



Working Paper 26/02

**ISSUES IN THE REGULATION OF ANNUITIES
MARKETS**

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*Presented at the third annual CeRP conference
“Developing an Annuity Market in Europe”
Moncalieri, Turin, 21 – 22 June 2002*

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**Paper presented at the conference "Developing an Annuity Market in Europe",
June 21-22, 2002**

**Real Collegio Carlo Alberto, Moncalieri (Turin) – Italy, organized by
CeRP (Center for Research on Pensions and Welfare Policies).**

Abstract

Annuities are a vital aspect of a growing number of reformed pension systems around the world, and will be of increasing relevance in Europe as reform of generous social security schemes gathers pace. This paper addresses the regulation of annuities, essential to ensure integrity of the system, from three sides; prudential regulation of insurance companies, conduct of business regulation of insurance companies and the regulation of annuities within the overall pension system. We also consider some broader systemic issues that may arise. It is highlighted that the main risks in annuities are traditionally held to relate to errors in mortality and interest rate assumptions, but increasingly credit and broader systemic risks are also coming to the fore. Thematically, we suggest that research into the appropriate response of regulation to the dynamics of competition among annuity providers and the implications of ageing warrant particular study. Further issues bearing directly on regulatory regimes are raised by the Equitable Life debacle and the Japanese experience of life company failure.

Keywords: financial regulation, insurance, pensions, annuities
JEL classification: G18, G22, G23

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1 Introduction

When an individual retires in a defined contribution pension scheme, there are three ways in which the tax-privileged assets can be released. One is a lump sum payment – which of course may be dissipated leaving the individual destitute. The second is programmed withdrawals over the retirement period, which also involves longevity risk if the individual lives longer than expected. And the third is the annuity from an insurance company, the only contract which guarantees income right up to the point of death. The key role played by annuities in the assurance of retirement income in defined contribution pension schemes is placing an increased focus on the appropriate regulation of such instruments. This is particularly the case in Europe in the light of ongoing and prospective reductions in social security pensions and progressive withdrawal of companies from provision of defined benefit pensions in many countries.

This paper seeks to address issues underlying the pattern of regulation both for individual annuities (in the context of insurance regulation) and the rules for annuitisation (in the context of pension systems). Some general and longer term risks affecting annuities and insurance companies are also addressed. We focus in particular on lessons from the situation in the UK, one of the most advanced annuities markets (Yermo 2001), but also address broader European and EU issues, while wider country-experience, notably from countries outside the EU with mandatory funded pension schemes, is also drawn upon where appropriate. We begin, however, by assessing the functioning of annuities markets abstracting from regulation.

2 Background – annuities in a free market

2.1 Annuities' characteristics

It is useful to begin by outlining the characteristics of annuities as financial instruments. Annuities are contracts sold to individuals by life insurance companies to provide a guaranteed income from the point of purchase (or coming into effect for deferred annuities) until death. They thus provide insurance against the non-diversifiable risk of outliving assets, which is feasible given the operation of the “law of large numbers” in a pool of annuitants. Investment risk is also eliminated in traditional level annuities, and even inflation risk can be removed by indexed annuities (if suitable price indexed bonds are available). The trade-off is losses in terms of missed opportunities to invest freely. Annuities, if fairly priced, allow maximisation of income over the pensioner’s lifetime compared with other ways of releasing assets, since alternatives would always require excess assets at death (Mitchell 2002). They also can provide a smooth income consistent with what is typically assumed to be a

desired pattern of consumption (Blake and Hudson 2000). They may thus also be the optimal way to invest, unless there is a bequest motive.

Correspondingly, for the provider, risk in annuities is related to two main aspects, the degree to which returns from the financial instruments chosen to back the claim match the income stream precisely, and the accuracy of the mortality assumption. If either of these is inaccurate in favour of the annuitant, the company can make unexpected losses. Ultimately, such losses may threaten solvency and hence the income stream to the pensioner. Equally, if the insurance company becomes insolvent for other reasons arising from liabilities (e.g. losses on life or general contracts) or assets, the annuity payment stream may again be threatened.

The conventional form of annuity, notably in Anglo Saxon countries, is a nominal-fixed contract, but in countries where inflation indexed bonds are available, such as the UK and Chile there can be real annuities. Variants on these basic annuities are available in some markets, such as survivor annuities, which effectively cover a couple rather than solely one person, and continue to function, usually at a lower income, if one partner dies. A further hybrid is with-profits annuities, where the income stream increases with the returns on the underlying investments, and the increase once granted may in some cases (so called reversionary bonuses) not be removed. Such annuities often have a high element of discretion to the insurance company in how much of its profits on investments it chooses to allot to policyholders. A variant on this structure, with a guaranteed rate and the remainder paid as a bonus, is common in Continental Europe (see Section 5.2).

Variable annuities transfer the market risk (usually of equities) to the annuitant, and hence they lack the guarantee element on income, while the insurance company still bears mortality risk. This is achieved by promising the payment of a number of shares in an underlying portfolio, with the number being recalculated annually and evolving over time according to a fixed formula. The actual money value of the pension varies according to the difference between the actual return on the assets and the assumed interest rate set out in the contract. If the pool of pensioners die more slowly than assumed, then the insurer bears the risk. Note that the name “variable annuities” is also applied in the US to pension-savings contracts, which merely give the option to buy a true variable annuity (an option which, as noted by Cardinale et al (2002), few consumers take).

CREF annuities promise the payment of a number of annuity units in the underlying portfolio, whose price is recalculated annually with a fixed formula, accounting for the difference between the actual rate of return on the underlying portfolio and the projected interest rate, the difference between mortality experience of the pool of annuitants and the expected mortality of that group; and changes in

expected mortality. A danger is that the insurance company, if so permitted, may offer new clients more favourable mortality tables, thus cross subsidising from existing members.

2.2 Annuities and pension systems

How do annuities fit into pension systems? During retirement, guaranteed cash flows are offered by pay as you go pension schemes (out of taxation) and defined benefit funds (usually out of the fund itself), albeit subject to wide discretion in respect to inflation indexation (Valdes-Prieto 1998). Both these types of schemes typically spread the risks at the income stage among pensioners, between pensioners and those of working age, and between members of the scheme and the sponsors of the arrangement.

In defined contribution pension schemes, such risk sharing mechanisms are not automatically available. Nevertheless, if defined contribution schemes are to provide a substitute for social security and occupational defined benefit funds, as typically sought in pension reforms, they will also need to provide guaranteed cash flows in a risk-sharing context. Annuities fulfil this objective by pooling the risk of living longer among all the pensioners who purchase them. As noted, annuities are the only form of financial contract that can provide the beneficiary with a guaranteed income till they die. Of course, if substantial social security and/or defined benefit funds are retained, then defined contributions could justifiably provide only lump sums (see Section 6).

To gain a guaranteed retirement income, each individual in a defined contribution scheme may (or must, in the case of mandatory systems) invest his or her own accumulated pension savings in the form of an annuity with an insurance company. As noted, the use of an insurance company entails certain financial risks, which justify financial regulation in the interests of retirement income security, as well as for the other objectives regulation may pursue.

2.3 Financing of annuities

In order to evaluate regulation, it is essential to outline how annuities are financed. Focusing on level annuities, if suitable assets are available as reserves, there can be matching of assets and liabilities, with cash flows precisely equal to the expected payments in the annuity. Immunisation leading to duration matching would allow a wider range of assets to cover the liabilities, with changes in market yields not affecting the coverage of liabilities by assets. Government bonds would in turn provide risk free backing for such strategies.

However, although a strategy of matching or immunisation would cover the liabilities, James and Song (2002) note that owing to the narrow margins inherent in it, it would not account for the high “money’s worth ratio” typical of most developed annuities markets, where the MWR is the expected discounted present value of cash flows from the annuity divided by the initial premium cost. Discounting at the risk free rate, they find MWRs of 95% or more for the annuitant population in a variety of countries. The difference in payout across countries is closely related to the differences in government bond yields, and the difference in MWR is related to mortality prospects.

The issue arises as to how insurers cover their administrative costs, risk premia and profits given such high MWRs based on risk free rates. James and Song suggest, supported by discussions with industry players, that insurers actually invest the initial lump sum on an annuity in riskier instruments, notably corporate bonds, mortgages and some equities. Blake and Hudson (2000) add that the menu may also include private placements and foreign bonds plus currency swaps. They may also duration-mismatch, not holding short-term assets to cover initial annuity payouts, but using net cash inflow from new business and maturing old investments, current interest and dividend receipts to pay them. This raises the average return with an upward-sloping yield curve and reduces reinvestment risk. Life insurers may thus earn a return that exceeds the guaranteed risk-free rate by over 130 basis points, and thus cover their costs. Underpinning this argument, In their sample, excluding most EU countries, James and Song note that the lowest MWRs are for UK indexed annuities, for which higher-yielding substitute assets are not readily available. They also point to life insurance company portfolios, which include sizeable proportions of risky assets (see Table 1), although as discussed below, riskier assets may link mainly to products such as variable or unit linked policies where investment risk is passed to the consumer.

The means whereby risky portfolios are transformed to risk free outflows include risk reduction and risk shifting approaches. Such methods are important to spell out here, as they constitute a key part of internal risk management by the firm, which underpins and complements regulation. Risks arising from failure of such risk management are discussed in Section 7. In terms of risk reduction, insurers employ investment diversification, including foreign assets (Davis 2002c); use of derivatives for hedging (if permitted) such as swaptions, which should provide a cheaper way of covering these risks (Blake (1999), Rule (2001)); sharing of risk across product lines whose risks are orthogonal, such as annuities and life insurance; lower information costs than for individual consumers owing to specialisation, as for any financial intermediary; and using cash inflows to provide liquidity and thus reducing market timing risk. In terms of risk shifting, there is reinsurance; annuity guarantee pools; risk sharing between cohorts of annuitants or different products (if competition is imperfect) notably in with-profits policies; using shareholders as residual claimants; and bankruptcy laws giving annuitants high priority.

3 Insurance companies, annuities and financial regulation

3.1 Why is financial regulation needed?

Given that annuities offer benefits to retirees, and insurers have various risk spreading and risk reduction methods at their disposal, why does a free market solution not suffice to ensure security of retirement incomes? Abstracting from issues of redistribution, a case for public intervention in the operation of markets arises when there is a market failure, i.e. when a set of market prices fails to reach a Pareto optimal outcome. When competitive markets achieve efficient outcomes, there is no case for regulation. There are three key types of market failure in finance, namely those relating to information asymmetry, externality and monopoly. Moral hazard and adverse selection may also play a role.

As regards information asymmetry, if it is difficult or costly for the purchaser of a financial service to obtain sufficient information on the quality of the service in question, they may be vulnerable to exploitation. This may entail fraudulent, negligent, incompetent or unfair treatment as well as failure of the relevant institution *per se*. Such phenomena are of particular importance for retail users of financial services such as annuities, because clients are seeking investment of a sizeable proportion of their wealth, contracts are one-off and irrevocable and involve a commitment over as much as 40 years. Innovative annuity products, while offering potentially desirable income streams, may be particularly difficult to evaluate by consumers (FSA 2002). Equally, consumers are unlikely to find it economic to make a full assessment of the risks to which life insurance companies are exposed across their entire asset and liability portfolios, which may nevertheless affect their ability to pay annuities. Such asymmetries are clearly less important for wholesale users of financial markets such as life insurers themselves, which have better information, considerable countervailing power and carry out repeated transactions with other financial institutions. However, a partial protection against exploitation, even for retail consumers, is likely to arise from desire of financial institutions such as life insurers offering annuities to maintain reputation.

Externalities arise when the actions of one individual in the economy has a consequence for other individuals which are not taken into account by the price mechanism. The most obvious type of potential externality in financial markets relates to the risk of contagious bank runs, when failure of one bank leads to a heightened risk of failure by others, whether due to direct financial linkages (e.g. interbank claims) or shifts in perceptions on the part of depositors as to the creditworthiness of certain banks in the light of failure of others. Given the matching of long run liabilities and long run assets, such externalities are less likely for life insurance companies. But on the other hand one can point to the possibility of contagion due to common ownership of different insurance firms; contagion from a

failing bank to an insurance company in a conglomerate; counterparty risk in the over-the-counter derivatives market; failure of a reinsurance company that had accepted risks from a large number of other firms; and a weakening of other insurance companies by a company failure that leads to a decline in purchase of insurance products, given the key role played by new inflows and commissions in insurers' profitability.

A third form of market failure may arise when there is a degree of market power. This may be of particular relevance for life companies vis a vis consumers who have saved in a personal pension and are seeking to offer annuities at the time of retirement. The consequence for consumers who are, or consider themselves to be, locked in, is that they may receive worse terms on an annuity that is available in the open market. Also there is a need for more general competition regulation to ensure that prices are not artificially boosted by monopoly. But as discussed in this paper, stringent prudential regulation may also be needed to prevent such competition from becoming destructive (externality case) or leading to abuse of consumers (the information asymmetry case).

Justifications for regulation may also include attempts to overcome problems of adverse selection - a situation common in insurance markets such as for annuities in which a pricing policy induces a low average quality of sellers in a market, while asymmetric information prevents the buyer from distinguishing quality. Basically, the annuity provider may face bad risks, those who know that they will live a longer time than the population average. When it is sufficiently severe, the market may cease to exist. For example, making annuities compulsory should reduce adverse selection in that market. Moral hazard considerations may also enter, in that individuals that are not forced to provide retirement income via annuities purchase could deliberately become destitute and a burden on the state.

Some would argue that annuities should be regulated independently of these standard justifications, notably as a component of the overall pension system, for example to ensure tax benefits are not misused, and that the goals of equity, adequacy and security of retirement income are achieved - correcting the market failures in annuities markets that necessitate pension funds and social security.

One may distinguish a number of aspects of annuities regulation that are covered below. One is the prudential regulation of insurance companies – ensuring insurers have the financial resources to pay all claims as they fall due. The second is their conduct of business regulation – ensuring they treat consumers in an equitable manner. The third is the overall regulation of annuities in the context of the pension system, with the aim that a secure retirement income is available. It will be seen there are overlaps, notably owing to prudential and pension regulations affecting annuity product design. In Sections 4-6, we discuss these aspects in turn. But first we consider whether market discipline could

obviate the need for regulation, or whether incentives generated by market processes rather underpin the case for regulation.

3.2 Market discipline and incentives to risk taking

It was pointed out above that individual consumers are unlikely to have sufficient information to discipline insurance companies by avoiding their products – though insurance companies will still be concerned to maintain reputation. This puts an onus on monitoring by wholesale financial markets for ensuring market discipline.

Disclosure of current balance sheets and profit and loss as well as other material facts affecting life companies are essential if market discipline is to be effective. It hence places a premium on sound accounting and the independence of the actuary, as well as on rating agencies. As noted in Financial Times (2002a), there is a wide diversity in insurance accounting standards internationally, which weaken market discipline by making it difficult to compare performance of companies cross country. Often insurers use book value accounting, there is a problem of “opacity of often subjective actuarial assumptions” and off balance sheet exposures are rarely reported in accounts (IMF 2002c). The IASB is planning to work to a standard, but only by end-2003. Further work will seek to introduce fair value accounting for insurers, valuing all assets and liabilities at current market value. This would imply for example that financial guarantees and onerous options on life policies such as annuity rate guarantees would be valued consistently with traded options in the market.

Credit rating agencies play an important role in informing policyholders and investors about financial risks. Standard and Poor’s assess risk-based capital for insurers based on their own capital adequacy model. Indeed rating agencies are widely seen as private market supervisors (European Commission 2002). Insurance companies may also monitor one another in a free market if they fear loss of reputation for the industry arising from company failure.

One may also consider the differing influence of market discipline depending on instruments outstanding. Market discipline will clearly have an independent effect on insurance companies that have debt outstanding, as risky behaviour will lead to a higher cost of debt via loss of credit rating. In practice insurers are typically not heavily levered, but this is a consideration for counterparties in derivatives transactions such as credit derivatives, which as discussed in Section 7 are becoming increasingly important. Outside equity means that equity holders may exert corporate governance over managers, either directly or via takeovers (Davis 2002d). However, the market discipline exerted via equity is ambiguous, since equity holders lose from bankruptcy, but may gain from a high but volatile rate of profits. There may be a particular danger of risky behaviour where equity values are low. Here

it is useful to recall the contribution of Keeley (1990) to banking theory, which we suggest is applicable to insurance also. He showed that deregulation may lead directly to incentives for risk-taking by financial institutions, even abstracting from the safety net. In a structurally regulated market, e.g. with controls on new entry, where institutions have a degree of market power, the charter is a capital asset. Then banks/insurance companies have incentives not to risk failure by reducing capital or increasing asset risk. Deregulation that facilitates new entry, or that liberalises pricing or mortality assumptions reduces the value of the charter. Risk-taking becomes more attractive, as the potential loss from bankruptcy is lower, and hence a higher mean and variance of profits may be sought. Such incentives will of course be increased by mispriced safety net protection, as for US Savings and Loans institutions (Davis 2001).

Mutual insurance companies, which typically have neither debt nor equity outstanding, have made some of the worst errors in risk control. This points to the importance of management and its own incentives. If they seek to increase market share regardless of rate of return, there may be a particular risk of insolvency. In this context, we shall see in sections below how regulation seeks to enforce prudence, as well as failures of risk control in the case of the mutual insurer Equitable Life and the Japanese life company sector.

4 Prudential regulation

Prudential regulation of insurance companies affecting annuities is directed in particular at regulation of solvency and asset regulation, as well as compensation schemes, and these are the focus of this section. We note that entry regulation is also usually a feature – which in Europe entails acceptance of entry by firms from other EU countries on the basis of home country recognition. This of course entails a need for confidence in foreigner countries' regulatory standards, which is underpinned by the harmonised solvency and asset standards set out in the relevant Directives.

4.1 Reserving and solvency regulation

The key protection for insurance companies against insolvency, and hence protection for annuity holders, is reserving and capital adequacy. The need for such solvency regulation for insurance companies in general is underlined by the argument of Finsinger and Pauly (1984), that given the technical properties of claims that insurers usually face, there are often two possible equilibria, in one of which the insurer will not put up any capital but rely on premium income and investment returns to meet claims. Then the risk of insolvency is very high; the insurer merely declares bankruptcy if claims exceed premium income and asset returns, having invested funds equivalent to capital separately in the securities markets. Following the argument above, this case may be particularly likely if the penalty

from losing reputation or licence is low, i.e. the franchise value of insurance is small due to intense competition and deregulation. Moreover, as noted in Rees et al (1999), if there are restrictions on portfolio composition, making it costly to hold capital in an insurance company as opposed to investing in the open market, the risk that insurers put up no capital in the absence of regulation increases. An argument against is that consumers would rapidly lose any illusion that insolvency is ruled out in an insurance market where zero capital were feasible.

As an introduction to solvency regulation, one may distinguish several parts of an insurance company's asset portfolio (Dickinson 1998a). First, there are assets that are held to cover obligations to policyholders, including annuities, called reserves or assets held against guaranteed liabilities (technical provisions). These are generally purchased with inflows of premium income and are expected to be repaid in the future. Second, there are assets that correspond to the capital funds of the company, in other words the surplus over policyholder liabilities. There are also fixed assets and current assets (forms of trade credit or other receivables). The main focus of solvency regulation is on reserves and investments held against the capital base. Assets held as reserves are or should be constrained by the risk characteristics of the liabilities, derived in turn from the guarantees inherent in the contracts that have been sold. Reserves are also the part of the portfolio which is most commonly subject to investment regulation, discussed in the following section.

Daykin (2002) outlines the main issues in reserving for annuities, using as background the UK regulatory regime – itself conditioned by EU Directives. He points out that there are multiple reasons for reserving, namely ensuring sound and prudent management of the insurer (i.e. internal risk management), ensuring accounts give a true and fair view of the insurance company, providing information to the tax authorities on which profits tax may be based, and for prudential supervisory purposes. There are potential conflicts between these different reasons. While the supervisors would like very conservative approaches to ensure the firm can meet future liabilities, tax authorities would prefer a low level of reserves, so as to maximise the tax “take” on profits. The accounting and internal risk management approaches are intermediate, although generally firms prefer lower reserves than the supervisors, in the interest of profitability. The chosen level of reserves should feed directly to price of policies, given a desired return on capital.

In theory, life business may offer a hedge against mortality vis a vis annuities, since life business becomes more profitable when life expectancy increases². It may be added that the larger the annuities business is relative to the total, the less such hedging is feasible, and the more the insurance companies

² In fact the mortality experience of the two pools are unlikely to be similar, due for example to age specific shocks such as those due to AIDS affecting life policies taken out at a younger age and not annuities taken out at an older age. This limits the scope for hedging by this means.

represent a concentration of risk. Furthermore, any with-profits policies on an insurer's books, where the terminal bonus is provided with discretion, provide an additional buffer. This is, however subject to the right of policyholders to challenge for their "reasonable expectations" to be upheld in court, as witness the Equitable Life case discussed below. Particularly given these caveats, from a prudential point of view, Daykin suggests that the annuities business should be stand-alone and not dependent on other business of the firm. Although hidden reserves or excess profitability in other parts of the business may cover losses on annuities temporarily, they should not be relied upon.

Prudential supervision of reserves requires a focus on prospective liabilities based on existing contracts. The main issues, as for the companies themselves as outlined in Section 2, are the mortality assumptions, the discount rate (based on the investments backing the contract) and future expenses. Mortality is not readily judged by the current mortality of the entire population. Allowance needs to be made for the likely self-selection of annuitants (especially if annuitisation is voluntary, see below), for the likely future improvement in mortality and the fact that those with larger annuities tend to have a higher life expectancy. Using UK data, Daykin (ibid) notes that the current trend is for life expectancy to rise one year every 4-5, and that this would justifiably raise the value of an annuity at age 60 – and hence appropriate reserves - by 10% above that based on current mortality experience, while the annuity-size adjustment may imply a 5% rise in the value. Since annuitisation in the UK is compulsory, the annuitant population is actually close to that of the population as a whole – this is not the case in countries such as the US where annuitisation is voluntary. Further increases in reserves would be justified to allow for prudence.

The rate of interest should be related to the returns on assets to back the annuity, and precisely so if there is matching or immunisation. Reserves can then be calculated on the basis of market value and the interest rate on the annuity taken from their redemption yield. However, the issue is more complex in the case of private bonds, when allowance has to be made for default risk and possible call provisions, and for the case of asset and liability mismatching, due for example to lack of long term government bonds. In the latter case allowance has to be made for reinvestment risk in terms of larger reserves. This may be done by dynamic cash flow modelling, reducing the interest rate on the liabilities or, when equities are used, by stochastic asset and liability modelling. The suggestion in Section 2.3 that mismatching and consequent exposure to default and reinvestment risk is very common in order even to cover costs lends considerable weight to this issue. Meanwhile, even if long-term government bonds exist, UK experience in the 1990s has shown the bond market can be significantly distorted by the demands of insurance companies and pension funds, leading to low annuity rates.

An additional policy implication of this is that if governments wish to reduce the cost of annuities, they may be able to help by issuing long-term bonds allowing insurers to match or immunise. A more radical suggestion (Blake et al 1999) is for governments to issue survivor bonds which would be indexed to the mortality of a cohort, and would thus help insurers to hedge demographic risks.

Expenses need to be allowed for also in reserves, to cover the full expected cost of administering the payments on the annuity. The firm itself would naturally do this on a going-concern basis, whereby new business helps finance overheads, but supervisors typically insist on a closed-fund basis. This assumes no more business is written and that the firm makes a transition from a going concern to a firm that is running off all its accrued liabilities, thus requiring extra margins for reserving, given the lack of inflows from new business.

Besides reserves per se, the firm must also hold capital and surplus assets in sufficient quantities to cover unexpected shocks and thus minimise solvency risk. The process of assessment must be made frequently (dynamic financial analysis) to assess how the firm's position is evolving. Stress testing may be combined with regulation, as well as being an internal risk management tool, to assess how the firm would cope with adverse scenarios affecting the above factors (mortality, interest rates and expenses). For example in the UK, reserves must be sufficient to cover a change in interest rates of 3 percentage points or a 25% fall in equity prices. Immunisation or matching would mean that such tests have no implication, but they will highlight the dangers of a mismatched position. More recently, risk based supervision in the UK has been extended to formally cover a range of risks to insurance companies, namely financial risks (capital adequacy and valuation of assets and liabilities), external environment risks (economic developments) and control risks (how firms organise and manage risks) (FSA 2001).

The EU Life Directives set out a minimum harmonised level of capital for insurance companies. However, as reported in Financial Times (2002a), the formal minimum solvency requirements (e.g. 4% of reserves for annuities) are only part of the solvency margin, with the rest hidden in accounting reserves. There is a great deal of discretion to actuaries of life firms. In times of stress, hidden buffers may be "eaten into or effectively mortgaged by using devices such as reinsurance, that erode solvency in ways invisible to the outside world" (Financial Times (ibid)). Also IMF (2002c) suggests that a weakness of EU solvency regulation is that no account is taken of risk on the asset side but only the volume of business underwritten. In Australia, Canada, Japan and the US regimes include capital charges for risks on the assets side of the balance sheet, although even in those countries there is doubt whether the weights are adequate to reflect risks (see Section 7.4 on Japan).

The EU council of ministers has just adopted two improvements to solvency regulation of insurance companies. Solvency I will give regulators extra powers to intervene when an insurer's financial position is deteriorating, as well as mandating higher capital overall and allowing member states to impose tougher solvency requirements. Solvency II will examine in greater detail the rules on valuing liabilities and the corresponding assets, asset-liability matching, treatment of reinsurance cover and double gearing within financial conglomerates, where life companies and banks in a group hold loans or shares in each other (see also Section 7.4).

4.2 The Equitable Life case

The case of Equitable Life may justifiably be mentioned in this context, resulting as it does from failure of reserving and pricing of annuities. It would appear that the company gave the option of deferred guaranteed annuities (promising a minimum return on retirement) during the period 1957-1988 to a large number of personal pension savers. This was apparently done without extra charge and with no specific reserves held to cover the cost of the guarantees. Over this period the embedded option was never "in the money" since market rates were always above the guaranteed rates. However, in 1993 the market rate fell below the guaranteed rate, and the guarantees began to have an intrinsic value. Other insurance companies having sold such policies dealt with the implicit mortality and interest rate risks in the guarantees in various relatively prudent ways. For example, they reserved for them, reinsured them, bought them out, capped them or put them in an orphan fund to run off. Instead, Equitable sought to manage them by discretion, by paying a smaller final bonus to those with-profits investors who sought to retain their guarantee as compared to those willing to give it up.

Challenged in court, this policy was abandoned, and the company claimed that as a mutual company with no shareholders and a small capital base, its only recourse was to use for reserves the general with-profits fund (including assets held for non guaranteed policyholders) to pay the guarantees. This was feasible because there was no separation between the guaranteed and non-guaranteed policyholders' funds, although the appropriate investment was entirely different – bonds for the former and equities for the latter. Effectively, the burden of the guarantees was transferred to the non-guaranteed policyholders (who were forced to issue implicit interest rate put options), despite the fact many of whom had bought contracts well after the guarantees ceased to be sold. Indeed, Blake (2001) argues that the process of attracting new policyholders after 1988 was akin to a Ponzi scheme, while the closure of the fund to new members in 2001 reduced investment flexibility by making the fund one that is winding up. It can be argued that the non-guaranteed policyholders are suffering from a number of adverse effects resulting from inadequate pricing, reserving, illegitimate combinations of types of liability in the same pool and asymmetric information.

Lessons for regulation are in particular to monitor closely reserving against embedded options in annuity contracts, whether in or out of the money. Separation of guaranteed and non-guaranteed funds may also be required. Similar, albeit broader issues arising from life policies rather than annuities are raised by the insolvency of the bulk of the Japanese life insurance sector (Section 7.4).

4.3 Portfolio regulation of insurance companies

Since the assets held to back the annuities will be subject to portfolio regulation, it is relevant to probe the nature of overall asset regulation faced by life insurers.

Background is provided by the overall business mix of life insurers. Life insurance company liabilities tended historically to be defined in nominal terms, which besides those arising from level annuities as outlined above include term policies (purchased to provide a certain sum in the event of death), and whole-life policies (term policies with a saving element). Guaranteed investment contracts (GICs) - a form of zero coupon bond typically sold to pension funds - are a modern variant. Insurers may also offer nominal, insured defined benefit pension plans. All of these require forms of matching or immunisation with bond finance predominating. As noted above, the introduction of financial derivatives such as swaptions should provide a cheaper way of covering the associated interest rate risks (Blake (1999), Rule (2001)), while insurance companies are also increasingly accepting credit risk per se in search of higher yields.

Life companies nowadays are also offering variable policies such as variable life policies, variable annuities (invested in equities), with-profits endowment and unit (mutual fund) linked life or annuity policies. As noted in Section 2.1, the life policies typically combine a term policy with a saving element aimed at capital appreciation, where for the latter there is no explicit guarantee regarding the rate of return. The annuities may still have a guarantee element overall, as shown in the examples given in Section 2.1, but much of the investment risk is passed to the consumer. Some policies may have option features, with, for example, variable returns but a guaranteed floor (as in Equitable's guaranteed policies). Variable policies may offer higher returns - and also risks - to policyholders, while posing less shortfall risk to the surplus of the life insurer. Unlike traditional policies, variable policies imply active investment in equities, real estate and international investments which may be expected to keep pace with inflation. The related assets may often be held in the form of mutual funds.

A life insurer's overall liabilities will reflect the chosen balance between these different types of policy, which can change over time as insurers choose which markets to serve. The desired asset portfolio will change in a corresponding manner, from mainly bonds for nominal-fixed products

(including level annuities) to a greater share of equities (for variable and unit linked annuity and life products, especially when the element of guarantee is small).

The surplus over guaranteed liabilities is intended to protect the firm against insolvency over time, and to finance future growth. Not held explicitly to back liabilities, it is likely to be aggressively invested for return to shareholders and development of reserves. The size of the surplus has an independent effect on investment from the nature of liabilities. This is because its size will affect the prudent degree of investment risk, i.e. the appropriate degree of mismatching of the embedded risks of liabilities and the assets held to cover them (Dickinson 1998b). In order to protect insurance firms from insolvency in the shorter term, supervisory rules typically impose stricter regulations on reserve assets backing technical provisions (i.e. guaranteed liabilities) than for the surplus (Dickinson 1998a). For example, a number of asset types are often forbidden to be held against technical provisions, but these restrictions typically do not apply to the surplus. This is also the case for the quantitative restrictions on asset holdings. Hence, the assets backing technical provisions are more likely to be invested in bonds, with only the surplus including a share of equities.

On the other hand, the size of the surplus is itself affected by the degree of conservatism of the regulatory and accounting framework. For example, surplus calculations are affected by valuation methods (e.g. whether assets are valued at market value or book value) and discount rates used to calculate the present value of future liabilities. Undervaluation of the capital base may significantly increase the leverage of investment restrictions. Life company sectors having low discount rates and book value accounting for the assets tend to have smaller surpluses and correspondingly lower allocations to equities than those with high discount rates and market value accounting. The German case used³ to be an extreme, with “lower of cost and market” accounting leading to aversion to equities well beyond limits imposed by portfolio restrictions.

The choice in regulation of insurance (and pension fund) asset portfolios is between prudent person rules and quantitative asset restrictions (Davis 2002a). A quantitative asset regulation is simply a quantitative limit on the portfolio share of a given asset class. Typically, those instruments whose holding is limited are those with high price volatility and/or low liquidity. Meanwhile, a prudent person rule stipulates that investments should be made in such a way that they are considered to be handled “prudently” (as someone would do in the conduct of his or her own affairs). The aim is to ensure adequate diversification, thus protecting the beneficiaries against insolvency of the sponsor and investment risks. Evaluation of the risk management as well as reserving of the insurance company are essential aspects of this approach.

³ This system was abolished after the potential impact of the 11/9/01 attacks on New York led to asset price shifts entailing potential insolvency of insurers and pension funds.

Compared to pension funds, the case in favour of quantitative portfolio restrictions may be quite strong for life insurance companies which have nominally-fixed liabilities such as level annuities (Davis *ibid*). For such institutions, matching with assets of similar duration may indeed be a desirable portfolio strategy. Hence, portfolio regulations (which usually do not restrict bond holdings) may not strongly distort free-market portfolios. On the other hand, as argued by Dickinson (1998a), restrictions may make it more difficult to cope with some of the underlying risks of traditional life insurance business, notably interest rate risk on annuities and term policies, arising from the implicit interest rate guarantee implicit in the price of the contract. He suggests that this can only be evaluated in the context of the asset and liability composition (immunisation characteristics) of the whole portfolio and not asset-by-asset. If there are strict investment restrictions, combined with restrictions on minimum premia, these may also give rise to economic inefficiency, as resulting low competition perpetuates a fringe of high cost firms (Rees and Kessner 1999). It is notable that the German annuity market is still less concentrated than other EU markets (Cardinale et al 2002), suggesting this critique still holds.

More generally, a competitive insurance market will involve firms seeking to earn higher rates of return on their financial assets in order to develop new products and compete with alternatives. They may then seek to have a wider and more flexible choice of financial assets than regulations may allow, including taking advantage of the risk diversification offered by international investment. Even traditional liquidity and interest rate risks can be handled at lower cost by use of derivatives. It can be argued that prudent person based diversification plus solvency rules⁴, as well as comprehensive conduct of business rules to protect consumers are sufficient protection for policy holders without the overlay of asset restrictions. This will be so especially if the restrictions are imposed on an annual basis.

This may be a particularly relevant argument for long-term policies, including annuities to some extent, where any mismatched position can be corrected well before liabilities are due, and where appropriate asset-liability management techniques are undertaken. Strict portfolio regulations could limit scope for innovative product design. It applies even more strongly for the surplus over and above the level of technical provisions (EU rules only apply to reserves). Furthermore, assets corresponding to non-guaranteed liabilities (such as the bulk of variable or unit linked policies, which may include annuities as well as life policies) are subject to inflation risk, as policyholders will anticipate a positive real rate of return on the policy. Such risks are minimised by investment in assets with real returns (indexed bonds, or in their absence international equities and real estate), which are often restricted by regulations.

⁴ Where the latter may include suitable stress tests, conservative valuation methods and/or risk based capital requirements.

If long-term rates fall sharply and the regulations enforce holdings of bonds, while maturities are relatively short, then the regulations can pose a danger to insurance companies. This appears to be the case in Japan, where guaranteed rates tended in the 1990s to exceed actual rates, leading initially to insurers cashing in gains on securities, but later to actual solvency problems (Section 7.4).

As regards experience, the portfolio regulations of life insurance sectors are summarised in Table 2 (source: Davis 2002a). The bulk of life insurance sectors, notably in Europe have quantitative restrictions, drawing on EU rules set out in the relevant Directives, with the UK being the clearest exception. Davis (*ibid*) shows that the restrictions come at a cost in terms of average real or nominal returns on the asset portfolio (around 100 basis points), see Table 3, and although risk as measured conventionally with the nominal standard deviation is reduced, this is not the case for the standard deviation of real returns, which is identical for both kinds of regulation. The superiority of prudent person rules for investment-linked products is underlined.

4.4 Insurance and compensation schemes

Within the insurance industry, the process of reinsurance helps to spread risk across a variety of insurance companies, both at a national and global level. Nevertheless, the possibility of insolvency of insurance companies leads to the issue of whether some form of a compensation fund for their claims is also appropriate. Many countries have set up mutual arrangements whereby insurance companies policies may be honoured even when they become insolvent.

The danger is that such a fund may lead to moral hazard and excessive risk taking by firms, as is the case for the “safety net” in banking (Davis 1995). Such an effect is intensified by a weakening of consumer discipline, in that a compensation fund would reduce the incentive for the public to deal only with strong and well-managed companies.

Firm prudential supervision as well as market discipline (notably insurers monitoring each other in their own interests) is needed to prevent this taking place. Managers and equity holders must lose their jobs and stakes in the case of insolvency, while consumers may be given less than their guaranteed returns to ensure market discipline operates to the extent possible.

5 Conduct of business regulation

We now turn to conduct of business regulation. In this section, we shall focus mainly on information aspects and the design of products, We note however that conduct of business links to other aspects, to the extent that regulators insist insurance products should have standard specification of “fine print”,

and also regulate, inter alia, use of language, grievance redressal, dispute resolution and licensing of intermediaries.

5.1 Information provision to consumers

At retirement with a defined contribution pension, the individual is faced with a plethora of choices, which will have an important influence on retirement income. Taking the example of what is feasible in the UK, first, the duration or term of the annuity must be selected. The highest income comes with 'single life' annuities, which cease to be paid at the time of death. But some protection against the risk of early death (offset by a lower annuity) may be obtained by a 'joint life' annuity, paid till both holder and spouse die, or a temporary annuity which lasts for a fixed period whether the individual dies or not. 'Capital protection' may allow for return of outstanding funds when the annuitant dies.

Second, the type of annuity must be selected. In the UK, options besides a 'level annuity' are 'index linked' where the income rises with inflation; 'with profits' where income grows in line with an assumed annual bonus rate, 'unit linked' which fluctuates in line with unit prices; and an 'escalating annuity' which rises at a fixed rate. Note that the actual return on a level annuity itself depends on the current yield on government bonds, less any charges the insurance company levies and the costs of any of the variants outlined above.

Of course, besides cost, the risks of the various annuities differ; inflation is the main difficulty in the case of level annuities and market crashes for unit-linked and with-profits annuities. These may be hedged by a combination of annuities. It is also possible to stagger purchase over time, so that the pension fund is converted to annuities in stages. This reduces the "timing" risk of retiring when annuity rates are low, owing to low yields on government bonds. It may also maximise the remaining assets, which stay in the pension trust. But there is an offset in terms of higher loadings for mortality improvements, the longer purchase is delayed. The third choice is frequency and timing of annual payments. The less frequent and later the payment, the higher the annuity. There is also the question whether individuals are able to assess in any way the solvency of a life company. In principle, access to credit ratings may help with such understanding, but in practice the degree of understanding of such information is likely to be low.

In this context, FSA (2002) comment that consumer understanding of annuities is very low and people do not fully understand the risks of the decisions they are taking. In the UK, there is an open market option to buy an annuity from a different provider, but not many individuals are aware of it, although shopping around could gain a 35% increase in income. Second, there is money illusion with falls in rates due to lower inflation seen as a fall in the value of annuities, whereas if it reflects lower inflation

the value is less likely to be eroded, while increases in longevity have to be balanced by lower annuity rates also. Often individuals delay purchase of an annuity, although such a strategy is vulnerable to “mortality drag” where lower mortality at a later date implies lower annuity rates, as well as high commission rates. Finally, very few individuals were buying impaired life annuities, which could offer a higher income, although 40% were eligible (due to health conditions, smoking history etc.).

In response to these concerns, the FSA is introducing consumer advice literature and also obliging firms selling annuities to inform consumers of their open market rights. Stringent qualifications are required of salesmen, in the light of earlier mis-selling scandals in the personal pensions field. Best advice must be offered for the circumstances of the individual and cooling off periods. Only specially trained individuals may conduct such analysis; and all such advice must be double checked within the insurance company. Equally, the government has imposed increasingly tough disclosure rules for commissions. Since 1990 providers have had to declare commissions earned by salespeople, as a proportion of contributions. Since 1995 commissions have had to be declared in cash terms. Also affecting UK advice is the current controversy over with-profits life insurance policies, a variant of which is available in annuitised form. Following Equitable Life and poor returns on such policies sold to back house purchase loans, they are widely criticised for lack of transparency and exposing investors to unanticipated risks. Accordingly, a severe tightening of the regulatory regime is underway.

As noted by Cardinale et al (2002), the regulatory regime is so severe that many annuities are sold execution-only with individuals receiving little or no financial advice. Given the tough regime and low commissions arising from the small size of maturing personal pensions, the level of interest among advisers in getting such business is low. Again this helps to explain why most individuals take annuities from their pension saving provider. And a larger proportion of these go for level annuities (90% compared to 80% who buy in the open market), which may not as noted be the best option.

The open market option is not present in some other markets. In Swiss occupational pension funds, the annuity is generally provided by an insurance company chosen by the pension fund or employer. And more generally, the practice of group annuities purchased by a firm entails a lack of choice by definition. Whereas there are clear dangers that a monopoly provider will give poor terms, in fact analysis (James and Song 2002) suggests that group annuities are superior in terms of money’s worth to individual ones, with the benefit of risk pooling and reduced adverse selection, as well as lower administrative and marketing costs to the insurance company more than offsetting any potential for higher monopoly profits and lower consumer choice. It is suggested that very low average commission on annuities in the UK stems from the weight of group annuities. It may be added that corporate firms

seeking providers of group annuities on behalf of their workers may have superior information and bargaining power to an individual.

5.2 Product and product-design regulation

The basic choice in terms of regulation of product design is between strict controls of products, maintaining a standard design and even pricing by regulation, and allowing innovation freely as long as consumers are provided with appropriate information. This is not however, solely an issue for regulators. Tax authorities are typically vigilant in limiting the range of annuity products to ensure tax benefits to retirement income accumulation are actually used for that purpose. In the UK for example, the criterion is that the income provided should be regular, stable and throughout life. We may add that although this section is grouped as a regulation of insurance company conduct of business, aspects of prudential regulation (Section 4) and pension system regulation (Section 6) are also present under this heading. Moreover, idiosyncratic control of product design can be an important barrier to entry preventing cross border competition in the EU.

At one extreme, in Germany until recently only products approved by the regulator could be sold and prices were strictly regulated (Rees and Kessner 1999). There remains a degree of regulatory control over product design, with little variety and controls imposed on profit sharing. In countries such as the US and France, firms are free to design innovative products for voluntary annuity purchasers, although as noted below prices are not entirely free.

Pricing regulations apply in a number of EU countries, where annuities are priced according to supervisory guidelines on a “technical rate basis”, with the guaranteed rate being equal to only 60% of the government bond yield and changed infrequently (Blake and Hudson 2000); any excess over this is paid in the form of a revaluation of the initial annuity. This is the case for example in Belgium, France, Germany and Italy, while in France there is also a separate ceiling of 3.5% (Cardinale et al 2002). The Netherlands permit insurers to offer higher guaranteed rates for 15 years, before reverting to the guaranteed rate. Besides “consumer protection”, this system provides a prudential safety margin, arguably at a cost in terms of lower incentives to maximise returns. Competition may be limited to second order aspects such as expenses – as well as bonus record. On the other hand, if rates change markedly and the administered rate is fixed, there can be solvency risks for firms, as is the case in Japan (Section 7.4).

Regulation of prices may also arise for pure consumer protection reasons. It can be argued that ceilings prevent exploitation of uninformed consumers. For example, in the US, the assumed interest rate on variable annuities is not permitted to be over 5% per year, thus seeking to limit aggressive

sales tactics by salesmen promising high returns. This in itself tends to limit the size of the market, since consumers typically consider such returns to be inadequate. More generally according to Mathur (2001) US state laws typically require that “policy benefits are commensurate with premiums charged”.

The advantages of a liberal approach to design and pricing are clear in a system of voluntary annuitisation, as there is a need to attract savers who would otherwise choose uninsured products, by offering appropriate income streams. Where annuitisation is compulsory, the case for free pricing remains clear, while the case for a liberal approach to design is more balanced. Plain vanilla products allow readier comparison of prices across providers and may thus help to stimulate price competition that benefits consumers, where this is permitted. Competition is for example intense in the UK where most annuities are level annuities, even though the market is dominated by 5 firms (Cardinale et al 2002). More complex products may facilitate price dispersion, and indeed James and Song (2002) note that dispersion is high in the US, where there are few regulations on product design.

Marketing expenses are also boosted by a wider range of products, as witness distribution costs in the US of around 5-6% of the initial premium compared with a reported 4% in Singapore, where products are standardised, and only 1%-1.5% in the UK, where there is a sizeable mandatory sector but the product range is limited and as noted above, a strong role for group annuities.

More generally, there is a close relation between restrictions and the mandating of annuities, discussed further below, which directly limits the freedom to sell differentiated products. As noted by James and Song (2002), governments often place restrictions on the type and price of annuities in mandatory systems. For example, in Switzerland, the pension at retirement is annuitised in a form and price closely regulated by the government, with the government insisting on joint annuities. Whereas this reduces the initial payment relative to an individual annuity, it does help to prevent old age poverty among dependent spouses. The Swiss also impose an actuarial factor to be used in transforming savings into such a joint annuity, namely 7.2%⁵. This is actually 20% higher than average rates available in the voluntary market. But it also prevents provision of new types of products.

As noted, tax authorities may also play a role in limiting product design. In the UK, Wadsworth et al (2001) note that the Inland Revenue is likely to oppose new products if it appears that the aim of the product is to provide ‘excessive income’ in the early years or to find a way of preserving the member’s capital on death to an extent greater than is allowed for in the income protection permitted by legislation.

⁵ The rate is set to be reduced to 6.8% shortly, owing to lower yields and higher longevity.

Mandatory use of certain mortality tables is another aspect of regulation affecting annuity products. Unisex tables of mortality are commonly mandated to prevent low income among older women retirees. In the UK, unisex mortality tables using a mixture of male and female rates are mandated, while in the US tax rules require that unisex tables be used in the taxable part of the benefit. As noted by Mitchell (2002) this implies governments are introducing cross subsidisation, but may also reduce the amount of adverse selection, which would otherwise lead mortality pools to be increasingly female.

James and Vittas (1999) note that in many countries, detailed mortality tables by cohort are not available, and reliance is placed on those from other countries, such as the UK, arbitrarily adjusted (e.g. Australia and Portugal). The US by contrast has a wide range of estimates that could be abused for competitive purposes by insurance companies. In many Continental countries such as Belgium, risk is limited by the government mandating mortality tables, although this could leave the government implicitly responsible for the errors in longevity projections. In Switzerland it is the industry association that mandates (till recently) the common mortality table, thus reducing this risk.

In Sweden, the defined contribution pensions derived from social security contributions will be provided by the government itself, which will also index the pensions to mortality trends. While the government is more financially sound than insurance companies, it is, as pointed out by James and Song (2002) not able to access the risk shifting and risk reducing methods of insurance companies that may make annuities more costly.

We now turn to considerations relating to the regulation of annuities in the context of pension systems.

6 Annuities regulation within the pension system

6.1 Compulsion in annuities purchase

Whether to encourage annuities or lump sum withdrawals is a key issues. Lump sums are less desirable for a number of reasons, such as the fact they may be dissipated and not used for pensions, thus imposing a burden on the state (a form of moral hazard); they have an adverse effect on the cost of annuities, as those buying annuities will be assumed to be bad risks; and they undercut protection for survivors. Individual may well be myopic about their prospective life expectancy, which justifies mandating annuities. On the other hand, compulsory annuity purchase on the day of retirement for defined contribution funds exposes the retiree to market timing risk. Such risks can be reduced by allowing staggered purchase, variable annuities or defined benefit pensions.

In general, practice in countries that tax-exempt pension savings is to severely restrict lump sums. Lunnon (2002) notes that of a range of countries, annuities are compulsory for all of defined contribution funds in Austria, Brazil, France, Germany, the Netherlands and Sweden, while a mix of annuity and lump sum is permitted in Canada, Denmark, Ireland, Israel, Italy, Norway, Portugal, South Africa, Spain, Switzerland and the UK. Only in Australia, Belgium and the US among countries which tax-exempt contributions and interest income are payouts mainly or entirely lump sum. In contrast, countries where pensions are accumulated from taxed income such as Hong Kong, Israel and New Zealand rely mainly on tax-free lump sums. See Table 4, derived from Yermo (2001) for a summary of practice in selected OECD countries.

Related to compulsion is the issue of controls over the way in which funds that are not available as a lump sum may be released. Lunnon (2002) suggests that there are several criteria for judging systems of release, namely whether they ensure pensioners have a secure income; whether they ensure money saved for retirement is actually used for it; the extent to which such controls inhibit asset allocation; and administrative ease. The conventional level annuity scores well on all these criteria except possibly asset allocation. But even in this case, pensioners would be likely to invest cautiously even if free to do so. Alternatives such as investment linked annuities and “pseudo annuities” (where investment risk is held by the pensioner, and there is only partial insurance of mortality risk) score less comprehensively in terms of income security, administrative complexity, while allowing more freedom in asset allocation.

This is even more the case for pure income drawdown, even if there are controls based on age or interest rates or both (as in Chile). These do not offer protection either against fund depletion or overfunding by wealthy individuals. Some combinations can be envisaged. These include a requirement to secure a minimum income with an annuity, while allowing income drawdown on the rest; income drawdown with the requirement to annuities if the fund falls below a given level, or requirement to annuitise before a certain age, with a possibility of drawdown before that age (the current UK approach). But again these score poorly on the criteria relative to complete annuitisation. Similar conclusions are reached by Doyle and Piggott (2000), after more systematic calculations. See also Blake and Hudson (2000) and Wadsworth et al (2001) for an assessment of issues in the UK.

In practice, as pointed out by James and Song (2002), when there is free choice between these options, people frequently prioritise investment choice over longevity assurance (usually involving scheduled withdrawals - or lump sums). This is the case, for example, in the US, Canada and Australia, as well as many EU countries. Underlying factors may be the high level of annuitisation provided by social security and defined benefit funds, underestimation of life expectancy based on current experience,

bequest motives (Bernheim 1991), and confidence in families substituting for annuities. Tax may also play a role (Section 6.4). Also there may be a desire for a higher rate of return than the risk free rate, due to liquidity constraints or the rest of the wealth portfolio, which leads to application of a discount rate to annuities in excess of the risk free rate. To the extent these issues are incorrectly perceived, a role for consumer education is indicated.

6.2 Inflation indexation

Defined contribution funds have inherent problems with indexation, as indexed annuities are not available in many countries, partly due to lack of indexed instruments, or are priced prohibitively. Where indexation of annuities is optional, it is common for retirees to avoid it. This is risky in the sense that even low inflation of 2.5% could erode the value of a level annuity by more than half over a 30-year retirement, thus contributing to financial difficulties. Individuals may commonly underestimate their life expectancy, enhancing this bias. In principle real values of indexed and conventional annuities should be identical, as long as there is no unanticipated inflation (or unanticipated increase in longevity). It is the time path of real income flows that differs.

The UK is one exception in that indexation is mandated for part of a personal pension. Social security regulations require the division of such personal pensions into two parts, first the national insurance rebate which is used to buy a so-called "protected rights pension" equivalent to the state second pension, and the remainder, the so-called "personal fund" including employees' and employers' contributions. Regulations state that the protected rights pension has to be uprated by Limited Price Indexation (i.e. inflation capped at 5%) and is taken at state retirement age at the earliest (60 for women, 65 for men). The disposition of the remainder is more flexible in terms of timing and type of annuity; 25% of the value of the fund at retirement (excluding the protected rights) can be obtained as a tax-free lump sum.

6.3 Timing of annuitisation

Market timing risk is commonly viewed as applying to the purchase of an annuity with an entire pension fund at a given point in time, when market conditions may be adverse. In the UK, annuities may be purchased at the date of retirement but may also be delayed until the age of 75. Income drawdown is also permitted, at a rate equivalent to that of a corresponding annuity or less, since the government changed the rules in 1995 in response to a fall in annuity rates. (In Ireland the liberalisation in 1999 went further, shifting from compulsory annuitisation to no requirement at all other than income drawdown.)

The UK rule is widely considered to reduce the timing risk of purchasing annuities on the date of retirement, when the market conditions may be adverse. On the other hand, as pointed out by Valdes-Prieto (1998), the risk actually arises from a change in the allocation of the portfolio. If the retiree had already switched to bonds prior to retirement, as recommended by so-called lifestyle investment, the risk would not arise.

6.4 Taxation of annuities

Rather than being viewed in isolation, the taxation of income annuities is an integral part of overall pension taxation, which we summarise briefly here. (For a comprehensive analysis of the economics of pension fund taxation, see Dilnot and Johnson (1993).) The basic choice in taxation of savings such as pensions, assuming there is not to be double taxation of contributions and pensions, is between a regime where asset returns are tax-free (expenditure tax treatment) and where they are taxed (comprehensive income tax treatment).

The choice between income and expenditure taxes rests on contrasting views of the appropriate form of neutrality to aim for. Is it neutrality between consumption and saving (implying returns are taxed) or between consumption at different points in time (in which case they are tax free)? On balance, the former seems more objectionable, since saving is not a commodity like any other, but an intermediate good, which is carried out as a means to future consumption. So an expenditure tax treatment, which taxes consumption at the same rate at all times and does not distort the equality between pre and post tax returns, seems more appropriate.

The other key issue in pension taxation is whether to treat pensions more favourably, thus leading to greater flows of saving being directed through this channel. Under a pure expenditure tax treatment of saving, all forms of saving would be equally tax advantaged. In OECD countries, reasons for taxing pensions relatively leniently are, first, the need to assist people to save enough to maintain post retirement living standards; second, a desire to encourage people to save and thus cut the cost to the state of means-tested social security benefits; and third, that annuitised pension funds are in some way superior to other types of financial institution. The first is the most important, and is largely paternalistic; it suggests the government knows best and accordingly should distort choices to ensure adequate retirement saving. The argument suggests that people are generally myopic and do not foresee their needs in old age, and/or that there is a form of moral hazard, in that they assume they will be cared for by the state even if they do not save. Moreover, a tax system based on income taxation makes postponement of consumption expensive, as noted above, and thus promotes inadequate retirement saving. The argument of encouraging saving and thus reducing social security is applicable where opting out of part of social security is possible, as in the UK and Japan.

A subsidiary argument in this context focuses on the different characteristics of different types of saving. Forms of saving other than pensions may be decumulated at will, or used as security for a loan⁶, whereas in the UK (and for defined benefit funds elsewhere) pension funds are unique in being contractual annuities. Thus they are on the one hand most appropriate for retirement income provision, but on the other hand are a priori less attractive to individuals. They may thus need some privileges to appear equally attractive, in the interests of ensuring that saving for retirement is adequate and not dissipated. The tax privilege underpins the need for compulsory annuities so that pension assets are not used for other purposes, as well as to ensure wealthy people do not take undue advantage of pension saving privileges. Accordingly, in expenditure tax systems where contributions as well as asset returns are tax free (EET), the income from the annuity is taxed as current income (and annuitisation is usually compulsory), while in expenditure tax systems where contributions are from taxed income (TEE), the income from the annuity is exempt (and lump sums are usually permitted).

Corresponding to this argument, the taxation of annuities may often lead to them being avoided if they are not compulsory, as is for example the case in Belgium, where taxes on lump sums are lower (Cardinale et al 2002), and also in France where the tax treatment is identical to lump sums. Differential tax treatment of annuities is an important aspect of market fragmentation, for example in the EU, limiting or preventing cross border sales of annuities products.

7 Longer term risks

We noted in Section 2 above that there may be errors in risk management by insurance companies in a free market, and this underlines the need for regulation. There may be errors in mortality assumptions and competitive conditions leading to inadequate premia being charged, as well as risks incurred on the asset side. History, particularly of banking, suggests that “company-by-company” regulation alone may not be sufficient to prevent such errors. This is the case even though externalities among insurers are less than for banking. It is suggested that regulators need to be sufficiently aware of incentives faced in companies, monitor the market structure and competition and take a long-term view of potential risks.

7.1 Current issues

As pointed out by the UK insurance regulator FSA (2002), one of the key risks for annuities for insurance companies is that owing to market-share competition or simple errors, they underestimate the average age to which people live. This could in turn lead to insolvency of an insurance company heavily reliant on annuities. Indeed, Blake (1999) suggests that UK insurance companies have already

⁶ In practice, personal pensions in countries such as the UK - but not occupational pensions - may also be used as security for a loan or mortgage.

underestimated life expectancy of their annuitants by 2 years or more, which could lead to major losses. Similar losses were made by US firms in the 1930s (Poterba 1997). Whereas well-capitalised life insurers could charge such losses to shareholders, the Equitable Life case shows grounds for caution for mutuals when capital is low and liabilities are underestimated. Blake (1999) adds that uncertainty about mortality in the future makes the deferred annuities market very thin, despite the fact that such products limit adverse selection compared to immediate annuities. There are clearly great difficulties in forecasting mortality, especially given the possibility of cures for cancer and heart disease in coming years.

Section 2.4 highlighted the fact that risks linking annuities and insurance companies may be aggravated by taking on of increased credit risk, if it is not properly priced and reserved for. A number of credit risk concerns are emerging for life insurance companies at the time of writing. In particular, defaults on corporate bonds are expected to impact on insurance companies that have sought low-rated high-yield bonds in the search for sufficient return (Financial Times 2002b). Background to this includes increased competition, lower inflation reducing market yields and the current shortage of government bonds. There remain questions whether insurers' credit risk assessment is adequate, with simple reliance being placed on fallible credit ratings (IMF 2002c) or inappropriate application of actuarial approaches to volatile credit risks.

Furthermore, credit risk has been transferred from banks to insurance companies via securitised claims (such as collateralised debt obligations) and credit derivatives at an unprecedented rate (Bank of England (2001)). Such a process is widely seen as driven by regulatory arbitrage, whereby insurance companies are seen as less regulated than banks and so are willing to hold credit risk at prices banks cannot afford (IMF (2002a)). Such a situation where banks transfer credit risk to insurers may leave the banks also vulnerable if the insurers fail, i.e. they enhance systemic risks arising from insurance company failure (Financial Stability Forum 2000).

7.2 Financial instability and competition among financial institutions

In this context, it is helpful to outline three approaches to the theory of financial instability, originally devised to address banking competition, that we maintain may be relevant to market dynamics of annuities and insurance notably where price competition is liberalised and franchise values of insurers are low (for a more comprehensive survey see Davis (1999)). Given the duration of many life products, the phenomena noted may have more profound consequences than the classic "insurance cycle" of property and casualty insurance premia.

First, there is the issue of uncertainty (Shafer (1986)). Following Knight (1921), uncertainty is defined as pertaining to future developments that cannot be reduced to objective probabilities (e.g. financial crises – or changes in longevity), and also providing opportunities for profit in competitive markets. It thus contrasts with risk, which refers to events for which in principle probability analysis can be employed. Behaviour of markets for new financial instruments, such as new types of annuities or forms of credit risk transfer, which have not yet been present in adverse market conditions, may be particularly subject to uncertainty in this sense. Systemic crises relating to insurance in Korea and Jamaica have related to losses on the innovation for insurance companies of offering deposit like instruments (IMF 2001).

Responses to uncertainty, for example by insurance underwriters, may be to apply subjective probabilities to uncertain events – (such as the enhanced credit risk, interest rate risk and mortality trends in the light of medical advances) - and add a risk premium. But agents often tend to judge such probabilities by the actions of others ('herding'⁷), which can collectively lead to errors affecting the entire industry. (One feature of herding is that individually low-risk strategies may collectively raise system fragility.)

Developing this point further, Guttentag and Herring (1984) note that bankers are prone to disregard low frequency, high impact risks. Again this may be applicable to insurance companies. Their example distinguishes between systematic market risks, such as recession and financial crises, - which are subject to much greater uncertainty. In the case of recession, it is suggested that *ex ante* risk pricing is generally accurate as such events occur frequently and are generally well understood. But for financial crises and other uncertain events, there is no such presumption; competition may drive prudent creditors from the market, as they are undercut by those disregarding the likelihood of financial crisis, because of ignorance or hope of competitive advantage.

In addition to competition, various psychological factors underlying this pattern of 'disaster myopia'⁸ may be identified, notably a tendency to calculate probabilities by how easily past occurrences are brought to mind, which declines with time, as well as institutional factors such as short periods over which loan officers are assessed, and asymmetry of outcomes for managers and shareholders. These tendencies, which imply declining expectations of financial crises during periods of calm, may lead to declining capital positions, loosening of "equilibrium" price and quantity rationing of credit, and hence increased vulnerability of creditors to shocks, since the actual probability distribution of shocks has not changed. Expectations and reality may thus drift apart during a period of calm, until a financial shock leads to an abrupt increase in credit rationing, as lenders become aware of their imprudence

⁷ 'Herding' may be defined as willingness of financial institutions to imitate each other's portfolios and pricing strategies, even if this is contrary to long-run profit maximisation.

⁸ 'Disaster myopia' may be defined as a tendency to disregard uncertain, low-probability, high-risk hazards.

triggering a crisis. There is an obvious extension of this point to annuities pricing and in particular long-term shocks to mortality, as well as possible market crashes and their impact on the asset portfolio, sharp increases in credit risk, and permanently lower interest rates affecting guaranteed annuity rates. There is also an extension to the behaviour of regulators, who often have accepted conventional market judgements, when those proved to be over optimistic in retrospect.

Third, Davis (1995) notes financial crises have frequently followed changes in market structure and suggests that changes in entry conditions in financial markets can provide a supplementary set of underlying factors and transmission mechanisms for excessive risk taking and subsequent financial instability. Again we consider it applicable to insurance companies selling annuities. Note that EMU, following on from the Single Market, generates considerable scope for changes in market structure in insurance, with in particular formerly oligopolistic markets being subject to new entry either directly or cross-border, albeit subject to fiscal and regulatory barriers. Indeed, as shown in Mathur (2001), even the US has a fairly concentrated market for life products, with 41% provided by the top 15 firms, a figure Europe may well fall short of.

Easing of entry barriers may be caused by deregulation (such as the Single Market), technical progress (such as innovative product design) or market developments reducing the comparative advantage of incumbents over new entrants (such as loss of reputation due to misselling). Note that such a framework does not require actual new entry – rather, the key is that the sunk (irrecoverable) costs of market entry should decline. This may be reflected in more competitive behaviour by incumbents, in order to protect themselves from the threat of entry. It is commonly observed that such changes in entry barriers typically do not merely entail reductions in profits and/or smooth elimination of excess capacity, but rather that reductions in risk pricing go beyond the equilibrium level, (i.e. the level at which intermediaries can make normal profits in the long term), leaving the institutions involved vulnerable to financial instability.

It is argued that the following mechanisms *inter alia*, may play a role. First, if new entrants to financial markets can induce clients to switch away from established relationships, information-based linkages will be weakened and existing information devalued. For example adverse selection of annuitants could increase. Second, uncertainty may be increased by new entry. Incumbents may be unable accurately to predict the responses of new entrants to changing conditions, and their existing knowledge of market dynamics will be rendered less useful. Entrants, inexperienced in the market, will face even greater uncertainty. Unaware of the dynamics of supply and demand in the market, they may be prone to herd-like behaviour. Third, as above, competition may cause firms to make inadequate provision for uncertain events such as sharp falls in mortality, because firms that make adequate provision are undercut by those disregarding such possibilities for reasons of ignorance or competitive advantage. New entrants may be particularly prone to such undercutting. Sufficiently

short time-horizons may even make firms disregard standard risks such as those on reinvestment in their risk appraisals, and so again, via the process of competition, help to reduce the prudential standards for the whole market. Hit-and-run entry as predicted by the theory of contestable markets must by its nature have a short-time horizon.⁹ Finally, competition for market share, as stressed by managerial theories of the firm - an approach frequently adopted by entrants, or in new and developing markets - may lead to cumulative reductions in market prices until it is checked by losses for participants, and withdrawal or retrenchment. Such competition may persist if participants can cross subsidise their operations from others making excess profits (i.e. there is a market failure elsewhere) and they are relatively immune to take-overs, as is the case for mutuals.

7.3 Ageing of the population, insurance and annuities

Further perspectives on risks are provided by the consequences of population ageing. As discussed in Davis (2002b), the prognosis among forecasters is for a major build-up of aggregate retirement funds in OECD countries owing to saving by workers in the large “baby boom” prime saving cohort up to around 2010, followed by decumulation, including a switch from pension funds to annuities.

As regards the build-up phase, Davis (*ibid*) points out that even if funds are invested in life insurance companies, avoidance of systemic risk is not guaranteed. Owing to the nature of their liabilities, as well as regulations (Section 4.2), life insurers tend to invest heavily in domestic bonds. As noted, a shortage of government bonds that may continue for some time ahead, as well as competition in asset management driving life insurers to increase returns, is already prompting more investment in higher risk assets such as high-yield bonds and low-rated securitised loans. Besides their general effect on credit expansion, which could generate fragility in the non-financial sectors, such funds may feed a property boom, leaving the insurers as well as banks vulnerable to a downturn in the property cycle, as was the case in the Jamaican insurance crisis of 1996 (IMF 2001). Following Allen and Gale (1999, 2000), if insurers become significantly involved in property investment and related credit finance, the massive inflows to pension funds as well as insurance companies could generate expectations of ongoing boosts to credit flows into property. There may also be increasing uncertainty about future such flows as ageing progresses. These in the past have tended to foreshadow asset bubbles generated

⁹ Besides the features outlined above, which are of particular importance in financial markets, there are several more general features of competitive processes may cause overshooting of competitive equilibrium. Firms earning normal profits on their existing products may all be simultaneously attracted to situations offering potential for growth, but individual firms are unable to predict in advance whether rivals will follow. Such tendencies will be particularly marked if there is no clear ordering of firms in terms of likelihood of success. Once investments are sunk, entry decisions may be difficult to reverse. Moreover, if there are sunk costs, firms may find it optimal to stay in the market for some time even if they make losses, as they will lose sunk costs of reputation etc. if they leave. During this period, they may be vulnerable to adverse conditions in financial markets.

by such credit flows. Externalities in property lending are significant, owing to the effect of new construction on the profitability of contiguous buildings.

When insurance companies focus increasingly on debt claims as members approach retirement, competition may lead insurance companies and their investment managers again to be willing to take heightened credit risks in order to maximise their return on assets (Bishop (1998), Allen and Gale (1999)). This suggests again that insurers could increasingly invest in high yield bonds and EME sovereign and corporate debt, and thus be vulnerable to credit risk to a greater extent than was the case in the past. Credit cycles could, in other words, affect them as well as banks. Solvency could be threatened directly for life insurance companies if a significant proportion of their assets defaulted.

A further key issue is whether asset prices will also be put under general downward pressure in coming decades by declining saving in OECD countries implicitly affecting the real interest rate or the risk premium. Schieber and Shoven (1994) note that given the correlation of ageing in OECD countries, and the likely decumulation of defined benefit pension fund assets, there could be widespread falls in asset prices, linked to high real interest rates. Supporting this, Erb et al (1997) find a positive correlation in the US between the fraction of the population 25-45 and 65+ to stock returns¹⁰, while those 45-65 have a negative effect. Looking at a range of OECD and EME countries, they find a positive relation of stock returns to the average age of the population. Davis and Li (2002) show that there has been an impact from the demographic structure on equity and bond returns as well as the equity premium in the major industrial countries over the past 50 years. Brooks (2000) focuses on the relation between ageing and the demand for equities and bonds, and suggests that there will be excess demand for bonds and excess supply of equities in coming decades, with a marked decline in the returns on the retirement savings of baby boomers.

It should be noted that not all researchers agree that a meltdown is likely, see Poterba (1998). Changes in issuance, for example, might smooth equity returns. Nevertheless, the possibility means prudence is warranted. In this context, solvency could be threatened for life insurance companies and defined benefit pension funds that had made undertakings based on expected returns on assets formed during the bull period (as has been the case recently for the Japanese life insurers and pension funds and for UK insurers such as Equitable Life). Mismatched balance sheets could have particularly adverse consequences.

¹⁰ And thus a negative effect on prices.

7.4 Issues raised by experience in Japan

We have already discussed the issue of Equitable Life. A key ongoing policy issue in Japan is the negative net worth of life insurance companies (and a number of pension funds). The pattern shows the downside of life insurance when there are guarantees on returns to beneficiaries in combination with poor risk management, restricted investment of assets, low levels of competition in asset management, and poor returns on the assets available. Although it resulted largely from life policies, the Japanese crisis is relevant both because failure will also affect any annuities and also because the regulatory lessons are applicable to annuities.

As was the case for Equitable Life, Japanese life insurers basically offered forward rate agreement options to their clients (mainly on life policies rather than annuities), at prevailing rates such as 5.5% up to 1992 (Fukao 2002). There was no duration matching of assets and liabilities, partly because most Japanese bonds are 10-year maturity. Average duration on the asset side has been 5 years and liabilities 15 to 20 years. As Japanese long-term interest rates have now fallen to 1–2%, the firms have been unable to make returns sufficient to meet guarantees to policyholders. The life insurers also faced huge bad debts on loans. Accordingly a number have become insolvent. Indeed, since the failure of Nissan Life in April 1997, seven life insurance companies of the 20 traditional firms have failed, of whom 5 were mutual. The paradigm of “disaster myopia” outlined above is germane.

Firms that failed went through a legal reorganisation procedure to cut promised interest rates on their insurance policies, thus leading to major losses by consumers. Policyholders lost 10% of their savings directly and had guaranteed rates reduced from 4% to 1-2%. A further 20% would be charged on early withdrawal. The best strategy according to Fukao (2002) was to cancel a policy before bankruptcy and get a new one with a healthy company – a form of “run”, from which unhealthy policyholders were excluded.

Fukao (2002) points out also that the firms that failed had healthy declared solvency margins before closure, and more generally that the crisis was worsened by forbearance by the supervisory authorities. Assets may be included in solvency calculations that have no liquidation value, and also deferred tax liabilities and future profits can be included in net assets. Risk weights for equities are 1/3 of those for US insurance and real estate and foreign currency assets one half. Due to this lenient solvency margin and slow closure, firms tended to be massively insolvent at the time of closure, worsening the losses of policyholders.

There is massive double gearing between Japanese banks and life insurers, with banks providing subordinated credit and surplus notes (non voting redeemable preference shares) of Yen 2.3 trillion in

2000, and life insurers providing Yen 6.7 trillion in subordinated loans to banks, as well as owning Yen 7.7 billion in bank stocks. This sharply increases systemic risk, since failure of a bank or a life company impinges directly on the other sector. Also it weakens corporate governance. When Chiyoda Life failed in October 2000, Tokai bank lost Yen 74 billion.

Earlier on in the crisis (Clark 1994), book value accounting¹¹ obscured poor performance of life insurers and prevented a clear assessment of solvency. It has also prevented institutions from selling poorly performing shares and prevented switching of asset managers (as both would entail realization of losses).

These difficulties may not be unique to Japan. As noted by IMF (2002c) life companies in Switzerland are unable to earn the guaranteed returns of 4% on occupational pensions, given a market rate of 3.6%. There has been comment on possible difficulties of life insurers in southern European countries such as Italy, Spain, and Portugal as well as Belgium and France.

Besides lessons for regulation in respect of capital adequacy supervision, forbearance, accounting, price controls and portfolio restrictions applicable also to annuities, the Japanese case highlights the difficulties of life companies when bond yields fall sharply, as may occur in the accumulation phase of ageing. Whereas the main focus of losses was on life insurance and not annuities, it is relevant to note that the life companies made partially offsetting gains from errors in mortality assumptions, because life policies benefit when longevity is underestimated. Had the focus been annuities, the losses owing to underestimation of longevity would have rather aggravated the asset problems.

Conclusions

This paper has covered the main issues in regulation of annuities, from three sides; prudential regulation of insurance companies, conduct of business regulation of insurance companies and the regulation of annuities within the overall pension system. We have also discussed forms of industry-wide risk that could be missed by detailed company-by-company regulation. Regulation of annuities is a vital part of a number of reformed pension systems around the world. Given the substantial risks highlighted as arising from inadequate pricing, regulation, “disaster myopia”, ageing and heightened competition, more research in these areas is needed.

Some aspects of regulation have been neglected in this paper. One is organisation of regulation; should there be a pillars approach to regulation, treating insurance, banking and securities as separate, a conglomerate approach with a lead regulator on the predominant business, or a single regulator (see

¹¹ A reform in the late 1990s shifted towards market value accounting (Pensions and Investments 1997).

the discussion in Mathur (2001)). There are also some issues relating to defined benefit occupational systems, where for example if a sponsoring firm of a defined benefit fund in the UK becomes insolvent, then the fund is used to buy deferred annuities for the members. Competition regulation may also be important, where in countries with concentrated insurance sectors, prices may become artificially high.

The structural analysis of Section 7 suggests that regulators should seek to develop “macroprudential indicators” for insurance along the lines of those developed for banking (IMF 2002b). For example, MWRs themselves could be monitored as a possible warning signal of intense competition, besides the portfolios and the mortality assumptions made by life companies. Changes in market structure could be used as signals for possible increases in competition. Recent results suggesting that equity prices give useful warning signals of failure of banks via the “distance to default” derived from the Black Scholes option pricing formula may also be valid for insurance companies (Gropp, Vesala and Vulpes 2002)

Finally, some EU issues may be highlighted. The advent of EMU will be an interesting case study in respect of market structure, since it facilitates cross border purchase of annuities in a common currency (although fiscal and other restrictions prevent such competition being fully expressed as yet, and such barriers need to be eliminated in the interests of market efficiency). Harmonisation of accounting standards becomes more urgent in an integrated market. As for banking, the issue arises whether and when transnational regulation of insurance companies becomes appropriate, especially as conglomerates operating on a cross border basis become more common. As noted, pension reform makes resolution of issues relating to competition and stability all the more urgent.

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Table 1: Life insurers' portfolio composition 1998

percent	Liquidity	Loans	Domestic Bonds	Domestic Equities	Property	Foreign assets
UK	5	1	25	48	6	13
US	6	8	52	26	0	1
Germany	1	57	14	17	4	0
Japan	5	30	36	10	0	9
Canada	7	28	55	26	7	3
France	1	2	74	15	7	0
Italy	0	1	75	12	2	0
Netherlands	1	29	24	24	5	10
Sweden	4	2	35	27	5	27
Finland	1	61	0	21	12	0
Average	3	22	39	23	5	6
Prudent person	4	13	33	33	4	8
Restrictions	3	26	41	18	5	6

Source: Davis and Steil (2001)

Table 2: Portfolio regulations for life insurance companies

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Canada (maxima applied to all assets)	No PPR	5-25% in real estate and stocks combined; 10% in non mortgage loans	Self investment banned, localisation rules apply	No currency matching rules
Finland (maxima applied to investments against technical provisions only)	No PPR, EU diversification rules (10% maximum of technical reserves in one piece of real estate, 5% shares and 5% loans of one borrower), maturity matching rules apply	Maximum 50% in domestic shares, 10% unquoted shares, 40% real estate, 40% mortgage loans, 50% in secured non mortgage loans or corporate bonds, 3% cash	Self investment banned, EU localisation rules apply	80% currency matching limit, non-OECD shares limited to 25%, technical reserves must be covered by real estate in Finland, securities issued by residents or assets guaranteed by residents
Germany (maxima applied to investments against technical provisions only)	No PPR, EU diversification rules (10% maximum of technical reserves in one piece of real estate, 5% shares and 5% loans of one borrower)	Maximum 30% quoted shares, 10% unquoted shares, 25% real estate, 50% in loans, 30% mutual funds and 50% bonds	Self investment banned, localisation rules apply	80% currency matching limit overall; 5% of premium reserve and 20% of other restricted assets
Italy (maxima applied to investments against technical provisions only)	No PPR, EU diversification rules (10% maximum of technical reserves in one piece of real estate, 5% shares of one borrower and 5% loans of one borrower)	Maximum 20% quoted shares, 20% unquoted shares, 50% real estate, 50% mortgage loans. Non mortgage loans prohibited	Self investment banned, localisation rules apply	80% currency matching limit overall; 20% may be held in foreign shares and 50% in other foreign securities
Japan (maxima apply to all assets)	No PPR, 10% limit on debt or equity exposures to one borrower	Maximum 30% shares, 20% real estate, 10% non-mortgage loans, 10% corporate bonds, 30% mutual funds (mortgage loans prohibited for life companies)	Self investment banned, localisation rules apply for foreign companies	No matching rules, 30% limit on foreign currency assets
Netherlands (maxima applied to investments against technical provisions only)	PPR, EU diversification rules (10% maximum of technical reserves in one piece of real estate, 5% shares of one borrower and 5% loans of one borrower); maturity matching rules apply	Maximum 8% in unsecured loans, 10% in real estate and 3% in cash	Self investment banned, EU localisation rules apply	80% currency matching
Sweden (maxima applied to investments against technical provisions only)	No PPR, Maximum 5% in a single item of real estate and for exposures to a single borrower	Maximum 25% in shares, 25% in real estate and mortgage loans together, 50% in corporate bonds and 3% in cash	Self investment banned, EU localisation rules apply	80% currency matching, maximum 20% of technical reserves in foreign currency and foreign securities; overall 25% limit on foreign shares
UK	PPR, maturity matching required	Maximum 3% in cash		80% currency matching
US (maxima apply to all assets)	PPR, per-issuer limitation of 3-5% of issues other than US government	Imposed at state level, e.g. Delaware 250% of capital and surplus in shares, 25% in real estate, 50% in mortgage loans New Jersey 15% in shares, 10% real estate, 60% mortgages		No currency matching rule; aggregate limits on foreign assets of 0-10% imposed at state level. Canadian investment more liberalised

Source: Davis (2002a)

Table 3: Returns on life company portfolios, 7 OECD countries, 1980-95

	Nominal return	Standard deviation	Real return	Standard deviation
UK	14.5	7.4	8.7	8.4
US	11.4	8.4	6.7	9.8
Germany	10.8	3.8	7.8	3.7
Japan	7.5	6.4	5.5	6.7
Canada	11.9	6.5	6.9	6.6
Netherlands	9.9	4.9	7.1	5.1
Sweden	12.8	13.9	6.1	14.4
Average	11.2	7.3	7.0	7.8
Prudent person	11.9	6.9	7.5	7.8
Restrictions	10.7	6.1	6.6	7.9

Source: Davis (2002a)

Table 4: Regulation of retirement income from defined contribution plans

	Occupational pension funds	Personal pension funds	Memo: tax treatment of funded pensions
Canada	No specific regulations – lump sums as well as annuities possible	Option of programmed withdrawals or annuities	EET
Finland	Annuities most common – lump sums subject to tax penalties	Annuities most common – lump sums subject to tax penalties	EET
Germany	No specific regulations	“Riester” individual pensions must provide an annuity or capital withdrawals guaranteeing payments also in very old age	TET/EET
Italy	Annuitisation required of at least 50% of the balance	Annuitisation required of at least 50% of the balance	EET
Japan	No regulations, DC funds just being introduced	No regulations, DC funds just being introduced	ETT
Netherlands	Full annuitisation at retirement mandatory	Full annuitisation at retirement mandatory	EET
Sweden	Full annuitisation at retirement mandatory	Full annuitisation at retirement mandatory of new compulsory individual accounts	ETT
UK	Pension fund must be annuitised by age 75, subject to 25% tax free lump sum and scheduled withdrawals from retirement till 75	Pension fund must be annuitised by age 75, subject to 25% tax free lump sum, and scheduled withdrawals from retirement till 75	EET
US	Lump sums as well as annuities possible	Lump sums as well as annuities possible	EET

Source: Yermo (2001), updated

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