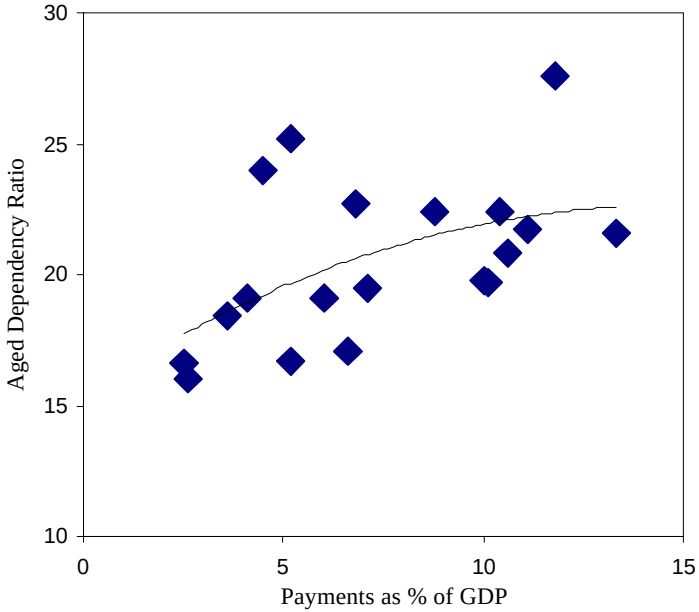

Figure 2

Change in support ratio and change in financial liabilities 1995-2030