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PORTFOLIO REGULATION OF LIFE INSURANCE COMPANIES AND PENSION FUNDS¹

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Abstract: This paper examines the rationale, nature and financial consequences of two alternative approaches to portfolio regulations for the long-term institutional investor sectors life insurance and pension funds. These approaches are, respectively, prudent person rules and quantitative portfolio restrictions. The argument draws on the financial-economics of investment, the differing characteristics of institutions' liabilities, and the overall case for regulation of financial institutions. Among the conclusions are:

- regulation of life insurance and pensions need not be identical;
- prudent person rules are superior to quantitative restrictions for pension funds except in certain specific circumstances (which may arise notably in emerging market economies), and;
- although in general restrictions may be less damaging for life insurance than for pension funds, prudent person rules may nevertheless be desirable in certain cases also for this sector, particularly in competitive life sectors in advanced countries, and for pension contracts offered by life insurance companies.

These results have implications inter alia for an appropriate strategy of liberalisation.

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Introduction

Adopting a financial economics (rather than actuarial) perspective, this paper seeks to assess the justification, nature and consequences of regulations on the asset portfolios of life insurance companies² and pension funds³. Broadly speaking, there are two main alternative approaches, namely “prudent person rules” which enjoin portfolio diversification and broad asset-liability matching, and “quantitative portfolio regulations” which limit holdings of certain types of asset within the portfolio. Both seek to ensure adequate portfolio diversification and (notably for insurers) liquidity of the asset portfolio, but in radically different ways. These are not, however, polar opposites and there are certain gradations between the two, as is revealed by the experience of a range of OECD countries which are used as raw material for the analysis.

We develop the argument by first showing the particular considerations that apply for asset management of life companies and pension funds, respectively, abstracting from regulation. We then consider the overall case for regulation of such institutional investors and note the different types of regulation, which apply (in particular highlighting that those potentially affecting asset holdings include solvency/minimum funding regulations and accounting rules as well as portfolio regulations per se). We go on to consider the overall case for and against the different types of portfolio regulations. We show how considerations may differ between life insurance companies and pension funds, depending largely on differences in liabilities, and also how differing circumstances (such as emerging markets versus advanced industrial countries) may lead to varying prescriptions. We then compare and contrast portfolio regulations for life insurance and pension funds in nine OECD countries, and thereafter highlight the differences in portfolios between these countries, considering the extent to which the restrictions actually bind and noting some of the other factors that may affect portfolio composition. We also assess the differences in terms of real returns achieved on portfolios as between prudent person and restriction-based regimes. In the conclusion we seek to assess a number of key policy issues, in particular whether life companies and pension funds should have identical regulations and whether prudent person rules are superior to quantitative asset restrictions for either or both of the sectors.

1 Investment considerations for institutional investors

² We abstract from property and casualty insurance since it is life insurance, which is most closely akin to pension funds (as offering a mix of insurance and saving), and hence offers the most fruitful comparison of asset regulations.

³ For an earlier assessment of issues in the regulation of pension fund assets see Davis (1998). Among the key findings was a markedly lower return - and generally comparable risk - for sectors with quantitative restrictions as

In this introductory section we introduce the **issues in institutional investment in general terms**, before going on in the next section to trace the economic influences on portfolio distributions of life insurers and pension funds, which would operate freely in the absence of portfolio and funding regulations and if there were appropriate accounting methods. This is seen as essential background for a comprehensive assessment of portfolio regulations.

1.1 General portfolio considerations

The most basic aim of investment is to achieve an **optimal trade-off of risk and return** by allocation of the portfolio to appropriately diversified combinations of assets (and in some cases liabilities, i.e. leveraging the portfolio by borrowing). The precondition for such an optimal trade-off is ability to attain the frontier of efficient portfolios, where there is no possibility of increasing return without increasing risk, or of reducing risk without reducing return. Any portfolio where it is possible to increase return without raising risk is inefficient and is dominated by a portfolio with more return for the same risk. The exact trade-off chosen will depend on objectives, preferences and constraints on investors.

1.2 Steps in institutional investment

There are common features of all types of institutional investment (see Trzcinka (1997), (1998) Bodie et al (1996)) which form a further useful introduction to an assessment of portfolios and appropriate restrictions. First there is identification of the investors' objectives/preferences and constraints.

In terms of **objectives**, there is a need to assess where on the above-mentioned optimal risk return trade-off the investor wishes to be, in other words his risk tolerance in pursuit of return. These issues are discussed for insurance companies and pension funds in the sections below.

As regards **constraints**, these may include liquidity, investment horizon, inflation sensitivity, regulations, tax and accounting considerations and unique needs. All of these may link to the nature of the liabilities, for example:

- liquidity based constraints link to the right for investors to withdraw funds as a lump sum, or the current needs for regular disbursement;

- the investment horizon relates to the planned liquidation date of the investment (e.g. retirement or maturity of a life contract), and is often measured by the concept of effective maturity or duration⁴;
- inflation sensitivity relates to the need to hold assets as inflation hedges, such as index linked bonds (or in their absence, equities or real estate);
- tax considerations may change the nature of the trade-off, and
- accounting rules can generate different 'optimal' portfolios, although market value accounting is needed to produce an appropriate portfolio in an economic sense. Finding a market value may itself be problematic for illiquid assets such as loans, art works and even real estate.
- finally there is the influence of regulations per se. Besides those linking to asset allocation, the main focus of this paper, there are sometimes liability restrictions, which may thereby affect desired asset allocations e.g. by enforcing indexation of repayments or minimum solvency levels.

This discussion emphasises that there are a variety of constraints which apply to life insurers or pension funds, all of which may have a marked effect on optimal portfolios, even abstracting from regulation. Notably, the nature of the **liabilities** is the key to understanding how institutional investors differ in their operations. A liability is a cash outlay made at a specific time to meet the contractual terms of an obligation issued by an institutional investor. Such liabilities differ in certainty and timing, from known outlay and timing (bank deposit) through known outlay but uncertain timing (traditional life insurance), uncertain outlay and known timing (floating rate debt) and uncertain outlay and uncertain timing (pension funds, endowment/unit linked life insurance, property and casualty insurance). It will be seen that certainty needs will vary within groups, e.g. a pension fund may require lesser certainty than a life insurer in nominal terms. In this context, an institutional investor will seek to earn a satisfactory return on invested funds and to keep a reasonable surplus of assets over liabilities. Risk must be sufficient to ensure adequate returns but not so great as to threaten solvency. The nature of liabilities also determines the institutions' liquidity needs.

After these considerations are taken into account, **investment strategies** are developed and implemented. A primary decision is to choose the asset categories to be included in the portfolio - usually money market instruments, shares, bonds, real estate, loans and foreign assets. Market conditions are monitored, using historic data on macroeconomic and financial variables as well as economic forecasts, to determine expectations of rates of return over the holding period. The efficient frontier can be derived between risk and return, depending on the probability distribution of holding period returns. Below the frontier the asset allocation is inefficient in the sense that risk can be reduced or return increased with no change to

⁴ Duration is the average time to an asset's discounted cash flows.

the other variable. An optimal asset mix may then be derived, selecting the portfolio that is efficient, which meets the required trade-off of risk and return and satisfies the constraints. Portfolio adjustments are made as appropriate when relevant variables change (such as market conditions, relative asset values and forecasts thereof, and the evolving nature of investor circumstances).

The investment process is often divided into several components, with **asset allocation** (or strategic⁵ asset allocation) referring to the long term decision on the disposition of the overall portfolio, while **tactical asset allocation** relates to short term adjustments to this basic choice between asset categories in the light of short term profit opportunities, so-called “market timing”. Meanwhile **security selection** relates to the choice of individual assets to be held within each asset class, which may be both strategic and tactical. Investment restrictions typically apply most strongly to asset allocation between instruments but may also affect security selection (e.g. if there is a limit on exposures as a proportion of the institution’s balance sheet, or as a proportion of the equity of the firm invested in).

It is evident that the influence of any binding quantitative portfolio regulations may be to constrain this process and potentially prevent the institution from achieving via strategic asset allocation the point on the frontier of efficient portfolios that is appropriate for the institution’s liabilities - or it may even force the institution to hold an inefficient portfolio which is below the frontier. They may also limit the profit that can be made from tactical asset allocation, and even in some cases limit security selection (where for example there are limits on credit quality or liquidity of individual assets).

1.3 Alternative approaches to asset allocation

The above considerations are based broadly on the **mean-variance model**, which assumes that the investor chooses an asset allocation based solely on average return and its volatility. Certain considerations in respect of liabilities give rise to alternative paradigms of asset allocation, which may imply a very different approach to investment (Borio et al 1997):

(1) **Immunitisation** is a special case of the mean-variance approach which implies that the investor tries to stabilise the value of the investment at the end of the holding period, i.e. to hold an entirely riskless position; this is done typically in respect of interest rate risk by appropriately adjusting the duration of the assets held to that of the liabilities. It necessitates a constant rebalancing of the portfolio - as well as the existence of assets which have a similar duration to liabilities.

⁵ Note that strategic choices include not only the disposition of the portfolio but also the choice of active versus passive management and domestic versus international.

(2) **Matching** is a particular case of immunisation where the assets precisely replicate the cash flows of the liabilities, including any related option characteristics.

(3) **Shortfall risk**⁶ and **portfolio insurance** approaches put a particular stress on avoiding downward moves, e.g. in the context of minimum solvency levels for pension funds or insurance companies. Hence, unlike mean-variance and immunisation they are not symmetric in respect to the weight put on upward and downward asset price moves. Shortfall risk sees the investor as maximising the return on the portfolio subject to a ceiling on the probability of incurring a loss (e.g. by shifting from equities to bonds as the minimum desired value is approached). In portfolio insurance the investor is considered to want to avoid any loss but to retain upside profit potential. This may be achieved by replicating on a continuous basis the payoff of a call option on the portfolio by trading between the assets and cash (dynamic hedging), or by use of futures and options per se. By these means, the value of a portfolio may be prevented from falling below a given value (such as that defined by the value of guaranteed liabilities of an insurance company or the minimum funding level of a pension fund).

(4) A further issue is whether the benchmark for investment is seen in nominal terms, as implicitly assumed above, or real terms. The benchmark may also be defined relative to the liabilities of the institution such as defined benefit pension or insurance claims. Asset management techniques which take into account the nature of liabilities are known as **asset liability management techniques (ALM)** (see also Blake (1999)), of which immunisation is a special case. They may be defined as investment technique wherein long term balance between assets and liabilities is maintained by choice of a portfolio of assets with similar return, risk and duration characteristics to liabilities (although characteristics of individual assets may differ from those of liabilities). Equities are a matching asset when liabilities grow at the same pace as real wages, as is typical in an ongoing pension fund aiming for a certain replacement ratio at retirement, because the labour and capital shares of GDP are roughly constant, and equities constitute capital income. Equities may also be appropriate for life insurers having variable policies (see Section 2.1 below). Bonds are not a good match for real-wage based liabilities although they do match annuities for pensions and nominal life insurance claims. This approach may affect inter alia the appropriate degree of diversification of the portfolio.

The key point here is that solvency considerations for insurance companies and defined benefit pension funds typically require a focus on shortfall risk and asset liability management rather than simple risk-

⁶ See Leibowitz and Kogelman (1991).

return optimisation. As a consequence, for these types of institution, the optimality of portfolio choices cannot readily be judged by simple measures such as the mean and standard deviation of the real return. In contrast, as discussed in Section 2.2, the mean-variance approach may be appropriate to defined contribution funds.

On the other hand, it may be added that quantitative portfolio restrictions may in principle interfere with optimal responses to shortfall risk and ALM considerations, for example if they limit use of derivatives or restrict necessary shifts in duration, by limiting the degree to which asset composition can be varied.

1.4 Asset return characteristics

As a further preliminary section, it is worthwhile to note the **risk and return characteristics of the various assets that are held by insurance companies and pension funds**, in order to evaluate different approaches to investment and investment regulation. The estimated risks and returns based on annual data for 1967-95 are illustrated in Table 1. Note that these are real returns and their corresponding risks. Nominal returns will be boosted by the corresponding rate of inflation in the country concerned (which for example was relatively high in Italy and the UK among this group, see Table 2). It is shown that the highest real returns are typically from (domestic) equities, which also have the greatest volatility. Other high-return assets are property and foreign assets, followed by bonds and loans, and finally short term assets. The “equity premium” return differential between equities and bonds is shown to be 6.3% for these countries on average.

Note that contrary to the expectations of finance theory, the volatility pattern based on annual holding period returns is not entirely congruent with the pattern of real yields, with total returns on bonds showing a relatively high volatility despite rather low real returns. This is partly linked to the fact that in the 1970s, bond yields rose sharply, while prices of bonds fell, with high and volatile inflation. This pattern was unique in history and has been much less characteristic of the 1980s and 1990s.

Table 2 shows inflation and real average earnings. The latter has been an average of 2% for the countries shown. This, as seen below, is a key target of pension fund investment, but generally less relevant for life insurance companies, which may nevertheless seek a return well above the rate of inflation in order to maintain competitiveness.

Since portfolio restrictions often limit equity investment and international investment, it is worth adding a few further considerations. For **equity**, there is considerable debate as to whether besides offering a

sizeable real return it is a hedge against inflation (see Ely and Robinson 1997). Or does it merely raise expected returns, and offering benefits of diversification (Bodie 1990a)? Is there a premium in returns of equities over bonds that has historically been more than can be explained by relative risk (Mehra and Prescott 1985), and is it disappearing (Blanchard 1993) or do we currently have a “bubble” (Bank of England 1999)?

Most of the work of equity returns has been undertaken in the United States. Jorion and Goetzmann (1999) strike a cautionary note regarding the resultant assumptions commonly made about the long-term returns to equity. They show (Table 3) that the historical average results for the US are atypically high, with a geometric real return of 4.3% (excluding dividends) since 1921 compared with a 3.4% mean return in other world markets (weighted by GDP) – and a median of only 0.8%. Comparative arithmetic mean real returns are 5.5% and 3.8%. This takes into account, for example, that in Germany stocks fell by 72% and Japanese stocks by 95% in 1944-49. With dividends, real returns were 8.22%, 8.16% in the UK, 7.13% in Sweden, 5.57% in Switzerland, 4.88% in Denmark and 4.83% in Germany. Technically, the results for the US are subject to “survival bias”. There are two further points to be raised. First, recent returns in all markets have far exceeded rates even in the US and hence may not be sustainable, and second, that concentration of risk in one market puts investors at risk of total loss of wealth.

The risks on **foreign assets** are often lower than for domestic assets of the same type because of the diversification benefits of foreign assets, which more than offset exchange rate risk. Crucially, to the extent national trade cycles are not correlated, and shocks to equity markets tend to be country-specific, the investment of part of the portfolio in other markets can reduce systematic risk for the same return⁷. In the medium term, the profit share in national economies may move differentially, which implies that international investment hedges the risk of a decline in domestic profit share and hence in equity values. And in the very long term, imperfect correlation of demographic shifts should offer protection against the effects on the domestic economy of ageing of the population⁸. In effect, international investment in countries with a relatively young population may be essential to prevent battles over resources between workers and pensioners in countries with an ageing population (Blake 1997).

Jorion and Goetzmann (1999) provide evidence for the returns and risks to international equity investment over the period 1921-1996, using GDP to weight portfolio holdings. The results, shown in

⁷ Consistent with this, Harvey (1991), shows that markets tend to have correlations of 0.16 to 0.86, with a majority in the range 0.4 to 0.7.

⁸ Erb et al (1997) show how asset returns vary systematically with a country’s demographic characteristics, with an older population being more risk averse and demanding a higher premium on equity investment.

Table 3, show that there is a major reduction in risk, with even inclusion of markets which failed (i.e. ceased to function entirely) not greatly reducing the global total return.

We turn now to assess the specific portfolio considerations that arise for insurance companies and pension funds.

2 Life insurance and pension fund assets and liabilities

In this section we seek to defined the business of life insurance and pension funds in a manner which is relevant for the evaluation of portfolio regulations. We note at the outset that the sharp distinctions made in this section are not always appropriate, given the blurring of differences between financial institutions. In particular, both life and pension business is often conducted via products employing mutual funds as an investment vehicle – themselves a separately regulated financial institution. Examples of products concerned are “unit linked” life policies and many types of personal pension product such as the US 401(k) plans.

2.1 Life insurance

One may distinguish several **parts of an insurance company’s asset portfolio** (Dickinson 1998a). First there are assets which are held to cover obligations to policyholders. These are generally purchased with inflows of premium income and are expected to be repaid in the future. Second, there are assets which correspond to the capital funds⁹ of the company, in other words the surplus over policyholder liabilities (so called technical provisions¹⁰). There are also fixed assets and current assets (forms of trade credit or other receivables). Our main focus is on investments held against technical provisions and investments held against the capital base. The investment of the former is constrained by the risk characteristics of the liabilities. These derive in turn from the explicit or implicit guarantees related to the contracts that have been sold. As will be discussed later, investments against technical provisions are also the part of the portfolio which is most commonly subject to investment regulation.

As mentioned, in assessing asset management of insurance companies, we focus throughout this article on life business, and largely **abstract from property and casualty insurance**. The latter, while having

⁹ Capital funds may be divided into those which fulfil regulatory minima and so-called free capital in excess of this amount. Note that ownership of capital varies between state, mutual and publicly-quoted companies, and that the incentives of the equity holders may differ considerably between these different forms of ownership structure.

¹⁰ Technical provisions and the corresponding assets can be defined either gross or netting off recoverables from reinsurers.

significant financial assets to back potential claims, does not constitute a mix of long term saving and insurance in the manner of life insurance and pension funds. The risks of the property and casualty sector are “insurance risks” which arise from highly uncertain flows of claims depending on major disasters and court cases offsetting the benefits of the “law of large numbers”. Because of risk and duration considerations, their portfolios tend to include a high proportion of short-term assets with rather low price volatility, often combined with a significant share of equities.

We now consider the **liabilities of life insurance companies, risks and appropriate investment strategies, abstracting from regulation**. A general point for liabilities of life insurance is that it is fundamentally a matter of actuarial calculation (notably using mortality tables as well as assumptions on asset returns) to assess and project how much a policyholder may be paid in the case of a claim. Errors in mortality estimates as well as in asset return expectations are hence key sources of risk. Note too, however, that besides their actuarial liabilities, life insurers are often allowed to borrow in order to fund themselves.

Life insurance company liabilities tended historically to be **defined in nominal terms**. These nominal liabilities would include those arising from term policies (purchased to provide a certain sum in the event of death), whole-life policies (term policies with a saving element) and annuities (to give a fixed income for the remainder of the insured's life). 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.

However, life companies are increasingly also offering **variable policies** such as variable life policies, variable annuities, with-profits endowment and unit (mutual fund) linked policies. These typically combine a term policy with a saving element aimed at capital appreciation, where for the latter there is no explicit guarantee regarding the size of the bonus to be disbursed. Or policies may have option features, with, for example, variable returns but a guaranteed floor. Such policies may offer higher returns - and also risks - to policyholders while posing less shortfall risk to the surplus of the life insurer. In many countries, including the US, there is a deferred-taxation benefit to such investment. Targets for the size of bonuses are typically determined by the need to attract new business in the light of competition in the market. Unlike for pension funds, discussed in the section below, there is no specific objective for capital appreciation defined in terms of average earnings, although this may enter implicitly via “policyholders’ reasonable expectations”, to use a current UK expression. As noted, a positive real return (i.e. exceeding consumer price inflation) would certainly be a minimum objective of life insurance investment generally.

Besides the popularity of variable policies, insurance companies are heavily involved in **investing pension monies**. This may occur directly on the balance sheet, generally on a defined contribution basis, or externally as asset managers in segregated accounts on behalf of defined contribution or defined benefit funds.

A life insurer's liabilities will reflect the chosen balance of these different types of policy, which can change over time as insurers choose which markets to serve. What are the **risks arising** from these different types of liability?

- errors in **mortality projections** may affect all life contracts, but especially term policies with a high sum insured relative to reserves
- there is **discontinuance risk**, when policies are surrendered before the expenses have been recovered
- where there is mandatory or customary early surrender guarantees or rights to take policy loans, there will be **liquidity risks** from this source.
- **interest rate risks** which arise in the context of guaranteed rates of return, notably for policies with high reserves relative to the sum insured and for new business (where duration of liabilities may be so long that there are no assets to match).
- there are **links between liquidity and interest rate risks**, since the demand for policy loans is likely to increase when interest rates rise, as policy holders buy high yield, low price bonds. When interest rates fall again, the value of bonds rises and the policy holder sells the bonds and repays the loan. The exercise of the surrender option will also take place when rates of return on financial assets exceed those expected on the policy.
- for variable contracts, the risk is also one of inflation affecting real returns that investors anticipate, and broader **asset-liability matching risk** (of which interest rate risk is a special case).

As regards **investment strategies**, nominal liabilities could be matched or immunised in the sense described above, usually using long term bonds. Life companies' portfolios also need some short term liquidity to cover liabilities arising from early surrender of policies and policy loans. On the other hand, the introduction of financial derivatives should provide a cheaper way of covering these risks (Blake 1996). For example, in order to hedge against the risk of a policy loan option being exercised, the life insurer can sell bond futures if it expects interest rates to rise and the policy loan option to be exercised. It may have to sell low valued bonds to finance the loan, but is compensated by the profits made on the future hedge. The company may later buy bond futures if it expects interest rates to decline.

Unlike traditional policies, variable policies imply active investment in equities, real estate and international investments which may be expected to keep pace with inflation, offering a positive real return. The related assets may often be held in the form of mutual funds. Pension liabilities, as discussed below, are another factor increasing equity and foreign investment.

It will be recalled that an **insurance company's surplus** measures the extent to which assets exceeds the value of liabilities which are implicitly or explicitly guaranteed. The surplus 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).

2.2 Pension funds

Pension funds collect, pool and invest funds contributed by sponsors and beneficiaries to provide for the future pension entitlements of beneficiaries (Davis (1995), Bodie and Davis (2000)). They thus provide means for individuals to accumulate saving over their working life so as to finance their consumption needs in retirement. Returns to members of pension plans backed by such funds may be purely dependent on the market (defined contribution funds) or may be overlaid by a guarantee of the rate of return by the sponsor (defined benefit funds). The latter have insurance features which are absent in the former (Bodie 1990b). These include guarantees in respect of replacement ratios (pensions as a proportion of income at retirement) subject to the risk of bankruptcy of the sponsor, as well as potential for risk sharing between older and younger beneficiaries. Defined contribution plans have tended to grow in recent years, as employers have sought to minimise the risk of their obligations, while employees desired funds that are readily transferable between employers.

For both defined benefit and defined contribution funds, the portfolio distribution and the corresponding return and risk on the assets seek to match or preferably exceed the growth of average labour earnings. This will maximise the replacement ratio (pension as a proportion of final earnings) obtainable by purchase of an annuity at retirement financed via an occupational or personal defined contribution fund¹¹

¹¹ The growth of receipts under funding with "defined contributions" depends on the rate of return on the assets accumulated during the working life. The actual pension received per annum varies with the number of years of retirement relative to working age (the "passivity ratio").

and reduce the cost to a company of providing a given pension in a defined benefit plan¹². This **link of liabilities to labour earnings** points to a crucial difference with insurance companies, in that pension funds face the risk of increasing nominal liabilities (for example, due to wage increases), as well as the risk of holding assets, and hence need to trade volatility with return. In effect, their liabilities are typically **denominated in real terms** and are not fixed in nominal terms. Hence, they must also focus on real assets which offer some form of inflation protection. This implies a particular focus on equities and property.

An additional factor which will influence the portfolio distributions of an individual pension fund is **maturity** - the ratio of active to retired members. The duration of liabilities (that is, the average time to discounted pension payment requirements) is much longer for an immature fund having few pensions in payment than for a mature fund where sizeable repayments are required. A fund which is closing down (or "winding up") will have even shorter duration liabilities. Blake (1994) suggests that given the varying duration of liabilities it is rational for immature funds having "real" liabilities as defined above to invest mainly in equities (whose cash flows have a long duration), for mature funds to invest in a mix of equities and bonds, and funds which are winding-up mainly in bonds (whose cash flows have a short duration). **Flexibility in the duration of assets, which may require major shifts in portfolios, is hence essential over time;** in contrast, while life insurers liabilities also have variable duration, the declining duration of a nominal life policy can be matched more readily by conventional bonds as they themselves approach maturity.

Pension funds are often subject to **pressures to invest according to non-financial objectives**. Notably there is often pressure to invest in "socially responsible" ways¹³ (although there is also a growing mutual fund sector specialising in socially responsible investment or SRI). Funds may also be directed to invest in local infrastructure projects (see Clark 1999). The reasons for such pressures may include their tax privileged non-profit status and a (mis)perceived link of pension financing to security of employment. There is a potential conflict between such restricted or directed investment and risk and return optimisation from the beneficiary or sponsors' point of view. For example, Mitchell and Hsin (1994) noted that public pension plans at a state and local level in the US were often obliged to devote a proportion of assets to state specific projects to "build a stronger job and tax base". These funds in turn tended to earn lower overall returns than others, suggesting inefficient investment.

¹² Under full funding, the contribution rate to obtain a given "defined benefit" replacement rate depends on the difference between the growth rate of wages (which determines the pension needed for a given replacement rate) and the return on assets, as well as the passivity ratio (the proportion of life spent after retirement).

¹³ In the UK in 1999 19% of private sector funds and 31% of public sector funds said they took ethical considerations into account in investing (Targett 2000).

Further key distinctions arise in the liabilities and investment approach of defined contribution and defined benefit funds:

2.2.1 Defined contribution pension funds

In a defined contribution pension fund the sponsors are only responsible for making contributions to the plan. There is no guarantee regarding assets at retirement, which depend on growth in the assets of the plan. Accordingly the **financial risks** to which the provider of a defined contribution plan (as opposed to beneficiaries) is exposed are minimal. In some cases, solely the sponsor and the investment managers it employs choose the portfolio distribution, and hence there is a risk of legal action by beneficiaries against poor investment. But increasingly, employees are left also to decide the asset allocation via choice of mutual funds (e.g. in the US 401(k) plans). The remaining obligation on the sponsor is to maintain contributions.

As regards **portfolio objectives**, a defined contribution pension plan should in principle seek to **maximise return for a given risk**, so as to attain as high as possible a replacement ratio at retirement. This implies following closely the standard mean-variance portfolio optimisation schema outlined in Section 1.1 above. As noted by Blake (1997), in order to choose the appropriate point on the frontier of efficient portfolios, it is necessary to determine the degree of risk tolerance of the scheme member; the higher the acceptable risk, the higher the expected value at retirement¹⁴. The fund will also need to **shift to lower risk assets for older workers** as they approach retirement¹⁵, thus reducing duration as outlined above and reducing exposure to market volatility shortly before retirement which might otherwise risk to sharply reduce pensions. They will imply marked portfolio shifts over time.

Until the approach of retirement necessitates a shift to bonds, the superior returns on equity are likely to ensure a significant share of the portfolio is accounted for by equities, depending on the **degree of risk aversion**. Where employers choose the asset mix, the degree of risk aversion is likely to be related to the fear of litigation when the market value of a more aggressive asset mix declines¹⁶, where employees choose the asset allocation it is more direct risk aversion.

¹⁴ Blake (1997) conceptualizes this as maximizing risk adjusted expected value; the expected value of pension assets less a risk penalty, defined as the ratio of the variance of the funds assets to the degree of risk tolerance.

¹⁵ Booth and Yakoubov (2000) cast doubt on the need for such "lifestyle investment".

¹⁶ Meanwhile, the constraint for defined benefit funds in the US is the fear of litigation under the prudent person rule if bond shares fall below a "market norm" such as 40%.

2.2.2 Defined benefit pension funds

Unlike defined contribution funds, defined benefit funds are subject to a **wide range of risks**:

- **Real labour earnings** will affect the replacement ratio which can be financed by the pension fund, and given there is usually a guarantee of a certain replacement rate, the fund is subject to risk from this source.
- Liabilities will also be influenced by **interest rates** at which future payments are discounted, and hence there are important interest rate risks.
- **Mortality risks** affect the cost of the annuities provided by the fund.
- **Falling asset returns** will affect asset/liability balance.
- There are also risks of **changes in government regulation** (such as those of indexation, portability, vesting and preservation) that can vastly and unexpectedly change liabilities. The example of the UK, where such changes have been marked, is discussed in Davis (2000).

Defined benefit fund liabilities are, owing to the sponsor's guarantee, basically a form of corporate debt (Bodie 1991). **Appropriate investment strategies** will depend on the nature of the obligation incurred, whether pensions in payment are indexed and the demographic structure of the workforce. Investment strategies will also be influenced by the minimum-funding rules imposed by the authorities which determine the size of surplus assets. These, as for life insurers, imply a focus on shortfall risk as defined in Section 1.3.

To further elucidate the appropriate strategies in the context of the nature of the defined benefit pension obligation, a number of definitions are needed. The wind-up definition of liabilities, the level at which the fund could meet all its current obligations if it were to be closed down completely, is known as the **accumulated benefit obligation (ABO)**. The **projected benefit obligation (PBO)** implies that the obligations to be funded include a forward-looking element. It is assumed that rights will continue to accrue, and will be labour earnings-indexed up to retirement, as is normal in a final salary plan. The **indexed benefit obligation (IBO)** also assumes price-indexation of pensions in payment after retirement.

If the sponsor seeks to fund the accumulated benefit obligation, and the **obligation is purely nominal**, with a minimum-funding requirement in place, it will be appropriate, as for life insurers, to **immunise the liabilities** with bonds of the same duration to hedge the interest rate risk of these liabilities. Unhedged equities will merely imply that such funds incur unnecessary risk (Bodie (1995)), although as for

insurance companies they may be useful to provide extra return on the surplus over and above the minimum funding level.

With a **projected benefit obligation target**, an investment **policy based on diversification** may be most appropriate, in the belief that risk reduction depends on a maximum diversification of the pension fund relative to the firm's operating investments (Ambachtsheer 1988). Moreover, it is normal for defined benefit schemes which offer a certain link to salary at retirement for the liability to include an element of indexation. Then fund managers and actuaries typically assume that it may be appropriate to include a significant proportion of real assets such as equities and property in the portfolio as well as bonds¹⁷. By doing this, they implicitly diversify between investment risk and liability risk (which are largely risks of inflation), see also Daykin (1995).

There are also **tax considerations**. As shown by Black (1980), for both defined benefit and defined contribution funds, there is a fiscal incentive to maximise the tax advantage of pension funds by investing in assets with the highest possible spread between pre-tax and post-tax returns. In many countries this tax effect gives an incentive to hold bonds. There is also an incentive to overfund with defined benefit to maximise the tax benefits, as well as to provide a larger contingency fund, which is usually counteracted by government-imposed limits on funding.

As noted by Blake (1997), minimum funding levels and limits on overfunding provide tolerance limits to the variation of assets around the value of liabilities. If the assets are selected in such a way that their risk, return and duration characteristics match those of liabilities, there is a "**liability immunising portfolio**". This protects the portfolio against risks of variation in interest rates, real earnings growth and inflation in the pension liabilities¹⁸. Such a strategy, which determines the overall asset allocation between broad classes of instrument, may be assisted by an **asset-liability modelling exercise (ALM)** as discussed above (see Peskin (1997), Blake (2000a))¹⁹.

The importance of **pension liabilities as a cost to firms**, and hence the benefit from higher asset returns, is underlined by estimates by the European Federation for Retirement Provision that a 1% improvement in asset returns may reduce companies' labour costs by 2-3%, where there is a fully funded, mature, defined benefit pension plan.

¹⁷ See the discussion of equities and inflation below.

¹⁸ Note that this is distinct from classic immunization, which relates to interest rate risk only.

¹⁹ Note that as described the ALM does not integrate the pension fund with the company balance sheet as may

2.3 Key differences between life insurance companies and pension funds

Drawing on the discussion above, we can note a number of **key differences which exist between life insurers and pension funds**, which one would expect to be reflected in investment strategies and correspondingly could be affected by any regulations affecting portfolios:

- the key is that **pension fund liabilities are linked explicitly or implicitly to average earnings**, which grow in real terms. In contrast, life insurance liabilities are either nominal, or have an objective of matching or beating price inflation, for competitive reasons. Of course, life insurance companies also run pension plans themselves with average earnings objectives, but these are often defined contribution, generating no guaranteed liabilities;
- as a corollary, falling inflation and hence bond yields may affect life insurance business (where they are guaranteeing nominal returns) but would not affect pension funds (which seek real returns);
- defined benefit pension liabilities most closely resemble those of life insurers in the sense that they have guaranteed obligations which are subject to shortfall risk. **Defined contribution liabilities resemble more closely those of a mutual fund**, having no guarantee element;
- even for defined benefit funds there is **no explicit capital base of a pension fund** unlike an insurer. There may be surplus assets, but these are typically limited by tax regulations, and may be run down by the sponsor (via “contribution holidays”) in order to boost its profitability. In contrast, life companies have their capital as a cushion against errors, and also non-guaranteed bonuses on variable policies;
- a corollary is that any **excess returns** on defined benefit pension funds only accrue to the sponsor gradually over time (via “contribution holidays”), while excess returns on investments against technical provisions profit the insurance company directly. This could affect risk-taking incentives in the absence of investment regulations, which might thus be higher for life insurers. Hence regulations might themselves need to be tighter;
- on the other hand, unlike insurance companies, **occupational pension funds have a link to a non financial firm**, whose own capital is effectively the backup for a defined benefit fund. This link is formalised in the accounting practice which puts uncovered pension liabilities on the sponsoring firm’s balance sheet. Where the firm is solvent, this is often a more extensive source of capital than a life insurer’s capital base, as well as being subject to shocks which are relatively independent of those affecting pension assets. Arguably this more extensive backup could justify riskier strategies in pension funds than for life insurers;

be warranted by its status as a collateral for the firm’s guarantee, but treats it as an entirely separate financing vehicle.

- **life insurance companies are subject to risks not present for pension funds to the same degree**, such as liquidity risk (for policy loans and guaranteed early surrender values) and expense risk (that policies will be surrendered before selling costs have been recouped). As noted, these have traditionally been seen as requiring heavy investment in low yielding, capital certain assets - but they could also be hedged by derivatives if regulations permit;
- given the expectedly strong upward trend in longevity, pensions and annuities business is more at risk of errors to mortality (since they profit from shorter longevity) than term life business (which profit from higher longevity);
- **life companies offer a diverse range of products** allowing a degree of diversification (for example selling annuities and term policies to protect against longevity risk) while pension funds offer only one form of liability;
- correspondingly, **life insurers are better able to control the duration of their liabilities** (by varying the mix of products sold) than pension funds (where duration is not only difficult to control but may also change abruptly due to government policies). Matching of duration is more straightforward for life insurance companies. More generally, liabilities of pension funds are regulated more closely than those of life insurers (apart from personal pensions offered by the latter), in terms of aspects such as indexation and transferability (see Section 3.1);
- **insurance companies are selling their products in a competitive market** and competing both with each other and with competing savings products, while (occupational) pension funds are typically monopoly providers²⁰ of pensions to workers in a given firm, suggesting a greater need for consumer protection. Life insurers are arguably more likely to make errors in premia due to competitive pressures than are pension funds in their contributions. As a result of competition, life companies may also have a greater incentive for risk taking on the asset side than do pension funds;
- as noted, pension funds as non-profit making institutions profiting from tax privileges are more subject to **social pressure on their investments** than are insurance companies.

These contrasts are in our view sufficiently marked to mean that there is not a strong case for identical regulations as between life insurers and pension funds. Broadly speaking, defined benefit pension funds appear to need more flexibility on the asset side, in order to cater for more dynamic liabilities over which they have much less control than is the case for life insurers; while defined contribution funds have no guaranteed liabilities at all, hence implying a strong case for freedom to optimise risk and return. In the light of the above discussion of investment by life companies and pension funds, we now turn to regulatory issues.

²⁰ Here particularly for defined benefit funds, the competition aspect arises in the market for asset management

3 Regulation of life insurers and pension funds

3.1 Reasons for regulating institutional investors

Given that life insurers and sponsors of pension funds are companies subject to normal legal provisions in respect of contracts, bankruptcy fraud and corporate governance, why does a free market solution not suffice to optimise conditions for consumers of the corresponding financial products? The expectation that the market will provide appropriate contracts is strengthened by the fact that both life insurers (given their need to attract new business) and pension funds (given employers' need to attract good employees) face significant reputational costs from any malpractice.

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, generally as a corollary of asymmetric information.

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 those provided by life insurance and personal pensions, because clients are seeking investment of a sizeable proportion of their wealth, contracts are one-off and involve a commitment over as much as 40 years. Such consumers are unlikely to find it economic to make a full assessment of the risks to which life insurance companies or pension plans are exposed - including the solvency of the life company and the solvency of the sponsor in the case of occupational pension funds. The argument justifies regulations of solvency in terms of asset-liability balance or minimum funding levels *per se*, and also “fit and proper controls” on entry in insurance. It could also justify portfolio regulations to avoid a lack of diversification and ensure liquidity of the underlying assets, that may otherwise contribute to insolvency of the insurer or inability of a pension fund to pay claims if the employer defaults.

skills, where the sponsor has an incentive to minimise the costs of funding the obligation.

Note, however, that many asymmetric information problems are not appropriately addressed by asset or capital regulations but rather by regulations for consumer protection, such as best advice, information provisions and cooling off periods. This is particularly the case when the institution faces no insolvency risk, as in the case of defined contribution pension funds (for a discussion of this issue in the context of investment management see Franks and Mayer (1989)).

Externalities arise when the actions of certain firms or individuals have beneficial or adverse consequences for others which are not reflected in the market 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. Again, solvency regulations may be justified. But given the matching of long run liabilities and long run assets, such externalities are less likely for life insurers and even less so for pension funds. There remain some possible externalities from failure of life insurance companies and pension funds, notably to the state, whether as direct guarantor or as provider of retirement incomes to those lacking them. A failing life insurance company could lead to bank runs indirectly via contagion to the bank within a bancassurance group; or a failing bank in a conglomerate could transfer bad assets to the group insurance company (Financial Stability Forum 2000). Equally, positive externalities may give reasons for governments to encourage life insurance companies and pension funds (e.g. via tax benefits), such as desire to economise on the costs of social security or foster the development of capital markets.

A third form of market failure may arise when there is a **degree of market power**. This may be of particular relevance for occupational pension funds, notably when membership is compulsory; hence regulatory attention to the interests of members (i.e. liabilities of the fund) is of particular importance in such cases, whether or not there is also asymmetric information. As argued by Altman (1992), employers in an unregulated environment offering a pension fund effectively on a monopoly basis will structure plans to take care of their own interests and concerns, for example will institute onerous vesting rules²¹ and better terms for management than workers. They will also want freedom to fund or not as they wish and to maintain pension assets regardless of risk for their own use, regardless of the risk of bankruptcy. Arguably a form of market power also applies in the case of life insurers if consumers are “locked in” to policies where the early surrender penalties are severe - desire to maintain reputation of the firm is the other bulwark for the consumer in this case, but it may not be sufficient if the life market is itself an oligopoly, with all firms offering similar policies and conditions.

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. When it is sufficiently severe, the market may cease to exist. (For example, making annuities compulsory reduces adverse selection in that market.) Also there can be **moral hazard** - where there is an incentive to a beneficiary of a fixed-value contract such as pension benefit insurance, in the presence of asymmetric information and incomplete contracts, to change her behaviour after the contract has been agreed, in order to maximise her wealth, to the detriment of the provider of the contract.

Some would argue that life insurance companies and pension funds should be **regulated independently of these standard market failure justifications**, 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. Consumer protection may go further than is strictly required by the various market failures pointed out above if, for example, it is thought that individuals may take excessive risks with their defined contribution pension monies if allowed to invest freely. Regulation may also be based on the desire for economic efficiency, for example removing barriers to labour mobility. Furthermore, governments may seek to employ regulations for directing the flow of investable funds to their desired ends (such as purchase of government bonds, and investment in the domestic economy) and to prevent institutional investors from exercising undue corporate governance influence on the non financial sector.

Regulations are of course not costless, and excessive regulatory burdens may increase the cost of life insurance, discourage provision of private pensions when it is voluntary, and reduce competitiveness of companies when occupational pensions are compulsory. Regulations may be divided into those of assets/inflows, liabilities/outflows and broader structural regulations. For pension funds, there is a sharp division between regulations for defined benefit and defined contribution plans. The reason is that the former have guarantee features akin to life insurance companies, whereas the latter have no such features and resemble mutual funds. For example, funding and surplus regulations apply only to defined benefit, while indexation and portability regulations are more complex for defined benefit. Contributions and commissions regulations apply only to defined contribution, while information issues are more important for them.

²¹ It is of interest that unregulated funds in developing countries do indeed institute such rules.

The broad **issues which life insurance and pension regulation seeks to address** are shown in Table 4, together with the types of regulation. The main focus of regulation of life insurance contracts is that there should be sufficient and appropriate assets to meet obligations to consumers, and that consumers should be sold appropriate financial products for their needs, while pension regulation has the broader core objective of aiming to ensure that retirement income security for individuals is ensured. As is evident from the table, asset regulations are only a subset of the total range of regulations which apply. In our view, pension regulation is typically much more wide ranging than that of life insurance notably on the liabilities side, where regulations include those of transferability, indexation and annuitisation, none of which are typically regulated for life insurers. This in turn reflects the broader objective of pension regulation. The general issue arises of whether the wider range of pension regulations (notably on the liabilities side) make portfolio controls more or less necessary. In our judgement they imply a premium on flexibility on the asset side. A further issue also shown in Table 4 arises from the fact that life insurance companies often offer personal or group pensions as well as life insurance contracts. This means their overall regulation has to cover two different kinds of financial contract.

3.2 Prudent person and portfolio restrictions - general considerations

We now go on to assess the different types of investment regulation in more detail. To begin with definitions:

A **quantitative portfolio regulation** is simply a quantitative limit on holdings of a given asset class. Typically, those instruments whose holding is limited are those with high price volatility and/or low liquidity. For pension funds, there are also often limits on self investment²² of the fund in the assets of the sponsoring firm, to protect more directly against the risk of insolvency of the sponsor, and appearance of conflicts of interest²³. Meanwhile, self investment by life insurance companies is generally forbidden. Furthermore, there are commonly restrictions on the proportion of the assets of an investor exposed to a single borrower or piece of real estate (where for insurers the latter may include the firm's own offices).

Meanwhile, a **prudent person rule** is a concept whereby investments are 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 thereby ensure adequate diversification, thus protecting the beneficiaries against insolvency

²² These limits do not, of course, apply to reserve funding pension systems such as those common in Japan, Germany, Luxembourg and Sweden, where 100% of assets are invested in the sponsor.

²³ As discussed in Davis (2000), illegal self investment was at the root of the Maxwell scandal in the UK.

of the sponsor and investment risks. For long term institutions, a prudent person rule would be naturally accompanied by an asset-liability management exercise, as outlined in Section 1.3.

As discussed by Goldman (2000), the **logic of the quantitative restriction or “prudent investment” approach** is that prudence is equal to safety, where security of assets is measured instrument by instrument according to a fixed standard. The focus is placed on the investment itself. The overall risk of a life insurance or pension portfolio must not go beyond a certain level, while allowing for the desire of life companies or pension fund sponsors to be as competitive or low-cost as possible. This leads to a quantitative view of prudence which is focused on the idea that the investment itself can be tested as to whether or not the decision was prudent at the time. The model effectively tests the investment category, the asset class and the outcome of the investment. Such quantitative regulation of portfolio distributions entail limits on holdings of assets with relatively volatile nominal returns, low liquidity or high credit risk, such as equities, venture capital/unquoted shares and property, as well as foreign assets, even if their mean return is relatively high. The aim is to protect beneficiaries against insolvency of operators and investment risks, by ensuring adequate diversification of assets. On the other hand, explicit allowance is by definition not made for potentially offsetting correlations between types of financial instrument. It thereby overrides the free choice of investments which was assumed in Sections 1 and 2 above. It may be added that there is a strong link to the civil law tradition typical of Continental Europe, where rules are codified, rather than in the common law tradition of the Anglo Saxon countries.

Meanwhile the **prudent person rule is focused on the behaviour of the person concerned**. The process of making the investment is the key test of prudence. More specifically, the test in this case is of the behaviour of the asset manager, the institutional investor and the process of decision making. It needs to be assessed whether, for example, there has been a thorough consideration of the issues, there is not blind reliance on experts and it is essential to have undertaken a form of “due diligence” investigation in forming the strategic asset allocation and prior to any change or variation to it. The institution would also be expected to have a coherent and explicit statement of investment principles.

Whereas in general terms a prudent person approach is a standard that measures a course of conduct and not an investment outcome, such rules are often accompanied by an **implicit or explicit presumption that diversification of investments is a key indicator of prudence** in this sense. The prudent person rule, in effect, allows the free market to operate throughout the investment process while ensuing, along with solvency regulations, that there is both adequacy of assets and appropriate levels of risk. Rather than the focus being on the external rules, the onus is rather on internal controls and governance structures in which the authorities may have confidence. The authorities correspondingly require information on these

aspects rather than purely focusing on the composition of the asset portfolio as is feasible with quantitative restrictions. Correspondingly, a wider degree of transparency is needed for the institutions (including in particular identification of lines of responsibility for decisions and of detailed practices of asset management). Such monitoring may however be delegated to self regulatory bodies, which have incentives to maintain compliance in order to protect the reputation of the industry and if there are forms of mutual insurance against losses.

It may be noted immediately that these **polar extremes are rarely adopted**, but often there is a degree of mixing of the two. Notably, prudent person rules are typically accompanied by a quantitative restriction on self investment, while some countries with asset restrictions also introduce concepts of maximising safety and profitability to their investment laws. Quantitative restrictions are rarely extended to require specific methods and targets for maturity matching.

The general case against quantitative portfolio regulations is put succinctly by European Commission (1999), namely that they are “in the way of optimisation of the asset allocation and security selection process and therefore may have led to suboptimal return and risk taking”.

In more detail, and drawing on the discussion above, they:

- **prevent appropriate account being taken of the duration of the liabilities** of an insurer or pension fund (which may differ sharply between companies and between funds, as well as over time), and related changes in risk aversion;
- regulations may more generally render **difficult or impossible the application of appropriate immunisation or asset-liability management techniques** for maturity matching. This is because these may require sharp variations in the portfolio between equities to bonds, as well as use of derivatives;
- in terms of risk and return optimisation, they are likely to **enforce holdings of a portfolio below the efficient frontier**, because they typically insist on high proportions of bonds and domestic assets;
- they **focus unduly on the risk and liquidity of individual assets** and fail to take into account the fact that, at the level of the portfolio the default risk and price volatility can be reduced by diversification, while liquidity risk depends on the overall liquidity position of the investor and not the individual instruments which are held;
- if portfolio regulations **limit use of derivatives**, abstracting from other operative limits, they will force the institution either to hold low-yielding assets - to the detriment of policy holders - or expose itself to unnecessary risks;

- they are **inflexible and cannot be changed rapidly** in response to changing conjunctural economic circumstances and movements in securities, currency and real estate markets. The threat to some insurance companies from the fall in inflation, which has driven bond yields below policy guarantees made in an era of high inflation, are a case in point. Arguably, a more diversified portfolio with more “real assets” and hedging could have offered better protection. Again, whereas prudent person rules have tended to date to accompany sizeable equity investments, there is no reason why asset managers should not shift wholesale to bonds if poor prospective equity returns made it prudent to do so;
- they also may find it **difficult to adapt to structural changes** in financial asset markets such as the reduction in government bonds outstanding in the UK and US and the development of corporate bond markets in the euro area;
- if enforced strictly, they may give **incentives to asset managers to hold proportions of risky assets which fall well short of the limits**, to avoid breaching them when markets perform well and prices rise;
- they may encourage **low levels of surplus assets**, given the low returns on equity that they entail;
- they encourage strategies to be conducted so as to **conform with legal restrictions** rather than attaining good returns, reducing risk and other desirable objectives. Notably they may limit tactical asset allocation;
- they encourage national governments to **treat life insurers and pension funds as means to finance budgetary requirements**, in a way that could not occur under a prudent person rule;
- they **reduce the extent to which the diversification benefits of international investment may be attained**, and can even be said to expose policy holders to currency risk, given that they will want to spend some of their income on foreign goods and services, and the domestic currency may depreciate. Allowance for international investment is particularly important for a country with a small and undiversified capital market. If institutions are confined to domestic markets they may be subjected to unnecessary diversifiable risk, including major macroeconomic risks arising from “asymmetric shocks” to the domestic economy, that could otherwise be avoided. Foreign currency risk can be hedged if use of derivatives is permitted;
- conversely, whereas investment regulations on domestic assets may seem appropriate in a small domestic market where there is high volatility and undiversifiable risk in equities, so as to ensure adequate diversification and portfolio liquidity, the **widening and deepening of capital markets may make the regulations less necessary**. The creation of EMU is a particularly relevant example in this regard, given that a number of important Euro area countries maintain strict portfolio regulations (see Section 4.1);
- portfolio regulations are **less needed to bolster solvency in the case of policies which pass risk to the consumer**, such as unit linked life policies and defined contribution pension funds. This is because

there are no solvency risks for the provider. Prudent diversification is still warranted - but could be mandated by prudent person rules;

- **limits on exposures** to single borrowers are unnecessary for the most part since diversification mandated by prudence would require small stakes in any case.

There may also be **deleterious effects of portfolio regulations on the asset management industry**:

- there is no incentive for the institutional investor to nominate investment managers with **skills to achieve higher return and lower risk** by equity and international investment
- **competition among asset managers is discouraged** if their main function is to meet quantitative asset restrictions
- the **development of the industry per se** is likely to be set back, especially if entry by foreign managers is restricted²⁴.

The economy as a whole may also suffer:

- quantitative restrictions may lead to **inefficient allocation of capital** and hence hold back economic growth and employment;
- in particular, limits on unquoted shares and venture capital (including limits on the proportion of a firm's equity that can be held) can **hinder the dynamic small firm sector**, which generate the bulk of new employment;
- they **increase costs for employers** where they are providing pensions or life insurance and hence hinder job creation

Some **possible exceptions** may be made to this argument, which may apply notably in emerging market economies:

- there could be a rationale for portfolio regulations if fund managers as well as regulators²⁵ are **highly inexperienced** and the markets volatile and open to manipulation by insiders. They in a sense ensure portfolio diversification in a rough and ready way, and avoid risk becoming excessive in such cases. A corollary is that restrictions may justifiably be eased as expertise develops;

²⁴ The traditional lack of competitiveness of the Japanese asset management sector, low resultant asset returns, the consequences for the funding of pension funds and life insurers, and the benefits of deregulation of entry and portfolio regulations, are considered in Davis and Steil (2000).

²⁵ We detail in an Annex some of the requirements for appropriate regulation (see also Davis (1998b)).

- this point applies more generally where **regulators have doubts about internal controls** in institutions, as well as in the industry's capacity for self-regulation and related governance structures. Again, this justification will in many cases be temporary;
- compliance with portfolio limits is more **readily verified and monitored** by supervisors than for prudent person rules. The latter requires a high degree of transparency of institutions, and strict supervisory controls on investor malpractice (such as occurred in the Maxwell case) as well as on self-regulatory bodies. There may also be legal difficulties with enforcing prudent person regulations, e.g. in civil law countries;
- the regulations may be used as a **safeguard against imprudent companies**, and as a signal to the market and consumers;
- if they reduce insolvencies²⁶, restrictions may reduce the need for an **insurance fund** that might otherwise lead to moral hazard;
- correspondingly, governments may by use of asset restrictions seek to **avoid bearing the burden of bailing out individuals from losses** following imprudent investments in products such as personal pensions where the individual bears the risk;
- following the general case above, **regulation should become more liberal** as financial markets become more sophisticated and mature, and should be reviewed frequently;
- further issues arise in the context of **capital outflow controls in developing countries**. As noted by Fontaine (1997), exchange controls have in the past been - justifiably - imposed during foreign exchange crises to deal with capital flight, to avoid a sharp and costly overshooting of the currency, but often kept in looser form once normal conditions were re-established;
- some countries also argue that restrictions are needed to boost development of domestic capital markets – but openness to foreign investment may also achieve this objective, while permitting international investment by institutional investments reduces their exposure to diversifiable risk;
- even in OECD countries, **limits on self investment** are appropriate to prevent concentration of risk;
- meanwhile a **difficulty with prudent person rules lies in the fact that court judgements (or desire to avoid litigation) may lead to narrow interpretations of risk and safety**. For example, life and pension funds could protect themselves from liability by tilting their portfolios towards high quality assets that are easy to defend in court. Del Guercio (1996) finds some evidence of this in the US for banks running personal trusts and pension funds²⁷. Of course, avoidance of individually high risk assets that

²⁶ In practice, there is little evidence from OECD countries that insolvencies of life insurers and pension funds have been significantly higher with prudent person than with asset restrictions.

²⁷ She found that bank managers hold 31% of their equities in stocks of companies rated A+ by Standard and Poor's while the corresponding figure for mutual funds is 15%. Alternative explanations to prudent-person rules for this behavior, namely passive indexing and limits in allowed portfolio positions, were rejected.

could improve the overall risk and return profile of the portfolio may actually be contrary to beneficiary protection, which was the intention of prudent person rules.

- Such interpretations may also encourage a **focus on portfolio indexation**. Indexing to narrow core market indices (such as the FTSE-100 and S and P 500) artificially drives up the value of the firms which are included and may increase the volatility of the investors' assets.

3.3 Prudent person versus portfolio restrictions for life insurance companies and pension funds

We now go on to examine the case separately for life insurance companies and pension funds. It may be noted first that in order to protect insurance firms from insolvency in the shorter term, supervisory rules typically impose stricter regulations on assets backing technical provisions (i.e. guaranteed liabilities) than for the surplus (Dickinson 1998a). For example, a number of assets 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 (i.e. in many countries they apply only to investments held against technical provisions and not to the surplus). Hence, the assets backing technical provisions are more likely to be invested in bonds, with only the surplus including a share of equities²⁸. A similar issue arises for defined benefit pension funds, discussed below.

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. The 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 **case in favour of quantitative portfolio restrictions may be put most strongly for life insurance companies which have nominally-fixed liabilities**, especially if there are rights to early surrender. For such institutions, matching with assets of similar duration may indeed be a desirable portfolio strategy, as set out above, and a high degree of liquidity will be needed. This will be particularly the case for assets matching technical provisions. Hence portfolio regulations (which usually do not restrict bond holdings) may not strongly distort free-market portfolios.

²⁸ Shortfall risk considerations are likely to entail cautious investment or hedging for these assets also.

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. 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).

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 such as mutual funds. 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. As noted, even traditional liquidity risks can be handled at lower cost by use of derivatives. It can be argued that prudent person based diversification plus solvency rules (where the latter may include suitable stress tests, conservative valuation methods and/or risk based capital requirements) as well as comprehensive conduct of business rules to protect consumers are sufficient protection for policy holders without the overlay of asset restrictions, especially if the latter are imposed on an annual basis.

This may be a particularly relevant argument for long term policies where any mismatched position can be corrected well before liabilities are due, and where appropriate asset-liability management techniques are undertaken. This argument applies even more strongly for the surplus over and above the level of technical provisions. Also assets corresponding to non-guaranteed liabilities (such as the bulk of variable-life or unit linked 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. Meanwhile, the restrictions on large exposures, while unnecessary in the context of diversification (since diversification would in any case lead to small stakes), may inhibit strategic stakes between insurance companies.

The case for portfolio restrictions is much weaker for pension funds, where it may be noted that any portfolio restrictions often apply to the whole of the portfolio. Indeed, for advanced countries, apart from the control of self investment, the degree to which such regulations actually contribute to benefit security is open to doubt. This relates to the link of liabilities to average earnings growth (as well as the vulnerability of liabilities to regulatory changes). Since pension funds, unlike insurance companies, may face the risk of increasing nominal liabilities as well as the risk of holding assets, they need to trade

volatility with return²⁹. Moreover, appropriate diversification of assets can eliminate any idiosyncratic risk from holding an individual security or type of asset, thus minimising the increase in risk. Again, if national cycles and markets are imperfectly correlated, international investment will reduce otherwise undiversifiable or "systematic" risk (see Davis 1995). In the case of restrictions which explicitly or implicitly³⁰ oblige pension funds to invest in government bonds, which must themselves be repaid from taxation, there may be no benefit to capital formation and the "funded" plans may at a macroeconomic level be virtually equivalent to pay-as-you-go. Meanwhile, changes in duration depending on the maturity of a fund require marked shifts in portfolios.

Even for defined contribution funds, it is hard to argue a sound case for such rules, given the superior alternative of prudent person rules. There seems little evidence that defined contribution investors need "protecting from themselves" i.e. prevented from taking high risks. Indeed, in practice, experience suggests that investors in individual defined contribution funds at least historically tend to be too cautious to develop adequate funds at retirement, while companies running defined contribution funds may invest excessively cautiously to avoid lawsuits. As noted, a case could be made (as in Chile, see Davis (1998b)) that a danger with unrestricted investments would be that firms providing pension contracts would seek to boost yield to attract clients, at a cost of excessive risk which could ultimately be borne by the government. But these tendencies could also be dealt with by a prudent person rule.

Portfolio limits would, however, appear to be particularly inappropriate for defined benefit pensions, given the additional "buffer" of the company guarantee for the beneficiaries and risk sharing between older and younger workers, and if benefits must be indexed. Clearly, in such cases, portfolio regulations may affect the cost to companies of providing pensions, if it constrains managers in their choice of risk and return, forcing them to hold low yielding assets, and possibly increasing their risks and costs by limiting their possibilities of diversification³¹. Even solvency rules may not be essential if there is an appropriate actuarial and accounting framework³².

In our view a very poor argument for portfolio regulation of pension funds - but nevertheless one which is occasionally heard - is the need for a **level playing field in terms of competition** between life insurance and pension funds. In our view the differences between types of liabilities are sufficiently radical to offset

²⁹ Indeed, in several countries, a false parallel seems to be drawn by regulators between life insurers and pension funds.

³⁰ For example, by closing down all alternative investment strategies such as international diversification.

³¹ As noted, portfolio restrictions are likely to prevent managers reaching the *frontier of efficient portfolios*, which indicates where return is maximised for a given risk.

³² See the discussion of the pre-1995 regime in the UK in Davis (2000).

this, and one could also question whether there is in fact direct competition, given pension fund membership is typically compulsory as part of the contract of employment, while purchase of life insurance is voluntary. At most, it is only the pension contracts offered by life companies that compete directly.

4 National experience

In this final section we compare the types of restrictions set in a number of OECD countries and make a preliminary evaluation of the effects they have had on portfolios and investment performance.

4.1 Comparing asset regulations of insurance and pension funds in nine OECD countries

Table 5 provides an impression of the types of restrictions which hold in a number of key OECD countries³³. We seek to compare pension and life insurance regulation directly, which leads to a number of relevant observations.

Concerning the **overall approach** to investment regulation, following the evaluation of OECD (2000), prudent person rules are much more common for pension funds than for insurance companies. Only the UK, US and the Netherlands have prudent person rules for both types of institution. Canada, Finland, Italy and Japan have prudent person rules for pension funds and not for life insurers, while in Germany and Sweden neither sector has prudent person rules. This predominance for life insurance is consistent with the suggestion above that quantitative restrictions may be more suited to this sector by the nature of the liabilities than for pension funds.

Both types of regulation are often accompanied by **diversification rules**. These tend to be more stringent for life insurers than pension funds, with the latter often having a general requirement to diversify (as in the UK, US, Finland and the Netherlands) while life insurers' diversification rules are generally quantitative, even in the Netherlands and the United States where there is also a prudent person rule. Where both types of institution are subject to quantitative diversification rules, the limits are often lower for life insurance than for pension funds, as in Sweden (10% large exposure limit for pension funds and 5% for insurers), or Italy (where the figures are 15% and 5% respectively). There are also maturity matching requirements for life insurers in Finland, the Netherlands and the UK - no country imposes maturity matching on pension funds perhaps partly because there are no assets which explicitly match such long liabilities.

Quantitative restrictions on domestic assets are naturally more detailed where they form the basis of asset regulation than where they do not, (i.e. a prudent person rule operates). They are not, however, absent in all cases of prudent person rules, as for Canadian pension funds (where real estate is limited to 5%) and Finnish pension funds (where an array of restrictions is imposed, perhaps casting into doubt the classification of the overall sector regulation as based on prudent person). Comparing quantitative restrictions between life insurance and pension funds, we see that in some countries they are tighter for pension funds than for life insurers, as in Finland and Germany (where the limit for shares is lower for pension funds). It could again be questioned whether this is in line with the differing nature of liabilities. These cases are however exceptional, and elsewhere the life insurers tend to have more onerous quantitative restrictions. Only the Netherlands and the UK have no restrictions on share holding for life insurers, whereas only Finland, Germany and Sweden (at a very high level) limit the share holdings of pension funds. Unquoted shares, real estate and loans are also commonly restricted for life insurers. The UK has no restrictions at all on domestic asset holdings, except for a 3% cash limit for life insurers. Note that in Canada, Japan and the US, life insurance regulations apply to all assets of the company, whereas in the EU the restrictions only apply to investments against technical provisions. It has been suggested in Section 2.1 above that the latter is perhaps more appropriate, as the surplus and free capital correspond to the equity of the firm and not to its liabilities.

Concerning **self investment**, this is typically banned for life insurers altogether, while for pension funds it is typically limited to 10% (whether or not there are prudent person rules), to protect against insolvency of the sponsor. Finland is unusual in that the maximum is 30%. US defined contribution funds and Japanese funds also have no limits, as is also the case for German and Japanese book-reserve pensions. Only for a few countries are there ownership concentration limits for unrelated firms, as in Canada and Sweden (these rules seek to prevent concentration of power in corporate governance rather than avoiding insolvency of the institutional investor).

As regards **foreign asset restrictions**, these tend to be more stringent for life insurers than pension funds, in line with the nature of the liabilities. There are typically two types, namely matching limits that usually apply to investments against technical provisions, and overall restrictions which apply to the portfolio as a whole. This is even the case where both pension funds and life insurers have prudent person rules, where Netherlands, UK and US life insurers are indeed subject either to currency matching or foreign asset restrictions, while pension funds have no restrictions. Finnish “prudent person rules” for pension funds

³³ Source: OECD (2000).

entail a currency matching limit and even more stringent limits on foreign asset holdings, and a separate limit on holdings in “other EU states”. In some countries, pension fund rules are more restrictive than those for life insurers, which is a paradox given the longer-duration and wage linked nature of the liabilities. An example is Canada where there are no limits for life insurers but pension funds have a foreign asset maximum of 20%. In Germany, pension funds again appear to have a stricter limit, with a 6% limit on foreign investment which is not present for life insurers. It may be added that EU life insurance sectors take the common Third Life EU Directive rules (80% matching in particular), with similar rules applying to Finnish and German pension funds.

This section has shown that in general pension fund asset regulation is lighter than life insurance, with prudent person rules being more common, while quantitative regulations which apply tend to be easier. This is consistent with the argument presented in Section 3, that portfolio restrictions are more appropriate - or at least less damaging - for life insurers than for pension funds. There are some exceptions, as in Canada, Germany and Finland, where pension funds face tougher restrictions for some or all asset types.

4.2 Assessment of portfolios in the light of asset restrictions and other influences

We set out to consider how sector portfolios differ, depending on whether there are quantitative restrictions, as well as seeing whether the restrictions actually bind. We also note some other key influences on portfolios. Tables 6 and 7 present data for end-1998, derived from various sources, on the life insurance and pension fund sectors in the countries noted above, together with France.

Taking the countries together on average, **portfolios with prudent person rules have fewer bonds, more equities and foreign assets than those with quantitative restrictions.** The differences for domestic assets are slightly greater for pension funds than for life insurance, and markedly so for foreign assets. Such a contrast would be much greater if the countries which have recently switched to a prudent person approach for pension funds (such as Japan) were excluded, as they are slowly adjusting to the new regime.

Tables 8 and 9 shows some tentative estimates of the **degree to which constraints on portfolios bind.** For pension funds, German, Canadian and Swedish limits on foreign assets are close to being attained, as well as Canadian limits on property. Elsewhere average portfolios fall well short of limits. For life insurers, it will be recalled that restrictions in the EU tend to apply to assets backing technical provisions. Foreign asset limits (for all insurance companies) are breached in Sweden probably for this reason.

Similarly, the overshoot shown for the US reflects the fact that only some states, following New Jersey, impose a 15% limit. Equity limits seem tight in Canada and Sweden, and foreign currency limits in the UK. Elsewhere there is considerable headroom. Note that the interpretation of headroom could be on the one hand that there is no effect of the restrictions on normal business - or on the other that the existence of such restrictions may lead to very cautious portfolio management to avoid ever breaching them even if markets soar. The distinction is hard to test. Caution in portfolios may also link to accounting and solvency limits, as discussed below.

A few further remarks may be relevant. Whereas portfolio restrictions are aimed to prevent overconcentration of risk in individual assets, portfolio regulations may operate contrary to this; Swedish pension funds, for example, have considerable exposure to housing markets via mortgage related bonds, and loans to housing credit institutions. Together with mortgages, these amounted to no less than 35% of Swedish funds' assets in 1998. These imply a sizeable exposure to potential effects of recession and falling house prices. Even countries with "prudent person rules" may not leave equity investment entirely unrestricted. Trzcinka (1998) maintains that US defined benefit fund managers target a fixed income ratio of around 40% owing to the prudent person rule (although the minimum funding regulation may be more influential). Davis (1995) reports that Dutch funds were at least till the early 1990s subject to unofficial tolerance limits for equity exposure of 30%, imposed by the supervisors.

Also of interest is the econometric results of Davis (1988) of the scope of **tactical asset allocation** for life insurers and pension funds in the US, UK, Germany, Japan and Canada. These estimates showed that changing portfolios are strongly influenced by relative asset returns (implying tactical asset allocation) where there are few regulations governing portfolio distributions and low transactions costs, as in the US and UK. Adjustment to a change in such returns in these countries is generally rapid. Assuming adequate information and appropriate incentives to fund managers, this should imply an efficient allocation of funds and correct valuation of securities. In Davis' research, these results did not all hold where transactions costs are high and portfolio regulations are strict - e.g., in Germany, Japan and Canada. In these countries adjustment to a change in returns is somewhat slower, implying that portfolios are relatively invariant to changes in asset market conditions. These estimates illustrate a certain inflexibility of portfolios to market conditions when portfolio restrictions apply. These could apply either directly owing to the limits themselves, or indirectly if portfolio regulations promote a cautious and uncompetitive asset management sector.

We now go on to note some other influences on portfolios which may complement, interact with or override those of portfolio regulations:

- **solvency and minimum funding rules** and their interaction with associated accounting arrangements may play a crucial role in influencing portfolios, and may account for the non binding nature of the portfolio restrictions themselves. This is because they determine the size and volatility of the surplus, as well as defining the rules for dealing with a corresponding deficit. They hence influence the likelihood and cost of any deficiency, and hence the importance for life insurers and pension funds of maintaining a stable valuation of assets relative to liabilities, independent of portfolio limits.

For example, as noted by Dickinson (1998a), there is some evidence “that actuarial asset/liability valuations have inhibited life insurance companies investment policies...putting greater concern on the short term investment positions when the real investment risks facing life insurance companies are essentially long term”, thus inhibiting investment in securities with volatile prices such as company shares. He notes that such rigor in respect of solvency is particularly unnecessary where there are no high guaranteed surrender values on policies. Similar arguments can be made in respect of defined benefit pension funds, which are widely subject to strict minimum funding rules (Davis 1998a).

- **minimum rates of return** set annually by regulation can constrain diversification even when quantitative limits are not stringent (OECD 2000). This is because they limit holdings of volatile assets which could reduce returns below the limit in one year, even if they offer a high mean return;
- as regards **accounting standards**, application of accounting principles which insist on positive net worth of the fund at all times, carry equities on the balance sheet at the lower of book value and market value and calculate returns net of unrealised capital gains (as in Germany and Switzerland) restrain equity holdings by life insurers and pension funds independently of the portfolio regulations (see Hepp 1992).
- **liabilities** have a major influence, for example on the share of bonds, in that:
 - inflation sensitivity** of liabilities will determine the demand for assets acting as inflation hedges such as index linked bonds, as well as assets whose return is unaffected by inflation such as real estate and equities; nominal liabilities require only money fixed assets;
 - the need for **cash flow** will play an important role by determining the need for liquidity to meet (known or uncertain) cash flows, for example in the context of growing maturity of pension funds, and policy loans/early surrender for life insurers;
 - duration** of liabilities in combination with the strictness of minimum funding and solvency rules will set a benchmark for the duration of assets - or if they are not matched, to the scope of interest rate risk;

Note that besides differing between countries, these factors will differ strongly between individual life companies and pension funds.

- higher **taxation** on bonds than equities makes the former an attractive investment to tax-exempt investors such as pension funds
- **ownership and control** of pension funds may influence portfolios, via the degree of risk aversion of those controlling the fund and the degree to which those holding residual risks (i.e. benefiting from a surplus or funding a deficit) can control asset distributions. Similar differences may exist between mutual and listed insurance companies, where the latter may be more aggressive in risk taking.
- concerning **international diversification**, in small countries the assets of institutional investors may exceed the entire domestic equity market, and hence simple liquidity considerations necessitate international investment, abstracting from risk/return considerations, if regulations permit.
- the **structure of insurance and asset management** markets and related levels of competition is likely to impact on the efficiency of investment. In particular, protection of fund managers from external competition may lead to a sub-optimal investment strategy from the point of view of beneficiaries with low yielding assets held as well as high commissions charged;
- whereas in principle capital market activity should ensure that asset returns are equalised across countries, owing to international investment restrictions, exchange controls etc. this has not always been the case in the past, resulting in markedly **different real returns on assets (Table 1)**. In this context, inter country differences in strategic bond holding may also relate to asset returns.
- **financial structure** more generally may have an important role to play. In traditionally bank-dominated economies where capital markets play a subordinate role, it is loans that often dominate the portfolios of long term institutional investors.

4.3 Returns on life insurance and pension fund portfolios

In order to assess the effects of portfolio regulations more directly, we **estimated the returns on life insurers' and pension funds' portfolios**, using aggregate data for the respective sectors in seven of the nine countries considered in Section 4.1. This was done by weighting the various components of the asset

portfolio by the annual total holding period returns (including capital gains or losses)³⁴ obtained on the corresponding instruments in the market. The implicit assumption is that the institutions are holding the index portfolio³⁵ in each instrument, while transactions and administrative costs, which would otherwise act to reduce returns, are disregarded. Clearly, this is a simplistic exercise and conclusions should be drawn cautiously. In particular, following the discussion in Section 1, the degree to which the (nominal or real) return and the standard deviation alone can be used to assess the optimality of portfolio choices is limited, given that the nature of the liabilities may justify some alternative approaches to investment (such as immunisation or shortfall risk minimisation) not focused on risk and return alone. Note also that we are mainly testing the efficacy of strategic asset allocation, and to a lesser extent tactical asset allocation but not security selection - although the latter may also be affected by portfolio regulations.

Data for life insurers are only available for the period since 1980, so for comparison we show the data for pension funds over the same period. This is rather shorter than is ideal, since it covers mainly a period of falling inflation and favourable market returns, that may not be typical of experience over longer periods. We include as a memo item longer term returns for pension fund sectors (derived in Davis and Steil 2000).

With these caveats in mind, we **present the results in Tables 10 and 11. We focus on average real annual returns** as the most relevant comparison, given the varying inflation rates between the countries concerned. Pension fund sectors are shown on average to have similar real returns to life insurance sectors, despite the difference in liabilities discussed in Section 2. The sectors with prudent person rules have higher returns than those with restrictions, both for life insurance and pension funds. The average difference between prudent person and restrictions is however greater for pension funds - of the order of 200 basis points as compared with 90 basis points for life insurers. Hence, the relative impact of portfolio regulations appears to be greater for pension funds than life insurers, consistent with the arguments presented above which suggested they may be less appropriate for pension funds. In effect, if we assume that sectors with prudent person rules are optimising, the loss of returns arising from quantitative restrictions is implied to be much less for life insurers than for pension funds.

³⁴ For some investors, holding period returns on bonds will be less relevant than redemption yields, e.g. when they are to be held to maturity. But this would not be in line with a market value basis for accounting – which is itself arguably most relevant for profitability and solvency.

³⁵ In practice there are vast differences between individual funds and companies in the returns they provide. As an illustration, Blake (2000b) shows that there is for example a 4.1 percentage point difference in the UK equity growth mutual fund sector between the top and bottom quartiles, and 5.9 percentage points for smaller companies. If sustained for 40 years, such performance could lead to accumulated funds 3.2 and 5.3 times larger for choosing the top rather than the bottom quartile.

While comparing sectors with prudent person rules, the average annual return for pension funds is 30-50 basis points above those for life insurers. This is consistent with the stronger link of liabilities to real earnings for pension funds, which would necessitate higher returns. For countries with restrictions, the returns are lower for pension funds than for life insurers by 80 bp. This is a large difference, which is not consistent with the differing nature of liabilities. As regards risk, the data suggest that the volatility of real returns for countries with asset restrictions is actually higher than with prudent person rules. (This is however largely a consequence of high volatility in Sweden.)

The 1970-95 data for pension funds, included as a memo item, suggests that the difference between prudent person and restrictions is rather less over a longer period - around 80-100 basis points. Meanwhile, the standard deviations are higher for prudent person, as might be anticipated. These outturns show that superior returns by prudent person sectors are not just a quirk of the 1980-95 data period.

Besides looking at absolute real returns, **it is also relevant to compare realised returns with benchmarks**. Are life companies and pension funds optimising given the opportunities, which may differ markedly between countries? Two benchmarks are proposed, first the returns on a portfolio with 50-50 domestic equities and bonds, and second a global portfolio of 50-50 international bonds and equities, distributed across the other markets with rough GDP weights. We also look at the returns on pension funds relative to average earnings, given an excess of returns over average earnings growth is essential to the viability of pension funds. The returns on the benchmarks are shown in Table 12. It is shown that there are marked cross-country differences over 1980-95, despite the ongoing global integration of capital markets. The annual real domestic returns vary from 10.4% in Germany to 6.6% in Canada. The global returns are more comparable, but still vary somewhat owing to the differing experience of exchange rate depreciation. They vary from 10.4% in Sweden to 9.3% in Germany. Note that in many cases a global portfolio offers a better risk/return trade-off than a domestic one.

Looking at the comparison of the portfolio returns with the benchmarks, it is evident that **sectors do not always profit fully from the available opportunities**. This is notably the case for Japan, the Netherlands and Sweden (for domestic assets) and Sweden (for the global portfolio), where returns are more than 400 basis points below a 50-50 portfolio of bonds and equities. On the other hand, risks on the institutional sectors' portfolios are generally lower than for the benchmarks, reflecting wider diversification. Looking at the averages for different types of portfolio regulations, the results are revealing. **For life insurers there is rather little difference** between prudent person and quantitative restrictions in the average shortfall for a 50-50 domestic portfolio, which is 2.2% for pension funds and 2.7% for life insurance. There is an 80 basis point lower shortfall for prudent person sectors on a global

portfolio. In contrast, **for pension funds there are major differences**. For a 50-50 domestic portfolio the difference in the shortfall between prudent person and quantitative restrictions is no less than 280 basis points, and 220 for the global portfolio. The excess over average earnings, while it is adequate on average during this bull market for both sectors, is nevertheless 2 percentage points higher for prudent person sectors.

Despite all the caveats that were introduced at the beginning of this section, one conclusion is clear, namely that **pension fund sectors with quantitative restrictions tend to suffer much more relative to prudent person sectors than do life sectors with restrictions**. Over 1980-95 there was not even an offsetting benefit in terms of risk reduction, if one focuses on the volatility of real holding-period returns. Given liabilities are not greatly dissimilar across countries for pension sectors, this indicates that portfolio restrictions raise costs unduly and are damaging to employee retirement security. In contrast the restrictions appear to be less damaging for life companies, although some reduction in return is apparent for no reduction in risk.

Conclusions

Summarising the main points of the paper, we have seen that there are a number of paradigms of investment which imply differing strategic and tactical asset allocation, and a varying importance of risk and return per se as a criterion for performance. Meanwhile equities and international assets are shown to be higher risk than domestic government bonds, but also offer a disproportionately higher return. There are strong arguments for the benefits of international diversification in terms of risk reduction, especially for countries with small and volatile domestic capital markets. Turning to the long term institutional sectors, the nature of liabilities are the key to understanding appropriate investments of life insurance companies and pension funds. There are a number of fundamental differences between the two types of institution which make it unlikely that identical asset regulations will be appropriate; in particular, pension funds are likely to have a returns-benchmark of average earnings, while life companies need at most to seek to beat inflation. Varying duration of pension liabilities - and difficulty of matching with a single asset class - may necessitate major shifts from one asset category to another over time, and major differences between funds at any given time. Life insurers are better able to control the duration of liabilities via the mix of policies sold.

Turning to regulatory issues, the overall case for regulation of institutional investors is strong, but also there are a wide range of potential regulations, some of which may substitute for others. In terms of portfolio regulations, both prudent person regulations and quantitative restrictions seek principally to

ensure diversification, albeit by differing routes. The former focuses on the process of investment, while the latter focuses on the individual instruments held. There are strong arguments in terms of financial economics for a prudent person rule for institutional investors, especially if it is combined with appropriate solvency regulations and limits on self investment. The case is particularly strong for pension funds. There are major differences between OECD countries in terms of the actual approach adopted; in some countries, the rules vary markedly between life insurance and pension funds, while in other cases identical rules apply, even though liabilities may differ. In most countries it is life regulations which are tighter than those for pension funds, although this is not universal.

The actual portfolios of life insurance companies and pension funds in OECD countries reflect a number of factors in addition to the portfolio restrictions and hence the effect of the restrictions is not easily evaluated; on the other hand, a general tendency can be discerned for sectors facing prudent person rules to have a greater share of equities and foreign assets. Constraints vary in the degree to which they bind, but this need not mean that the restrictions have no effect on portfolios. Finally, returns on pension fund sectors are similar on average to life insurers, while the variance of returns between pension fund sectors with prudent person and portfolio regulations are greater than for life insurers.

We suggest that the key points for policy purposes are that prudent person rules are generally preferable to quantitative restrictions for pension funds, except in certain specific circumstances which may arise notably in emerging market economies. Even if such circumstances currently hold (e.g. inexperienced regulators and poorly developed regulatory structures), quantitative restrictions should not in our view be seen as desirable in the long term. Rather, there needs to be a modernisation of such frameworks, which would in turn make implementation of prudent person regulations feasible. Meanwhile asset restrictions are less damaging for life insurance than for pension funds. Since liabilities and associated risks differ markedly between life insurers and pension funds, there is not in our view a strong case for identical regulations. Nevertheless, prudent person rules may be desirable in certain cases also for life insurers, particularly in competitive sectors in advanced countries – and for pension contracts offered by life insurance companies.

Appropriate strategies of deregulation will thus address pension funds first, with an early introduction of prudent person regulations. For life insurers, the choice is less urgent, although it can be argued that prudent person rules become more appropriate, the more competitive the life sector is and the greater the share of variable as opposed to nominal fixed products. Even investment for nominal fixed products may be performed more efficiently if there is permission to use derivatives for hedging.

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Table 1: Real asset returns and risks over 1967-95

Average real return and standard deviation	Loans	Corporate bonds	Shares	Government bonds	Mortgages	Short term assets	Property	Foreign equities	Foreign bonds
Australia	4.8	1.9	8.3	-0.1	3.4	1.8	4.4	7.5	4.4
	5.2	22.4	19.9	18.5	4.2	4.3	18.7	20.7	17.8
Canada	4.2	3.3	5.0	2.0	5.5	2.7	9.4	8.2	5.1
	3.1	12.9	15.8	13.3	2.9	3.3	8.3	17.8	15.0
Denmark	6.6	5.3	5.9	4.4	6.2	2.3		5.2	2.1
	3.5	12.2	25.6	19.1	3.5	2.8		21.4	17.7
France	3.3	3.2	7.7	2.5	4.0	2.9	4.3	6.9	3.8
	3.3	16.2	18.4	15.8	2.5	3.4	14.5	17.2	14.5
Germany	6.8	4.4	10.8	3.9	4.7	3.1	10.9	5.5	2.4
	2.0	15.4	23.8	15.7	1.4	2.1	11.5	21.4	17.4
Italy	4.3		4.1	-2.0		-0.3		7.9	4.9
	3.7		32.5	20.8		4.4		16.3	14.5
Japan	1.4	3.4	8.5	3.1	2.7	-0.2	11.5	7.8	4.4
	4.7	16.3	20.9	19.5	4.7	4.5	19.4	20.4	12.8
Netherlands	4.0	2.8	8.8	2.6	4.4	2.1	5.9	6.2	3.1
	3.4	16.1	26.6	14.1	2.4	3.8	8.3	18.7	13.9
Sweden	4.4	1.7	14.1	1.4	4.3	2.1	10.3	7.7	4.6
	3.8	15.3	31.4	16.3	3.3	3.9	27.1	17.6	15.4
Switzerland	2.8	0.4	7.8	0.0	1.6	1.3	1.7	5.3	2.2
	2.0	20.3	22.8	18.7	2.2	2.0	9.1	19.9	15.9
United Kingdom	1.7	2.1	8.3	1.0	2.7	2.1	1.5	8.0	4.1
	6.1	14.7	17.8	14.9	5.1	4.6	15.3	17.7	15.7
United States	3.8	1.7	6.2	1.2	4.7	2.0	5.6	8.5	5.5
	2.3	13.0	14.8	15.2	2.9	2.3	22.1	18.7	14.9
Average real return	4.1	2.7	8.0	1.7	4.1	1.8	6.5	7.1	3.9
Average standard deviation	3.6	15.9	22.5	16.8	3.2	3.4	15.4	19.0	15.4

Source: Davis and Steil (2000)

Table 2: Inflation and real average earnings growth (mean and *standard deviation*)

	Inflation	Real average earnings
Australia	7.3	1.4
	3.9	3.4
Canada	5.7	1.5
	3.4	2.3
Denmark	7.1	2.6
	3.5	3.4
France	6.3	2.9
	4.2	2.4
Germany	3.5	3.0
	1.9	2.8
Italy	9.4	3.3
	5.9	4.4
Japan	4.7	3.5
	5.1	3.7
Netherlands	4.6	1.6
	2.9	2.6
Sweden	7.7	1.5
	3.0	3.5
Switzerland	3.9	1.7
	2.4	2.0
United Kingdom	8.1	2.8
	5.4	2.2
United States	5.5	-0.1
	3.0	1.8
Average	6.2	2.1
<i>Standard deviation</i>	3.7	2.9

Source, Davis and Steil (2000), own calculations.

Table 3: Performance of global stock indices: 1921-96 (%)

Index	Real return (arithmetic)	Standard deviation	Real return (geometric)
USA	5.5	15.8	4.3
Non-USA	3.8		3.4
Global	5.0	12.1	4.3
Survived markets	4.6	11.1	4.0

Source: Jorion and Goetzmann (1999)

Table 4: Principal regulations for life insurance companies and pension funds

Abbreviations: LI Life insurance contracts; PP Defined Contribution Personal Pensions, DB Defined Benefit Pension Funds, DC Defined Contribution Pension Funds

Issue	Regulation	Applies to life insurance?	Applies to pension funds? Which type?	Main economic issue
Are portfolios of life insurance companies and pension funds adequately diversified and matched to liabilities?	Portfolio distributions	Yes (either PPR or QR)	Yes- Both DB and DC (either PPR or QR)	Monopoly/asymmetric information
Are there adequate funds to pay life insurance obligations/pension promises?	Funding/Solvency	Yes	Yes- DB	Monopoly/asymmetric information
Who should benefit from assets accumulated in excess of guaranteed life insurance/pension benefit promises?	Surpluses/reasonable expectations	Yes	Yes – DB	Fiscal/equity
Regulation of minimum levels of contributions or premia	Contributions, premia and commissions	Yes in highly regulated markets	Yes – DC	Monopoly/Fiscal
Should individuals and companies be obliged to have private pension schemes or life insurance?	Membership	Not LI – possibly PP	Yes – Both DB and DC	Moral hazard/fiscal
Should annuities be inflation-indexed?	Indexation/contract design	Yes – PP only	Yes – Both DB and DC	Monopoly
Should private pensions or life insurance be an addition or partly a substitute for social security?	Integration	Not LI – possibly PP	Yes – Both DB and DC	Fiscal
Should individuals be forced to take annuities from life insurance companies, or are lump sums acceptable?	Annuities	Yes – for PP	Yes - Largely DC	Adverse selection
Should rights under life insurance or pension benefits be insured?	Insurance	Yes, in liberalised markets	Yes - Largely DB	Monopoly/asymmetric information
Can losses on pension funds be avoided when individuals change job, or when individuals wish to shift their assets between life insurance companies?	Portability	Yes – for PP – not LI	Yes - Largely DB	Monopoly/economic efficiency
Should there be controls on the distribution of costs and benefits from life insurance and pension schemes?	Benefits, contract conditions	Yes in highly regulated markets	Yes - Largely DB	Monopoly/equity/efficiency
How can one ensure adequate governance and member representation?	Trustees, fit and proper controls	Yes	Yes – Both DB and DC	Asymmetric information/Monopoly
What information is essential for members to judge the soundness of life insurance companies and pension plans?	Information/consumer protection	Yes	Yes - Largely DC	Asymmetric information
How best to organise these various regulatory tasks?	Regulatory structures	Yes	Yes – Both DB and DC	Economic efficiency

Table 5: Portfolio regulations for pension funds and life insurance companies**CANADA**

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	PPR, maximum 10% in liabilities of one company	Real estate limit to 5%	Maximum 10% self investment; maximum 30% of shares of one company	No currency matching limit but foreign assets maximum of 20% of fund
Life insurance (maxima applied to all assets)	No PPR	5-25% in real estate and stocks combined; 10% in non mortgage loans (Non life : 25% in shares and 10% in real estate)	Self investment banned, localisation rules apply	No currency matching rules (Non life: foreign investment prohibited)

FINLAND

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	PPR, assets to be diversified and decentralised	Maximum 30% in shares, 5% unquoted shares, 50% mortgage loans, 40% real estate	Maximum 30% self investment.	80% currency matching limit, 5% in foreign currency, 20% in other EU states
Life insurance (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

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	No PPR, deposits with single credit institution limited to 2%	20-25% in equities and 15-25% in property	Maximum 10% self investment	80% currency matching limit; 5% of premium reserve, 20% of other restricted assets; 6% limit on non-EU investment
Life insurance (maxima applied to investments against technical)	No PPR, EU diversification rules (10% maximum of technical reserves in one piece of real estate, 5% shares and	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

provisions only)	5% loans of one borrower)			
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ITALY

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	PPR, debt and equity of one issuer limited to 15% of fund	Maximum 20% liquidity and 20% in closed end funds	20% in one company or 30% for multiple sponsors. May not hold more than 25% of a closed end fund's assets	Minimum 33% matching. Securities of OECD countries not traded in regulated markets limited to 50%; non OECD securities traded in regulated markets limited to 5% (forbidden if traded in non regulated markets)
Life insurance (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 (Non-life: 35% real estate and 50% mortgage loans)	Self investment banned, localisation rules apply	80% currency matching limit overall; 20% may be held in foreign shares and 50% in other foreign securities (Non-life, 10% in foreign shares and 30% in other foreign securities)

JAPAN

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	PPR	None	Self investment permitted	None
Life insurance (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

Note: rules for pension funds apply to Employee Pension Funds, while Tax Qualified Pension Funds bear no investment restrictions. Both EPFs and TQPPs were subject to quantitative restrictions till the late 1990s.

NETHERLANDS

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	PPR, investment policy to be sound consistent and transparent, diversification required by sectors, countries and currencies	None	Self investment limited to 5%, except for surplus assets where it is 10%	None
Life insurance (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 (Non-life: 5% in unsecured loans)	Self investment banned, EU localisation rules apply	80% currency matching

SWEDEN

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	No PPR, investment in one company limited to 10%	Maximum 60% to be held in shares	Self investment limited to 10% Maximum 5% of shares of one company	Currency matching required. Foreign assets limited to 5-10% of the fund
Life insurance (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

UNITED KINGDOM

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	PPR, concentration limit to DC funds	Maximum 10% in any one mutual fund and 25% in funds run by one manager.	Self investment is limited to 5%	None
Life insurance	PPR, maturity matching required	Maximum 3% in cash		80% currency matching

UNITED STATES

	Prudent person rule/diversification rules	Quantitative restrictions on domestic assets	Self investment and ownership concentration	Foreign asset restrictions
Pension funds	PPR, general requirement for diversification	None	Self investment limited to 10% for DB funds	None
Life insurance (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 (Non-life 40% in shares) New Jersey 15% in shares, 10% real estate, 60% mortgages (Non-life 5% real estate and 40% mortgage loans)		No currency matching rule; aggregate limits on foreign assets of 0-10% imposed at state level. Canadian investment more liberalised

Sources OECD (2000), Dickinson (1998)

Table 6: Pension funds' portfolio composition 1998

percent	Liquidity	Loans	Domestic Bonds	Domestic Equities	Property	Foreign assets
UK	4	0	14	52	3	18
US	4	1	21	53	0	11
Germany	0	33	43	10	7	7
Japan	5	14	34	23	0	18
Canada	5	3	38	27	3	15
France	0	18	65	10	2	5
Italy	0	1	35	16	48	0
Netherlands	2	10	21	20	7	42
Sweden	0	0	64	20	8	8
Finland	13	0	69	9	7	2
Average	3	8	40	24	9	13
Prudent person	5	4	33	29	10	15
Restrictions	0	17	57	13	6	7

Sources: National flow of funds balance sheets, Mercer (1999). In Tables 6-13, the categories "prudent person" and "restrictions" reflect the classification in Table 5.

Table 7: 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: National flow of funds balance sheets, OECD. Data for Sweden cover all insurance companies

Table 8: Pension funds' shortfall relative to main portfolio restrictions

percent	Equities	Property	Foreign assets
Germany	15	18	-1
Canada		2	5
Italy			33
Sweden	40		2
Finland	26	33	18

Table 9: Life insurers' shortfall relative to main portfolio restrictions

percent	Equities	Property	Foreign assets
UK			7
US	-11	25	9
Germany	23	21	20
Japan	20	20	21
Canada	-1	18	
Italy	28	48	20
Netherlands		5	10
Sweden	-2	20	-7
Finland	39	28	20

Data for Sweden cover all insurance companies

Table 10: Estimated returns on pension funds' portfolios (1980-95)

	Nominal return	Standard deviation	Real return	Standard deviation	Memo: 1970-1995 real returns	Memo: 1970-1995 Standard deviation
UK	15.8	8.7	9.8	9.7	5.9	12.8
US	13.2	9.2	8.4	10.9	4.5	11.8
Germany	9.7	7.0	6.7	6.9	6	5.9
Japan	8.9	9.1	6.9	9.4	4.4	10.2
Canada	12.4	10.0	7.5	10.6	4.8	10
Netherlands	9.2	6.3	6.3	6.7	4.6	6
Sweden	11.5	15.2	4.9	15.9	2	13.1
Average	11.5	9.4	7.2	10.0	4.6	10.0
Prudent person	11.9	8.7	7.8	9.5	4.8	10.2
Prudent person (excluding Japan)	12.7	8.6	8.0	9.5	5.0	10.2
Restrictions	10.6	11.1	5.8	11.4	4.0	9.5

Source, Davis and Steil (2000), own calculations.

Table 11: Estimated returns on life insurers' portfolios (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

Table 12: Pension fund and life insurance real returns and benchmarks (1980-95)

		Real return for life insurance	Real return for pension funds	Real return on 50-50 domestic equities and bonds	Real return on global portfolio 50- 50 equities and bonds	Real average earnings growth
Canada	Mean	6.9	7.5	6.6	10.6	0.3
	Standard deviation	6.6	10.6	13.1	14.1	1.2
Germany	Mean	7.8	6.7	10.4	9.3	1.4
	Standard deviation	3.7	6.9	18.4	18.4	1.4
Japan	Mean	5.5	6.9	9.6	8.9	1.4
	Standard deviation	6.7	9.4	14.5	9.8	1.3
Netherlands	Mean	7.1	6.3	11.4	9.9	0.1
	Standard deviation	5.1	6.7	19.5	13.7	1.7
Sweden	Mean	6.1	4.9	10.3	10.4	0.3
	Standard deviation	14.4	15.9	21.7	15.3	2.4
United Kingdom	Mean	8.7	9.8	9.2	10.2	3.0
	Standard deviation	8.4	9.7	11.9	15.2	1.2
United States	Mean	6.7	8.4	8.7	10.0	-0.8
	Standard deviation	9.8	10.9	12.6	15.5	1.4

Source, Davis and Steil (2000), own calculations.

Table 13 Comparing pension fund and life insurance real returns with benchmarks

Real return on	Life insurance less:			Pension funds less:		
	50-50	Global	Real earnings	50-50	Global	Real earnings
Canada	0.3	-3.7	6.6	0.9	-3.2	7.2
Germany	-2.6	-1.5	6.4	-3.7	-2.6	5.3
Japan	-4.1	-3.4	4.1	-2.7	-2.0	5.5
Netherlands	-4.3	-2.8	7.0	-5.0	-3.5	6.2
Sweden	-4.2	-4.3	5.8	-5.4	-5.6	4.6
United Kingdom	-0.5	-1.5	5.7	0.6	-0.4	6.9
United States	-2.0	-3.3	7.5	-0.3	-1.6	9.2
Average	-2.2	-2.9	6.5	-2.2	-2.7	6.4
Prudent person	-2.2	-2.5	6.7	-1.8	-1.9	6.9
Prudent person excluding Japan	na	na	na	-1.6	-1.8	7.4
Restrictions	-2.7	-3.3	5.7	-4.6	-4.1	4.9

Source, Davis and Steil (2000), own calculations.

Annex: Necessary capabilities for regulating long term institutions

Developing countries often lack the pre-existing capacity to regulate financial markets and institutions. A general point made by Vittas (1993) is that a country which is unable to manage well an unfunded or funded public pension system, because of administrative inefficiency, shortage of skilled personnel or political interference would most likely be unable to regulate and supervise a private pension system, be it mandatory or voluntary, or a competitive and liberalised life sector. Ability to enact clear rules and penalise malfeasance in a predictable way will likely be lacking in such cases (James and Vittas 1995). It may be added that pension and insurance regulators typically rely on other regulators such as those of securities markets (e.g. to prevent insider trading in equity markets) and financial institutions (notably of banks) and regulation of long term institutions can thus not be seen in isolation (Turner and Rajnes 1995). Mitchell (1997) notes in addition the need for efficient oversight of contributions via computerisation and secure record keeping. A further complement for regulation is use of a sound accounting methodology such as the FASB of the US, including a requirement to mark assets to market.

Vittas (1994) sets out some specific aspects of the regulatory structure that are needed in order to introduce an effective mandatory funded pension system, which also apply to life insurance and voluntary pension schemes. In particular, he notes that it may be necessary to create or reorganise insurance regulatory agencies, which have traditionally been concerned with the verification of compliance with arbitrary price and product controls, to rather emphasise market discipline, solvency monitoring and consumer protection, and to employ experienced professionals. They may need extensive training, perhaps aided by close links with agencies in OECD countries and international financial organisations, and also consultation and co-operation with market professionals. Such training should be of regulators and professional staff, as well as fund managers, actuaries, accountants and auditors.

Furthermore, developing countries need to strengthen the supervisory and intervention powers of regulators. They must be independent of the regulated institutions. To ensure systemic stability, and compliance with solvency, investment and consumer protection rules, regulators have to exercise effective supervision via off-site surveillance and on site inspections. They need effective intervention powers to enforce corrective measures. They must establish objective criteria for entry and exit, setting out authorisation criteria for insurance companies and pension fund managers, establishing rules for the exit of insolvent firms and opening the market for new entry from domestic and foreign firms. Markets dominance by a small number of government controlled insurance companies is a recipe for low returns. Openness to new entry³⁶ while ensuring stability may require moderate but not excessive capital requirements.

³⁶ This openness may help to create a contestable market, wherein a seeming oligopoly situations may be characterised by competitive behaviour on the part of existing firms, because of the potential for new firms to enter in a "hit and run" manner in response to excess profits.