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POLICY RESEARCH WORKING PAPER 1229

The Structure, Regulation, and Performance of Pension Funds in Nine Industrial Countries

E. P. Davis

Company pension funds can make important contributions to retirement income and to capital market development. But they need to be regulated and supervised to avoid fraud; protect the interests of workers, and minimize restrictions on labor mobility.

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Summary findings

Davis offers an overview of issues relating to the development of funded pension schemes in industrial countries. The analysis applies the economic theory of pension regulation to experience with the structure, regulation, and performance of funds in nine countries — Canada, Denmark, Germany, Japan, Netherlands, Sweden, Switzerland, the United Kingdom, and the United States — seeking to shed light on the finance of old age security in developing countries and the reform of pension funds in industrial countries.

The main points of the analysis are as follows:

- Pension funds are either defined benefit or defined contribution. The individual bears more risk with defined contribution plans because the pension benefit depends on asset returns. Conceptually, defined benefit funds offer better "employee retirement insurance." Private defined benefit pensions are generally available only through companies and typically include some restriction of labor mobility.
- Because of some shortcomings of fully or largely funded plans, especially for income redistribution, governments have chosen to maintain at least basic levels of pay-as-you-go social security. The scope of such unfunded social security schemes is the key determinant of the scale of private retirement saving.
- The extent to which pension funds are used as a vehicle for retirement saving depends on the regulatory regime. Tax advantages are the most important incentive, but a wide range of other regulatory choices also make pension funds more or less attractive to firms and employees. And some regulations, such as those affecting the portability of pensions, may have important consequences for economic efficiency. Though countries differ widely in their regulation of pension funds, some suggestions for good practice can still be made.
- Whether pension funds are a cost effective way of providing pensions depends on the real asset returns that can be attained, in relation to the growth of real wages. Ideally, there should be a gap of 2 to 3 percent between them. Portfolio distributions and fund management are the key determinants of returns to pension funds, subject to the returns available in the market. Prudent diversification in domestic and foreign markets and indexation of much of pension funds' portfolios both appear to be important.
- Pension funds affect capital markets in many ways. They influence market structure and demand for securities; stimulate innovation, allocative efficiency, an market development; and have a positive effect on overall saving. They may also have some deleterious effects, such as increases in volatility, "short termism," and weakening of the control exerted by investors and creditors over firms.
- Prospects for pension funds in industrial countries vary with the maturity of existing funds and the generosity of social security benefits. In countries such a France, Germany, and Italy, growth in coming decades could be sizable.
- The key recommendations for countries that are just starting pension funds are for a mix of social security an private funds; for separate funding rather than "book reserves;" for defined benefit plans, subject to appropriate regulation; and for company-based pension funds.

The paper — a product of the Financial Sector Development Department — was prepared as background material for th forthcoming Policy Research Report on Income Security for Old Age. Copies of this paper are available free from the Worl Bank, 1818 H Street NW, Washington, DC 20433. Please contact Priscilla Infante, room G8-118, extension 37642 (5 pages). December 1993.

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THE STRUCTURE, REGULATION AND PERFORMANCE OF PENSION FUNDS IN NINE INDUSTRIAL COUNTRIES

E P Davis

This paper was prepared as background material for the forthcoming Policy Research Report on "Income Security for Old Age". The views expressed are those of the author, who is with the Economics Division of the Bank of England, and not necessarily those of his employer. The author thanks J-P Beguelin, Z Bodie, D Blake, N Collier, S Hepp, E Kroeger-Lohrey, F Lauritzen, W Naef, D Vittas and participants in a seminar at the World Bank for comments and suggestions, K Faulkner and S Friend for assistance with typing and K Woodfine for research assistance.

Contents

INTRODUCTION

This paper provides an overview of the principal policy issues relating to pension funds, illustrated by data and details of current practice for a selection of advanced countries, namely the US, the UK, Germany, Japan, Canada, the Netherlands, Denmark, Sweden, and Switzerland. Given its largely pay-as-you-go system, France is given limited coverage. The definition of pension funds employed is of financial intermediaries, usually sponsored by non-financial companies, which collect and invest funds on a pooled basis for eventual repayment to members in pensions.

The work is structured as follows; in the first section we provide key definitions and an outline of the general economic issues relating to pension funds, many of which are developed and illustrated in the rest of the paper. In the second section we give an overview of the different structures for old age security, and the role of pension funds in the countries studied, which is both of direct relevance to the issues addressed and key background for the rest of the analysis. The third section addresses the main issues in pension fund regulation (including fiscal treatment), and seeks to assess whether there is any consensus on "good regulatory practice". Among the key issues are tax treatment, rules on funding, portfolio regulations, benefit insurance, protection against insolvency and fraud, vesting, ownership of surpluses and the mechanics of supervision.

The fourth section assesses aspects of the performance of funds. To the extent that the available data permit, the level and nature of benefits paid, contributions and administrative costs of pension funds to the company are compared. The key influence on returns and hence costs of providing benefits, namely portfolio distributions, are compared and related to asset returns, capital market structure, the nature of liabilities and regulation. Estimates of pension fund returns are presented[1] and the nature of the fund management process considered. Some qualitative effects on capital markets are also discussed, notably effects on innovation, market structure, supply of funds and the development of securities markets. A final section offers a summary, takes a view of prospects in advanced countries, and assesses issues and makes recommendations for countries seeking to set up pension funds de novo.

1. GENERAL ISSUES AND DEFINITIONS

Pension funds, which can be defined as financial intermediaries, usually sponsored by non-financial companies, which collect and invest funds on a pooled basis for eventual payment to members in the form of pensions, are among the most important institutions in certain national financial markets. For example, in 1988 in the US, pension funds held 17% of equities, in the Netherlands funds accounted for 40% of personal sector assets, and in Switzerland their assets were equivalent to 68% of GDP. In contrast, in other advanced industrial countries such as France, Germany, and Italy, funds are of minor importance (reasons for this are assessed below). Reflecting these patterns, most economic analysis has been performed in countries such as the US, the Netherlands, and the UK (see for example Bodie (1990a), Turner and Daily (1990), Van Loo (1988), Blake (1992) and Davis (1988), and their bibliographical references).

Pension funds are of two main types, namely defined benefit and defined contribution, which differ in the distribution of risk between the member and the sponsor (typically a non-financial company). In the former, the sponsor undertakes to pay members a pension related to career earnings, such as a predetermined percentage of final or average salary, subject to years of service. Hence members trade wages for pensions at the long-term rate of return in the capital market, while employers undertake to top up the fund to keep it in actuarial balance. This risk sharing feature is absent from defined contribution schemes, where contributions are fixed and benefits vary with market returns; all the risk is borne by the employee. (In the case of a stock market crash just prior to retirement, such risks for defined contribution plans may be severe - pensioners in the UK who retired in 1974 often had pensions less than half the value of those retiring in 1973.[2]) In addition, with defined benefit schemes there may be a transfer of risk between young workers who can bear investment risk, and older workers and pensioners. This enables such funds to have a high share of equity - trading return for risk. Note that both types may also have life insurance aspects e.g., widows' benefits.

The main features of pension funds can be analyzed partly by contrasting them with other types of provision for old age and financial institution. Hence unlike pay-as-you-go pension funds, where workers' contributions are paid direct to pensioners, large quantities of funds are accumulated by or on behalf of workers to pay their own pensions, and there is no intergenerational transfer. (The relation between pension funds and social security is discussed in Section 2.) Unlike banks, pension funds benefit from regular inflows of funds on a contractual basis and from long term liabilities (i.e., with no premature withdrawal of funds), which together imply little liquidity risk. The main risks are rather those of inaccurate estimates of mortality and lower than expected returns on assets. Defined benefit pension schemes may also suffer from the influence on liabilities of unexpected changes in salaries, transfer payments out of the scheme and legal changes (e.g., equal retirement ages).

Given the nature of liabilities, pension funds may concentrate portfolios on long term assets yielding the highest returns, compensating for the increased risk by pooling across assets whose returns are imperfectly correlated. Pooling is facilitated by the size of pension funds which lowers management, information and transactions costs and facilitates investment in large indivisible assets, such as commercial property. Portfolio distributions and resulting risks and returns are discussed in Sections 4 (b) and (c). Pension funds may in turn aid development of capital markets (Section 5) although this may be hindered by portfolio regulations (Section 3(c)) or the structure and behavior of the fund management sector (Section 4(d)).

Meanwhile, unlike other types of institutional investors (life insurance, mutual funds) pension funds in most countries benefit from tax deferral. Contributions are tax free, as are accumulated interest and capital gains; tax is only paid on receipt of a pension after retirement. (Tax treatment is discussed in Section 3(a).) Hence, for both the sponsoring company and the employee - or for the individual, in the case of

personal pensions - pension funds are superior to alternatives (for the company, unfunded schemes, for the employee, other forms of saving). In addition, pension funds are generally contractual annuities, meaning that lump sum withdrawals are precluded even during the period when claims are payable after retirement. In contrast, for life insurance, early withdrawal is possible (at some cost) and policy loans also entail a degree of liquidity for holders. Members of pension funds are willing to accept low liquidity given potential for higher returns (at greater risk) that contractual annuities permit, supported by benefits of tax deferral and implicit insurance of pension levels (in defined benefit schemes). Pension funds tend also to have much more liberal portfolio regulation than life insurers, partly due to lower risks to solvency resulting from contractual annuities, which again enables them to offer high returns.

As regards economic analysis, pension funds generally clearly have a role to play in the life cycle pattern of saving, with the function of ensuring that sufficient assets are available to provide income after retirement. But more specifically, at a micro level Bodie (1990a) has suggested that pension funds (particularly defined benefit) should be seen as a form of employee retirement insurance.[3] Given risk sharing, insurance is provided against an inadequate replacement rate, social security cuts, longevity, investment risk and (to some extent) inflation. Pension funds are seen as insurance subsidiaries of the sponsoring firm. He suggests this approach explains a number of features of pension funds, notably provision by the employer and the dominance of defined benefit schemes. Employer provision may occur because they have superior information over earnings, which are of key relevance to the employee's long term financial needs; benefit from economies of scale in processing information, employing competent fund managers, etc compared with individuals arranging their own pensions; can implement enforced saving by deferring wages and salaries; can overcome many of the agency problems faced by individuals in dealing direct with financial institutions;[4] and can avoid some of the adverse selection problems of private annuity insurance.[5] Meanwhile, the dominance of defined benefit schemes is because they provide superior insurance to defined contribution[6] - although the implication is also that company-based defined contribution schemes are superior to individual contracts. The balance in the countries studied between defined contribution and defined benefit, and its determinants, are discussed in Sections 2 and 4(a).

Note that the information and insurance arguments for employer provision suggest why the market (insurance companies, options markets, etc) does not (and perhaps cannot) provide defined benefit schemes.[7] But the approach also highlights the fact that, particularly in the absence of separate funding, and legal separation, pension benefits may be vulnerable to risk of default of the firm in question. In contrast, social security pensions are subject to political risk that future governments will not honor benefit promises.

Insurance is not the only way to view pension funds; there is also the tax shelter perspective (which suggests tax advantages to companies are the main reason for growth of funds). From a labor economics perspective, defined benefit funds assist the employer by reducing costs of labor turnover (if vesting is imperfect, i.e., early leavers do not gain a proportionate share of benefits in relation to contributions) and hence funds can be a source of labor market inflexibility. Even with perfect vesting and indexing, workers tend to lose out by changing defined-benefit funds compared with those remaining in one fund, because part of their pensions are based on the low salaries that they earnt early in their careers. Defined contribution schemes avoid these problems. (Portability is discussed in Section 3(f).)

The corporate finance perspective sees defined benefit pension fund liabilities as corporate debt and fund investments as corporate assets which collateralise the pension obligation. (Section 3(d) offers a discussion of funding rules.) Given tax deductability, corporations manage pension funding and investment to maximize benefit to shareholders. This perspective also raises the issue of the status of members as stakeholders in the firm, given ownership of the surpluses - as

well as liability for deficits - rests with the owners of the company. Although the independent status of a fund offers some protection from predators in a takeover, stripping of surpluses and reduction of expected benefits has been a controversial issue (Schleifer and Summers (1988)). (For discussion of policy regarding surpluses, see Section 3(e).)

The paper now goes on to assess the status of funded pension schemes in the structure of retirement income provision in the nine countries studied.

2. STRUCTURE

(a) The Pillars of Retirement Provision

Pension funds are conventionally seen as merely one part of a system of provision for old age. The other so-called "pillars" include compulsory flat-rate social-security pensions[8] (which is usually pay-as-you-go, i.e., workers pay pensioners directly); earnings-related social security, often for those without private pensions (again pay-as-you-go); individual saving, including that via life insurance savings plans and purchase of residential property; support by the family; and work after retirement.

Key macroeconomic and welfare issues arise in this context, particularly from the choice of (public or private) pension systems between funding and pay-as-you-go. The issue arises partly from aging of the population, which as discussed below will put increasing strain on pay-as-you-go systems, as workers and employers become increasingly burdened by social security contributions, (i.e., there will be an increasing problem of competition over domestic resources). Such difficulties will impact on competitiveness, depending on the situation in other countries. If contributions are seen as taxes they will distort the labor supply decision; this does not occur with funding. Pay-as-you-go may also discourage saving and hence capital formation, while funding increases it, thus raising future output for workers and pensioners.

There are nevertheless some arguments against funding. From a welfare point of view (Pestieau (1991)), funding may be objectionable for intergenerational equity[9] (because no transfers are possible between generations,[10] to compensate for a changing economic environment) as well as within generations (well paid workers who stay with one firm benefit most from the fiscal benefits offered). Pay-as-you-go schemes can offer immediate pensions, without waiting for assets to build up. They remove inflation risk to pensioners by linking future benefits to wages. They can provide a higher rate of return to each generation if the sum of wage and employment growth exceed the interest rate. (But if they do not, then there may be a corresponding fall in rates of return and increase in costs per capita.) Funding may adversely influence the exchange rate and the current account if ex ante domestic investment is less than the increase in saving. The increase in saving may depress the domestic rate of return. A trust fund run by the government could be diverted into public consumption, or at least be vulnerable to political influence (private funds avoid this problem). A transition from pay-as-you-go to funding can be difficult, as one generation has to "pay twice", once for existing pensioners via pay-as-you-go, and once for their own pensions via funding.

Also the problem of competition over domestic resources is not entirely removed by funding; instead it is switched from pensioners seeking a share of labor income (via taxation) to claims over the returns on the capital stock. (Vittas (1992) shows their equivalence in a closed economy.) But at least ownership of the capital stock may be a more secure basis for retirement than the willingness of existing workers to pay pensions as in pay-as-you-go schemes. In addition, the potential for conflict over use of domestic resources in the case of funded schemes can be reduced by international investment in (developing) countries that do not face demographic problems. Such diversification would also reduce any adverse effects on the domestic rate of return and the exchange rate.

However, given the conflicting risks arising from funded and pay-as-you-go schemes, analysts such as Vittas (1992) suggest countries are best advised to have a mixture of both.

(b) The Size of Funded Sectors

The data in Table 1 show a contrast between the role of pension funds in the Anglo-American countries (the United Kingdom, the United States, and Canada), the Netherlands and Switzerland,[11] where they account for a sizable part of personal sector saving and wealth, and those in other continental European countries such as Germany and France. Japan occupies an intermediate position, with sizable total assets but small in relation to personal wealth, saving or GNP.

Table 1: Pension fund assets[a], 1988

	Stock of assets (end-1988) $bn	% of personal sector assets	% of GNP	Total net investment $bn	% o personal sector saving	% of GN[b]
UK	475.9	27.2%	57.0%	21.9[c]	71.3%[e]	3.5%
US	1646.7	13.2%	33.8%	72.6[c]	49.9%	1.5%
Canada	130.9	14.1%	26.7%	11.4[d]	38.8%	2.4%
Japan[b]	134.1	2.1%	4.6%	17.0[d]	19.5%	0.6%
Germany[b]	41.1	2.4%	3.5%	4.0[d]	3.9%	0.3%
Netherlands[f]	177.4	39.6%	77.9%	11.6[d]	37.9%	5.1%
Sweden(g)	51.2	-	28.4%	3.8[d]	(i)	2.1%
Denmark(h)	13.1	-	12.9%	1.2[d]	-	1.1%
Switzerland	121.1	-	68.0%	11.1[d]	95.0%	6.2%
Memo: France	27.7	3.1%	3.0%	1.0[c]	1.5%	0.1%

Source: National Flow-of-Funds Data

Notes (a) The table covers only independent funded schemes, which are the main subject of the paper, and hence excludes pension funds managed by life insurers, which in 1988 had assets of $100 billion in the United Kingdom, $628 billion in the United States, $80 billion in Japan and $6 billion in Germany.

(b) The data exclude unfunded Japanese and German pension reserves held directly on the balance sheet of the sponsoring firm (booking). In 1988 these amounted to $87 billion in Japan and $100 billion in Germany.

(c) Flow.

(d) Difference of stock (ie may include some revaluations).

(e) The large balancing item in the United Kingdom national accounts means this ratio may be inaccurately measured.

(f) Includes both public (ABP) and private funds. Private funds alone were $104 billion.

(g) Data for Sweden relate to the ATP scheme, which is a hybrid between social security and funded private schemes (it is nationally coordinated but relies on employers contributions and employers are represented on the investment boards). There are also private schemes in Sweden (ITP/STP) but they are usually booked or unfunded.

(h) 1987.

(i) Not meaningful (saving negative).

Similar contrasts are apparent over time. The proportion of personal sector financial wealth[12] accounted for by pension fund assets, and the ratio to GDP (see Table 2), has increased in all the countries illustrated, although by different amounts. Absolute growth has also been rapid. Real growth in Japan over 1980-8 was at an average of 17% (UK 13.3%, US 8.8%, Canada 6.4%, Netherlands 7.5%).

Savings based life insurance policies, and pension funds managed by life insurers, are of course alternative ways to pension funds of financing retirement. The combined size of life insurance and pension fund sectors has also grown, albeit often more slowly than pension funds alone (Table 3). The principal change in the ordering is in Japan, where the size of the life insurance sector is almost eight times that of pension funds (run by trust banks). In most other countries the size of the life sector is commensurate with the size of its pension funds.

This section now goes on to outline the causes of these differences by reference to structural features of the funds themselves and the main alternative pillar, namely social security. Note that a complete assessment of the causes of the differences in size of funded sectors must also incorporate the arguments presented in sections 3 and 4, which respectively address regulation and performance; these underly the structural differences between funded schemes that are outlined here, as well as the scale of their use as compared with other types of private saving (the "third pillar").

(c) Causes of Differences

What accounts for the differences in the importance of funded sectors in the provision of pensions? Since pension funds comprise financial assets, it is natural to begin with portfolio considerations such as risk and return. However, the majority of pension fund members are affiliated as a consequence of their employment, and such fund membership is often compulsory, although setting up of a fund is not compulsory for the firm, except in Switzerland and France. Therefore rates of return on pension funds do not attract investors in the same direct way as do other types of financial asset. (Although legislation in the United Kingdom outlawing compulsory membership, as well as the development of personal pensions in a number of countries, may make the situation more fluid.) On the other hand, the nature of the benefits offered may provide an incentive to work for a particular firm, making it attractive for that firm to offer a particular type of scheme. For employees, pensions have often been a subject for collective bargaining (particularly in the United States, Denmark, and the Netherlands). And as noted, private annuity markets suffer from imperfections, encouraging employees collectively to press for pension funds to be set up. The more generous the benefits offered, and the wider the coverage, the more assets pension funds will require. Finally, taxation and regulatory provisions, as discussed in Section 3, make it more or less attractive for the firm to offer a pension fund. For employees, too, high marginal tax rates may increase the attraction of tax deferral via pension funds.

But the most crucial point is that private funded schemes cannot usefully be viewed in isolation; the principal alternative to a private pension fund is the state social security pension scheme. Not surprisingly, the growth of private schemes can be related to the scale of social security pension provision, which impose limits on private sector schemes. Note that social security is invariably a compulsory, indexed, defined benefit, and usually unfunded pension scheme.

On the other hand, as noted, the age structure of the population will determine likely future strains on a social security system. As shown in Table 4, rapid aging of the population, with a rising proportion of, retirees, is projected for all advanced countries, but especially those in Continental Europe and Japan (see also Hagemann and Nicoletti (1989)). This results largely from declining birth rates, but also greater longevity and a decline in the amplitude of migration. Where social security is relatively generous (see Table 5), maintenance of promises may lead to vastly increased contributions from the workforce, resulting in a loss of competitiveness due to higher wages and/or a marked reduction in personal income. For example, Mitra (1991)

Table 2: Pension fund assets (as a percentage of GDP)

	1970	1975	1980	1985	1990
UK	17	15	23	47	55
US	17	20	24	29	35
Germany	2	2	2	3	3
Japan	0	1	2	4	5
Canada	13	13	17	23	28
Netherlands	29	36	46	68	77
Sweden	22	2[illegible]	30	29	28
Switzerland	38	41	51	59	69
Denmark	5	5	7	12	15

Source: National Flow-of-Funds data.

Table 3: Life insurance and pension fund assets (as a percentage of GDP)

	1970	1975	1980	1985	1990
UK	43	37	46	83	97
US	37	37	42	49	59
Germany	10	11	14	19	22
Japan	8	10	13	20	41
Canada	31	28	31	39	46(3)
Netherlands	45	51	63	86	107
Sweden	42	48	51	55	63
Switzerland	51	55	70	82	n/a
Denmark	14	14	19	31	n/a
Memo Items:					
France	6	7	7	9	13(1)
Italy	n/a	4	3	6	12(2)

(1) 1988
(2) 1987
(3) 1989

Table 4: Percentage of Population Over 65

	1990	2020	Percent Change	2050	Percent Change
As a percentage of population 15-65					
UK	23.1	25.6	10.8%	30.4	18.8%
Germany	22.5	33.2	47.6%	42.3	27.4%
Netherlands	18.5	28.9	56.2%	38.1	31.8%
Sweden	27.4	33.0	20.4%	35.8	8.5%
Denmark	22.7	30.5	35.6%	39.8	30.5%
Switzerland	25.0	48.1	92.4%	46.0	-5.6%
France	21.0	30.5	45.2%	37.8	23.9%
US	18.7	25.0	33.7%	31.8	27.2%
Japan	16.6	33.7	103.0%	37.6	11.6%
Canada	16.8	29.0	72.6%	36.4	25.5%

Source: Hagemann and Nicoletti (1989)

Table 5: Indicators of the scope of social security pensions

	Payments/GDP (1985)(1)	Social security replacement rate for single worker (1980)(2)
US	8.2%	44%
UK	7.5%	31%
Germany	13.5%	49%
Japan	5.2%	54%
Canada	6.4%	34%
Netherlands	11.8%	44%
Sweden	13.0%	68%
Denmark	9.8%	29%
Switzerland	8.5%	37%
Memo: France	14.4%	66%

(1) Source: Mitra (1991)

(2) Source: Aldrich (1982)

suggests that contribution rates for social security pensions in Germany might rise from a current 14% of labor costs to 23% in 2010 and 30% in 2050. French government calculations suggest a rise from a current 19% to 31-42% in 2040. In Japan the contribution rate would be 30% in 2020 under unchanged policies.

Political problems would be likely to follow such increases, as well as the workforce and industry "voting with its feet" to shift to other countries with lower contributions. Elements of this are already apparent in Germany, where firms are tending to locate new factories in countries with lower social costs. Note that taking the strain via increased public deficits instead of taxation will only postpone the problem until the bonds need to be repaid with taxpayers' money. A rational private sector in the sense of Barro (1974), which anticipates perfectly the future taxes to pay off bonds and immediately adjusts its expenditure accordingly, would not even differentiate the two cases.

Governments are seeking to limit social security commitments, and stimulate private saving for retirement, in the light of these potential burdens. They may also seek partially to fund social security. (Related policies are to increase the labor force participation rate, notably of older or even "retired" people, to encourage immigration, to raise the retirement age,[13] and to seek to promote fertility.) In the light of these policies, and associated expectations of further action, in many countries, individuals now anticipate promises will be scaled down in the light of the burden of such schemes on future wage earners and/or government borrowing. This in turn is stimulating precautionary saving via institutions indeed, private pensions can be seen as a form of private sector insurance against the political risks of a government run system). Section 3 probes more deeply the further question of why increased precautionary saving should occur via pension funds, rather than private voluntary saving of other types.

Structures of Pension Provision in Nine Countries

What are the structures of the pension systems? This section discusses the balance between social security and funded pensions, together with key structural features of the systems which determine the balance between them. These features are summarized in Table 6.

In the UK (Blake (1992)), 70% of workers have a funded pension, of whom 50% are in company schemes. Schemes are quite long-established; the current level of coverage of company schemes was reached in 1967. Defined benefit plans, often with provisions for a degree of indexation, cover all public sector and the majority of private sector beneficiaries. Defined contribution plans declined in popularity during the mid-1970s, an era of high inflation and low real rates of return to investment. Defined benefit plans are obviously vulnerable to deficits during periods of securities market weakness, such as the 1970s, and firms had to make large "topping-up" payments in the late 1970s. More recently (since 1981), asset growth has reflected the strength of capital markets, and with in addition widespread reductions in membership due to redundancy (which reduces projected pension obligations), many schemes became overfunded, with firms taking contribution holidays. And the advent of personal pensions has accompanied a resurgence of defined contribution plans. The development of social security has been favorable to private schemes; employees with company pensions may "contract out" of all but the most basic state scheme, and the government, concerned over future state pension obligations, is offering incentives to individuals without a company scheme to take a personal defined contribution pension instead of an earnings-related state pension. It is also reducing the maximum benefits from the latter.

In the United States (Turner and Beller (1989)), coverage is lower, at 40%. Most primary private funded pension coverage is again in defined benefit schemes (which account for two thirds of pension assets). However, a large number of workers also have supplementary defined contribution plans. From 1975 to 1985 US workers covered by defined benefit plans rose from 27.2 to 29.0 million but fell from 39% to 30% of the workforce, while participants in defined contribution plans rose from 11.2 to

Table 6a: Features of funded pension systems

	UK	US	Germany
Nature of benefits for average member	Largely defined benefit based on final salary.	Primary cover largely defined benefit based on final salary. Supplementary defined contribution plans widespread.	Largely defined benefit with flat rate benefit based on years of service.
Taxation of funded schemes.	Contributions and asset returns tax free. Benefits taxed, except tax free lump sum.	Contributions and asset returns tax free. Benefits taxed.	Employers' contributions taxed as wages; employee contributions and asset returns tax free. Benefits taxed at low rate.
Social security	Low replacement ratio. Scheme members can contract out of earnings related social security.	Low replacement ratio.	High replacement ratio.
Regulation of portfolios	Prudent man concept; 5% self investment limit; concentration limit for defined contribution plans.	Prudent man concept; 10% limit on self investment for defined benefit plans.	Guidelines; maximum 20% equity, 5% property, 4% foreign; 10% self investment limit.
Regulation of funding (see Section 3(d)	Maximum 5% overfund of IBO or PBO. Funding only obligatory for contracted out part of social security.	Maximum 50% overfund of ABO. Higher insurance premia if underfunded.	Funding obligatory for pension funds (Pensionskassen), albeit only up to PBO. Option of booking (tax exempt- pensions taxed at normal rate).
Maturity of funds	Mature.	Mature.	Immature.
Coverage of workforce (approx)	50% (company schemes) 20% (personal pensions)	46%	42%
Insurance of benefits	No (although state guarantees payment of minimum pension if fund defaults).	Yes (special guarantee corporation).	Yes (via insurance supervisors). Booked benefits insured by Pension Guarantee Association.
Portability features	Vesting in 2 years. Indexation of accrued benefits. Transfers must be made to other pension funds.	Vesting in 5 years. No indexation of accrued benefits. Lump sum distribution permitted on transfer.	Vesting in 10 years. Indexation of accrued benefits.
Indexation	Discretionary (to date) but total or partial indexation common in practice (75%).	Full indexation rare (5% of schemes). Discretionary cost-of-living increases common.	Mandatory.

Table 6b: Features of funded pension systems

	Japan	Canada	Netherlands
Nature of benefits for average member	Largely defined benefit based on years of service and career earning or final basic salary. Often taken as a lump sum.	Largely defined benefit based either on final salary or flat rate benefit.	Almost exclusively defined benefit based on final salary.
Taxation of funded schemes.	Contributions tax free. Tax on asset returns. Benefit taxed, except tax free lump sum.	Contributions and asset returns tax free. Benefits taxed.	Contributions and asset returns tax free. Benefits taxed.
Social security	High replacement ratio. Scheme members can contract out of earnings related social security.	Low replacement ratio.	Low replacement ratio.
Regulation of portfolios	Guidelines; maximum 30% equity, 20% property, 30% foreign, 10% one company. Minimum 50% bonds.	Prudent man (since 1987); tax on foreign assets above 10%; 7% limit on real estate.	Prudent man; 5% self investment limit except for ABP (see text).
Regulation of funding (see Section 3(d)	Funding optional. Tax exempt up to ABO only. (Book reserves tax exempt up to 40% of liabilities).	Funding obligatory. Maximum 5% overfund of PBO.	Funding obligatory for IBO or PBO.
Maturity of funds	Immature.	Mature.	Mature.
Coverage of workforce (approx)	37% (funded plans only)	41%	83%
Insurance of benefits	Yes (under wage payment law). Mutual guarantee scheme for EPFs introduced 1988.	No (but social security provides backup).	Contributions insured for one year.
Portability features	Vesting graded between 5 and 30 years for voluntary leavers. Low transfer values for voluntary early leavers.	Vesting after 2 years. Little indexation of accrued benefits.	Vesting in one year. Accrued benefits indexed. Transferability within extensive pension circuits with same conditions.
Indexation	Rare except for part replacing social security.	Provisions rare (6% of private schemes); some discretionary increases.	Indexation almost universal) albeit not mandatory).

Table 6c: Features of funded pension systems

	Denmark	Sweden (ATP)	Switzerland
Nature of benefits for average member	Largely defined contribution.	Defined benefit based on best income years.	Majority of schemes (60%) defined contribution but with targets of 60% replacement rate which contributions adjusted). 40% defined benefit.
Taxation of funded schemes.	Contributions tax deductable. Fund may be taxed. Benefits taxed, including 40% of lump sum.	Contributions tax free. Tax on asset returns (1991) benefits taxed at low rate.	Contributions and asset returns tax free, benefits taxed.
Social security	High replacement ratio.	Low replacement ratio; only for basic needs.	Low replacement ratio; designed to be supplemented by mandatory private scheme.
Regulation of portfolios	Real estate, investment trusts, shares limited to 40%. 60% in domestic debt. No self investment. Only "small proportion" can be invested internationally.	Majority to be in listed bonds, debentures and retroverse loans to contributors.	30% limit on domestic shares. 50% domestic real estate. 20% foreign currency assets, 10% foreign shares.
Regulation of funding (see Section 3 (d))	Irrelevant as defined contribution.	Contribution rate adjusted 5-yearly to ensure. IBO is funded.	Funding compulsary for PBO or IBO.
Maturity of funds		Mature.	Mature (pre-BVG immature (post-BVG).
Coverage of workforce (approx)	30% (company funds) 20% (personal pensions)	90% (compulsory)	90% (compulsory to workers and employers).
Insurance of benefits		State backup as national scheme.	Yes; Government Safety Fund. Small funds backed by insurance companies.
Portability features	Immediate access to own contributions, 5 years total vesting. Transfer values can be negotiated.	Vesting immediate - national scheme and transferability perfect.	Immediate access to minimum contributions; imperfect vesting for employers' excess contributions, with graded vesting between 5-30 years of service.
Indexation	No.	Yes.	Indexing not compulsory but almost universal in practice.

33.2 million (14% to 33%). Advantages of defined contribution plans for the employer include lower regulatory and administrative costs (including avoidance of PBGC insurance premia), as they need not meet the actuarial funding standards required of defined benefit funds; shift of risk to employees, as noted in Section 1, although this should be offset by higher compensation; and self investment being permitted for over 10% of assets.

But in fact Kruse (1991), using US micro data, suggests that rather than a positive shift by employers, with termination of a defined benefit plan, the relative shift to defined contribution relates largely to slower employment growth for firms offering defined benefit plans (although there was some supplementing of defined benefit by defined contribution). Effects of relative costs on shifts towards defined contribution were also not large. Finally, greater economic instability in an industry leads firms introducing new pension plans to choose defined contribution, perhaps due to lower risk.

Social security is the US is again supportive of private schemes; the replacement rate is low (though funds can take full account of social security in paying pensions, so as to ensure a fixed replacement ratio for all levels of income). A recent reform will make social security pensions a smaller proportion of earnings, beginning in the year 2000, and will increase the age at which full benefits are payable. It also introduced a degree of prefunding for social security; funds are accumulated in a trust fund and invested in government bonds. This should in principle reduce any tendency for social security provisions to reduce national saving (while increasing the risk that it will be diverted by the government to unproductive uses). However, as pointed out by Bodie and Merton (1992), it is not clear that government's willingness to repay bonds (or at least, not to devalue them by a bout of inflation) should be any more reliable than the promise to pay pensions, unless the funds are used for productive capital investment, with revenues hypothecated to pay pensions.

In Japan (Murakami (1990), Clark (1991)), tax qualified pension plans (TQPPs), authorized 1962, are similar to Anglo-American funded pension plans, and are available to firms with 1 or more employees. In 1989 they covered 28 of the private sector workforce and held assets of $76 billion. 90% of benefits are taken as a sum. Employee pension funds (EPFs) (19 unlike TQPPs, enable the private plan to replace the earnings related component of social securi (and hence the firm can contract out of earning related social security contributions), and are o available to large firms with 500 or more employees. Benefits are in the form of an annuity equal to the social security pension plus the excess (which has to be at least a further 30%) - often taken as a lump sum. These cover 26% of the workforce and had assets of $143 billion in 1989. Both schemes' "defined benefits" usually relate to final "basic" salary, which may not keep pace with total remuneration, given the importance of bonuses and allowances. These plans coexist with traditional unfunded retirement bonuses, which benefit from a 40% tax deduction for accruing liabilities, payable when they are earmarked through an accounting entry in the books of the firm.

In contrast to the US and UK, social welfare promises in Japan were historically relativel generous, with a prospective "replacement ratio (average pension as a proportion of averag earnings) of over 50 per cent (Table 5), although a reform of 1985 will gradually reduce publi pensions as a proportion of average earnings. A in the US, some assets, amounting to 50% of GDP at present, are accumulated by the state in advance of benefit commitments; this can help allay demographic concerns. Such social security benefit commitments are likely to constrain the growth of pension funds. However, social security in Japan is not payable until 60, while retirement is often at 55, so a private pension can bridge this gap.[14] In addition, as noted companies can opt out of part of social security contributions by paying an equivalent pension.

The German private pension system comprises four main types of scheme (Deutsche Bundesbank (1984)). The largest are unfunded schemes, "direct commitments" (Direktzusagen) on the balance sheets of large firms, which are usually

mutually insured to cover the risk of bankruptcy.[15] In 1990 these were 60% of pension liabilities, valued at DM 181 billion. Another common form of company scheme is "direct insurance" (Direktversicherung) (10%), whereby an enterprise concludes a contract with a life insurer on behalf of its employees. Employees then have a direct claim on the life insurer. Risk and administrative expenses are shifted to the life insurer, but the funds are of no direct use to the firm. An enterprise may also commission a legally independent "pension fund" (Pensionskasse) (1990; 20%; DM 61 billion) or "provident fund"[16] (Unterstützungskasse) (1990; 10%; DM 29 billion) to handle its pension scheme, operating as a mutual insurance association. Pension funds are closest to practice elsewhere. Provident funds face no limit on investment; all can be loaned back to the sponsoring company, and there is no legal right to benefits. However, since 1974 only part of transfers to provident funds have been tax-deductible for firms as an operating expense (all may be deducted for pension funds) and employees' legal rights to benefits have been strengthened, so provident funds have declined.

A recent development is "special security funds" (Kapitalanlagegesellschaften), a form of investment company whereby highly-liquid firms having direct commitments can invest part of their pension provisions in the capital markets. This overcomes the concentration of risk inherent in booking the liability on the firm's balance sheet. Given the attraction of exemption from capital gains tax and turnover tax these have grown rapidly; inflows were DM 19 billion and assets DM 116 billion in 1990, although only a part of these were counterparts to pension liabilities.

The development of German private pensions needs to be put in perspective, as it accounts for a relatively small proportion of personal saving and wealth, even if unfunded schemes are included (Table 1). This is largely because Germany has a relatively generous, mandatory and wholly pay-as-you-go state social security scheme (Table 5). Private schemes are supplementary, and need far fewer assets to cover their more limited commitments than elsewhere. However, the retirement age has recently (1989) been increased as an initial response to demographic concerns. (See Schmähl (1992a).)

In the Netherlands, "supplementary" pension funds have developed over a long period, often as a result of collective bargaining, to cover virtually the entire labor force (83%) - despite not being compulsory for employers[17] - and were codified in the Pension and Savings Fund Act of 1953 (see Lutjens (1990), Zweekhorst (1990)). 90% of pension plans are defined benefit (usually paying 70% of final salary, in combination with the basic social security pension), and 90% of pensioners receive inflation protection. Private pension provision in the Netherlands falls into three categories; industry funds covering multiple employers (40% of the workforce); and individual company funds (19%); insurance contracts (3%). There is also the pension fund for public servants (ABP) (28%). Industry funds may be made compulsory by collective agreement for all employers and employee organizations. Corresponding to the development of private pensions, social security only offers a minimal basic benefit related to the minimum wage.

In Canada funds are again largely defined benefit. Private "trusteed" schemes, which cover 40% of the labor force, co-exist with a flat rate non-contributory state pension scheme (OAS), a negative income tax (GIS) for those over 65 on low incomes and a contributory earnings-related public pension (CPP/QPP). The last is partly funded.

In Sweden, the main funded pension scheme is a compulsory, publicly directed "National Supplementary Pension Scheme" (ATP Scheme), set up in 1960, which complements a basic, flat rate, social security scheme. It covers 90% of the workforce. The aim is to accumulate significant quantities of funds to provide future benefits, thus offering an occupational pension that is indexed and equal to a sizeable proportion (60%) of the best years of earnings. The fund is administered independent of the government in a series of sub funds, which invest monies from different sectors of the economy (public sector, large firms, small firms/self employed) in a variety of both public and private financial assets (Section 4). There are also certain smaller private schemes in Sweden,

one for white collar workers (the ITP system) and one for blue collar (the STP system). The ITP system is funded either through book reserves, through insurance contracts or through contracts with a special pension company, while the STP scheme is unfunded. However, we focus in the paper on the ATP scheme, as the major funded scheme invested directly in the capital markets, while bearing in mind - and using for comparative purposes - its public sector basis.

The Danish funded pension schemes are private, largely defined contribution plans run by private companies for their staff, although some multinationals offer defined benefit schemes. There are also nationwide sectoral and professional pension funds, which are classed as mutual insurance companies. Retirement assets are accumulated in banks and life insurers as well as pension funds; the latter account for only 28% of the total. The attraction of private pensions to blue collar workers is reduced by the generosity of the public pension system, which currently offers a replacement rate for married couples of 66% (OECD (1988)). (Note that the data in Table 5 are for 1980 and single employees.) High composite marginal income tax rates on supplementary pensions are also a disincentive to pension saving.

The Swiss pension system (Hepp (1990)) consists of the state social security scheme (AHV/IV), the compulsory occupational pension schemes (BVG/LPP) and individual saving. The formation of the BVG/LPP schemes stems, as in Sweden, from recognition that the state pay-as-you-go scheme would impose a rising burden on future generations, as well as desire to increase the proportion of final salary provided in pensions (i.e., to fill the gap between state pensions and the retirement income considered socially desirable). However, the funds are more clearly private-sector than the Swedish system. The BVG requires companies basically to set up a defined contribution plan, which, together with social security, offers a defined benefit target (90% of retirement income for the low paid, 60% at average earnings, 25% for top earners). Many individual funds offer defined benefits, which may target a higher replacement ratio. When instituted in 1985, the scheme was grafted onto existing private pension schemes, which already cover 85% of the workforce. After institution of BV this rose to 90% (it excludes the unemployed some part time and temporary employees, an those under 18). Unlike the public ATP scheme in Sweden, fund management is not centralized, but arranged by the individual employer.

In France and Italy, the generosity of the sta scheme (supplemented in France by "hybrid private/public industry-wide pay-as-you-g schemes) has been such as to almost completel crowd out funded private pension plans (s Metais (1991)). For this reason, these countries are not covered in detail in the current analysis. Recent proposals in France to increase the importance of private pension schemes (for background, see Commissariat Generale du Plan (1991)) face difficulties given the short-run fiscal implications of tax-free pension contributions. However, in Italy a 1991 reform did seek to raise the retirement pension age from 60 to 65, impose higher contributions and longer contribution period (20 to 35 years).

To summarize, the influence on the development of private schemes of the scale of social security, offset in some cases by demographic concerns, can be discerned in each country; for example the Swedish public and Swiss private national funded systems are designed to provide the bulk of retirement benefits beyond a basic flat rate pension, and are accordingly both compulsory and comprehensive. In a more free-market context the forces encouraging funding are also at work in the Netherlands, the United Kingdom, the United States and to a lesser extent Canada and Denmark; state pensions are not comprehensive, and thus development of funded schemes is encouraged. Meanwhile, in Germany and Japan relatively generous social security promises, as well as tax incentives to "booking" have - at least until recently - accompanied smaller funded schemes, while in France and Italy they have crowded them out completely. An illustration of these relative patterns is the ratio of social security pensions to national income, which in 1985 was 12.5% in Continental Europe, 7.5% in the UK, 8.2% in the US and 5.2% in Japan (see Table 5). The relatively high UK and US levels, which contrast with the low replacement ratios,

relate to the current age structure (Table 4) with a relatively high proportion of pensioners.

(e) Other Determinants of the Importance of Funding

Personal pensions, which are invariably defined-contribution, have grown in importance in recent years, the main aims being to provide the tax incentives of pension schemes to those not in company schemes, to enable company schemes to be supplemented, and/or to offer greater portability than is available from company schemes. In some countries, boosting national saving was also a motive, although evidence as to its success is mixed. (See Venti and Wise (1987) and Gravelle (1991) for opposing views on the US.) Individual retirement accounts (IRAs) were introduced in the United States in 1974 for workers without company pensions; they offer the same tax benefits as pension funds and grew more rapidly after 1982 when all workers and their spouses became eligible (15 million plans were open in 1985). Similar provisions, introduced in the early 1970s, cover 3 million workers in Canada (1987). More recently 4.5 million have taken "personal pensions" in the United Kingdom, generally opting out of the social security earnings related scheme. Regulations state that UK personal pensions must be indexed up to 3%, and 25% of the value can be extracted as a tax free lump sum. France and Switzerland have introduced similar provisions. On balance, personal pensions seem to have complemented rather than substituted for other types of private provision. Andrews (1990) suggests that countries such as Japan find personal pensions unnecessary, due to low labor mobility and a high savings rate.

A further factor influencing the size of pension funds is the maturity of the schemes, i.e., whether they have a long-run ratio of contributing to benefiting members. Immaturity helps explain the growth of schemes in the Anglo-American countries, the Netherlands, Sweden, and Switzerland over the last twenty-five years. Now, some of these schemes are maturing, and the growth of their assets will slow (to around the growth rate of real wages), although changing regulations, such as those for indexation and retirement ages, as well as broadening of coverage following moves to compulsion, may add to this. (Commentators suggest that recent changes in UK regulations could boost liabilities by £40-50 billion.) As discussed in Section 4(b), maturity may have an important effect on investment, as income from assets becomes relatively more important than capital growth. Maturity for an individual scheme will depend on its history and development, and demographic factors. Thus, "aging of the population" in many countries is leading to growth in pension funds.

As an example of maturity, outflows in the United States exceeded inflows by $1bn in 1989 and $6bn in 1990 (growth of assets also depends on asset returns, of course). Also the number of beneficiaries rose 41% between 1980 and 1986. United Kingdom net inflows were 19% of assets in 1980 and 4% in 1990. By contrast, schemes in Germany and Japan are less mature, so future growth will continue to be strong. For example, in Japan in 1988 only 9% of the population over 65 received a pension from a funded scheme.

Coverage is obviously also important (i.e., the proportion of employees covered by pension plans, which as shown in Table 6, varies between 90% in Sweden, Switzerland, and the Netherlands to around 40% in the US, Germany, Japan, and Canada). However, this is a consequence of factors discussed above and in Section 3, rather than a separate cause of growth in itself.

3. REGULATION

This section assesses the main issues in pension fund regulation, comparing and contrasting the adopted solutions in the nine countries studied. It is suggested that whereas social security is the key determinant of total precautionary saving for retirement, it is the fiscal and regulatory environment that influences the use made of pension funds as a vehicle for such saving. An attempt is made to come to a view regarding "good regulatory practice".

(a) Taxation

One of the main determinants of the scale of benefits and advantages of pension funds as a means of saving is exemption of contributions from taxation. As discussed in Johnson (1992), pensions may be taxed at three points, when money is contributed, when investment income is earned and when retirement benefits are paid to scheme members. In general, taxing contributions only and benefits only are equivalent (except to the extent that progressive taxation may be lower on lower post-retirement income, and deferment itself means pretax rather than post tax income is available for investment and accumulation). These are expenditure tax regimes, where the post tax rate of return equals the pre tax rate, and the consumption/saving choice is not distorted; consumption is taxed at the same rate now and in the future.

In contrast, regimes where investment income is taxed as well as contributions or benefits are comprehensive income tax regimes (they tax income equally regardless of source). This reduces the incentive to save by driving post-tax rates of return below the pre-tax rate. Note that if the distinction between nominal and real returns is not made by the fiscal authorities (i.e., nominal returns are taxed) a comprehensive income tax also induces a growing distortion dependent on the rate of inflation. In general, pension funds are given expenditure tax treatment, while other forms of saving are not. There is thus a distortion between types of saving, encouraging accumulation via pension funds.

Corresponding to this distortion, the growth of assets in long-term institutions in countries such as the United Kingdom and the United States as a proportion of personal portfolios has a counterpart in a continual reduction in direct personal equity holdings as a proportion of financial assets. This clearly partly results from the fact that direct equity holdings generally suffer from double taxation (purchases of securities are made from taxed income, and both dividends and capital gains are also taxed).[18] However, in the longer term, this reduction may also result from an equalization of the income and wealth distribution, where only the wealthy could economically maintain equity portfolios with adequate risk diversification, although mutual funds overcome this problem. As a means of retirement provision, equity holdings also have the disadvantage of greater capital and income uncertainty than institutional investment and (particularly) defined benefit pension funds.

In other countries such as Denmark, supplementation of the state retirement schemes occurs via insurance schemes and bank investment products as well as through pension funds (given a more even tax treatment).

Reasons for taxing pensions relatively leniently include, first, the need to assist people to save enough to maintain post retirement living standards; second, a desire to encourage people to save and thus cut the cost to the state of means-tested social security benefits; and third, to raise the general level of saving.

The first is the most important, and is largely paternalistic. It suggests that people are generally myopic, and/or that there is a form of moral hazard, in that they assume they will be cared for by the state even if they do not save. That people do not save sufficiently is confirmed by US studies such as Diamond (1977), and recent evidence in New Zealand shows removal of tax exemption can cut retirement saving sharply. Of course, compulsion (as in Sweden and Switzerland[19]) is an alternative way of ensuring adequate saving, but tax exemption mitigates the associated element of coercion. However, despite this argument, Munnell (1992) argues for taxation

of pension fund income in the US on equity grounds, as with coverage of less than 50%, the bulk of benefits to tax deferral, which amount to over $50 billion per year,[20] go to richer people.[21] This is particularly the case for Individual Retirement Accounts (Munnell (1984)).

The argument of encouraging saving and reducing social security is only applicable when state schemes are means tested and/or opting out is possible, as in the UK and Japan.

The evidence for the third effect, i.e., raising the level of saving, is positive but minor (see Section 4). Johnson (1991) concluded that these arguments for special treatment of pension funds are less well founded than those for the general expenditure-tax treatment of saving, all of which could contribute to retirement income (a counter argument is presumably that other forms of saving may be decumulated at will, whereas pension funds are unique in being contractual annuities, as defined in Section 1).

The United Kingdom is an example of expenditure tax treatment of pensions, where employees' and employers' contributions and all returns on investments are free of tax and employers' pension contributions, unlike wages, are not subject to national insurance contributions. (A pay-as-you-go scheme, in contrast, would not gain tax privileges nor be eligible to contract out of earnings related social security.) However, an anomaly, which is contrary to expenditure tax treatment (as well as the idea of pension funds as "contractual annuities" (Section 1)) is that up to one and a half times an employee's salary (up to £150,000) may be taken out at retirement as a tax-free lump sum. Recently nominal limits have been imposed on tax-free contributions, and other forms of saving such as equities and deposits have been accorded (limited) expenditure tax treatment. The tax treatment of pension funds is broadly similar in the United States, Canada, Japan, and the Netherlands. However, in Japan (Clark (1991)) other forms of saving also enjoy tax privileges, pension funds' asset returns are subject to a special 1% corporate tax, and unfunded liabilities are partly tax deductible, (which could help explain the slow growth of funded schemes in Japan).

In Germany, employer contributions to independent pension and provident funds (and direct insurance) are treated as current income of employees and are subject to wage tax - hence deferred taxation is absent - although pensions are taxed lightly compared with earned income, partly to compensate. This provision makes "direct commitments" (i.e., pension liabilities held on the books of the sponsoring firm), which are fully tax-deductible, more attractive. They are consequently the dominant form of private pension obligation, accounting for 60% of pension liabilities, compared with 30% for funded independent pension funds (Pensionskassen) and provident funds.

In Denmark, there is a special variable tax (currently) 44% on pension asset returns, which is imposed when real returns exceed 3.5%. This thus avoids the comprehensive income tax's difficulties with inflation (as outlined above), but does impose some deviation of pre and post tax returns. Equities are exempt. The reason for the tax was concern that high real returns could lead pension payments to exceed earnings. Meanwhile, taxes on receipts of supplementary pensions are reportedly so high as to constitute a disincentive to pension saving. Sweden imposed a major reform in 1991 (Munnell (1992)), to tax all annual earnings on pension funds, to offset losses in revenue due to tax deferral and improve equity with other forms of saving. The rate is 15%, half the rate of tax on other forms of saving. Taxation of benefits is relatively low; contributions are tax exempt.

In the case of company pensions, the attraction of schemes to employers is important, since provision is only compulsory to firms in Sweden and Switzerland. "Direct commitments" in Germany, in effect, offer tax-deductible "free capital" to the firm,[22] though in principle the liabilities arising from pension claims should be reflected in the share price. In Japan a taxation change in 1980 encouraged companies to replace unfunded by funded pensions or bonuses, by reducing from 50% to 40% the amount of tax free book reserves that could be set against pension obligations. Many schemes remain unfunded however. In the Anglo-American countries and the Netherlands the tax exemption

of funded schemes makes them the cheapest way for firms to provide retirement benefits to employees. Unfunded private pensions - which account for virtually all private pensions in France, and which are themselves compulsory - may appear advantageous to companies when population and the economy are growing, interest rates are low and employment is high, but in more adverse circumstances may prove more risky to the firm, workers and pensioners. In effect, they may face similar demographic and financial problems to state social security without the ability to raise taxes. These problems also arise for German or Japanese "book reserves" if actual investment does not follow the booking of provisions, and/or the investment is unprofitable.

(b) Integration with Social Security

Certain regulatory issues are raised by the treatment of the relation between private pensions and social security. As noted, in Switzerland, the schemes aim to dovetail so as to offer a declining replacement ratio, the higher up the income scale the retiree is, thus ensuring maintenance of living standards. In the US, by contrast, pension funds are allowed to aim for a fixed replacement ratio (including social security) across the board, and hence low income earners may not receive a pension at all, despite the firm having contributed on their behalf. This system is strongly criticized by Munnell (1984) as an abuse of tax privilege and social injustice. In the UK a compromise is reached, whereby pension funds may substitute for earnings related social security, but may not take flat rate social security into account, which ensures a falling replacement ratio over the earnings scale, other things being equal.

(c) Regulation of Portfolio Distributions

Quantitative regulation of portfolio distributions is imposed in a number of countries, with the ostensible aim of protecting pension fund beneficiaries, or benefit insurers, although motives such as ensuring a steady demand for government bonds may also play a part.[23] Limits are often imposed on holdings of assets with relatively volatile returns, such as equities and property, as well as foreign assets, even if their mean return is relatively high. There are also often limits on self investment, to prote against the associated concentration of ri regarding insolvency of the sponsor. Apart from the self investment control, the degree to which such regulations actually contribute to security open to doubt, since pension funds, unlike insurance companies, face the risk of increasing liabilities as well as the risk of holding assets, and hence need to trade volatility with return. Moreover, appropriate diversification of assets can eliminate any idiosyncratic risk from holdin an individual security (such as an equity), thu minimizing the increase in risk - and if nationa cycles and markets are imperfectly correlated international investment will actually reduce systematic risk (see Sections 4 (b) and (c)). Clearly, such regulations may affect th attractiveness to companies of funding pensions - and the generosity of provision - if it constrains managers in their choice of risk and return (i.e., forcing them to hold low yielding assets and increasing their risks by limiting their possibilities of diversification).[24]

This is not, however, the case in all countries.[25] For example, United States pension funds are subject to a "prudent man rule" which requires the managers to carry out sensible portfolio diversification; there are no limits on portfolio distributions other than a 10% limit on self investment for defined benefit funds. United Kingdom pension funds are subject to trust law and again follow the "prudent man" concept; they are not constrained by regulation in their portfolio distribution except for limits on self-investment (5%) and concentration. Dutch private funds face no restrictions,[26] except for a 5% limit on self investment, see Van Loo (1988). (In contrast, the public service fund (ABP) faces strict limits, being able to invest only 5% abroad, and 15% in shares or real estate). Similar prudent man rules are implicit in current EC proposals for a Pension Fund Directive, stressing security (consistent asset/liability matching, diversification and limited self investment), liquidity and profitability.

Other countries impose portfolio limitations, though the degree to which they bind varies. For example, Japanese funds face ceilings on holdings of certain assets (such as 30% for foreign assets

and for equities), which Tamura (1992) suggests "(inappropriately) imitate regulations devised for trust banking and life insurers". German pension funds, besides a 10% self investment limit, remain subject to the same panoply of regulation as life insurers (4% limit on foreign asset holdings, 20% limit on equities, 5% on property). It is arguable that these are particularly inappropriate for pension funds given the indexed nature of their liabilities (Section (d)), though they could be justified by the need to protect the insurance funds (Section (h)). They may be contrary to the EC Capital Movements Directive, depending whether they are judged to be "reasonable prudential restrictions". Resolution of this question is being sought in the Pension Funds Directive, as discussed in the conclusion.[27] Note that by offering tax privileges to "booking", Germany and Japan effectively impose no limits on self investment of book reserves (although the Germans do insist on insurance of such reserves).

Swiss limits are similar, if slightly less restrictive than the Germans'; a 30% limit on shares, 50% for real estate and 20% on foreign assets. Scandinavian limits are in some ways even tighter, in that minima are also specified. The Swedish funds have historically been obliged to hold the majority of their assets in domestic listed bonds, debentures and retroverse loans to contributors (although recent deregulations have permitted limited investment in property, equities and foreign assets, which some private schemes have reportedly taken advantage of); Danish funds have to hold 60% in domestic debt instruments, although since 1990 they have been allowed to hold 20% in foreign assets. Some countries have switched to prudent man rules; Canadian funds were strictly regulated till 1987 (when the prudent man concept was introduced) and have till recently faced limits on the share of external assets as tax regulations limited foreign nvestment to 10% of the portfolio. A tax of 1% of excess foreign holdings was imposed for every month the limit was exceeded. In 1990, it was announced that the limit would be raised to 20% over 1990-95. There is also a 7% limit on real estate.

(d) Funding Rules

Regulation of the funding of benefits is a key aspect of the regulatory framework for defined benefit pension funds. Note that by definition, a defined contribution plan is always funded, whereas with defined benefit plans there is a distinction between the pension plan (setting out contractual rights to the parties) and the fund (a pool of assets to provide collateral for the promised benefits). When the fund is worth less than the present value of promised benefits there is underfunding, when the opposite, overfunding. Calculation of funding requires a number of actuarial assumptions, in particular the assumed return on assets, projected future wage growth (for final salary schemes) and future inflation (if there is indexing of pensions).

Minimum funding limits seek to protect security of benefits against default risk by the company, given unfunded benefits are liabilities on the books of the firm, and therefore risk is concentrated and pensioners (or pension insurers - see below) may have no better claim in case of bankruptcy than any other creditor. Funding offers a diversified and hence less risky alternative backup for the benefit promise, as well as offering the possibility of unplanned benefit increases if the plan is in surplus. Extra protection against creditors of a bankrupt firm is afforded when the pension fund is an independent trust (as in the Anglo-American countries), or a mutual insurance company (as in some Continental European countries) and, as in most countries, when self investment is banned or severely restricted (see above). However, funding does not increase personal saving or wealth in an economic sense - it only affects the distribution of the cost of insuring those benefits. There are usually also upper limits on funding, to prevent abuse of tax privileges (overfunding). Bodie (1990b) suggests that the three main reasons why firms fund, besides regulations per se, are the tax incentives, provision of financial slack (when there is a surplus) that can be used in case of difficulty, and because pension benefit insurance may not cover the highest-paid employees.

In the United States an important influence was

the Employee Retirement Income Security Act (ERISA) of 1974, which provided for minimum standards of vesting and increased funding requirements, both of which increased the burden to firms of running a pension scheme. It also introduced the Pension Benefit Guarantee Corporation (PBGC) to guarantee (up to a limit) benefits of funds in default, funded by contributions from all defined benefit plans; the funding requirement can be seen partly as a protection for PBGC. (This has not prevented heavy financial claims on the PBGC, following several cases of default of underfunded schemes, as discussed further below.) Following ERISA, the growth in pension funds slowed. Some firms terminated their schemes, and the number of new defined benefit plans initiated dropped. Some firms switched to defined contribution plans; and overall coverage ceased to grow.

More recent changes in United States regulations have clarified funding rules by defining pension fund liabilities as the present value of pension benefit owed to employees under the benefit formula absent any projections of salary, discounted at a nominal rate of interest. Implicitly, these are the obligations of the fund if it were wound up immediately. Current estimates suggest that 76% of pension funds are overfunded on this basis, with an average overfund of 74%. If pension assets fall below this level, the unfunded liability must be reported in the firm's balance sheet, and since they are senior debt, they act as a major problem for the firm in raising funds. However, a surplus cannot be included on the balance sheet (although it can be implicitly recouped via a reduction in contributions, see Section (e)). In this definition, indexing up to retirement is not compulsory but only an implicit promise, despite the fact most US schemes are actually final salary. This has an important influence on portfolio distributions, discussed at greater length in Section 4, since underfunding on this basis can be avoided by holding bonds; equities are only suitable for overfunded schemes. As discussed below, regulations now seek to reduce the moral hazard of deliberate underfunding by charging higher PBGC insurance premia to underfunded schemes; but they do not take account of the asset composition of underfunded schemes, which may be more important for risk.

This "wind-up" definition of liabilities, the "solvency" level at which the firm can meet all its current obligations, is known as the accumulated benefit obligation (ABO). Indexation up to retirement, as is normal in a final salary scheme, gives the projected benefit obligation (PBO) which is not guaranteed except in the United Kingdom although it is common in the Netherlands (80% of members are covered). Taking account of future obligations instead of purely focussing on current liabilities is likely to permit smoother levels of contributions as the fund matures, which may be better for the financial stability of the sponsor. The indexed benefit obligation (IBO) assumes indexation after retirement, which is not generally guaranteed in Japan, the US or Canada but is in Switzerland, the Netherlands, Germany,[28] and Sweden, and will be soon in the UK. (See Bodie (1991) for a further discussion of these concepts.)

In the US, the accounting standard FASB 87 focuses on the PBO, in contrast to the minimum funding regulations as described above. In addition, overfunding in the US is limited to 150% of the ABO or the PBO, whichever is the lower. These limits may have different effects. The 150% of ABO limit implies a rise in interest rates could prevent further funding, leaving the scheme underfunded when interest rates fall. This is not the case for a PBO definition taking projected rises in benefits into account, as long as interest rates rise with expected inflation.

In Japan, as noted in Section 2, the traditional means of provision of retirement benefits was via pay-as-you-go, with a special reserve account on the balance sheet as benefits accrue. The TQPFs and EPFs, as described above, must be funded only up to the ABO, and there is reportedly very little overfunding, partly because contributions above the ABO are taxed.

In Germany, various laws or court decisions akin to ERISA have enforced minimum standards of funding for pension funds (while leaving open, as in Japan, the choice of an unfunded book reserve system) and what amounts to inflation indexing of pensions. However, although this implies funding

the IBO, it appears that provisions for indexation are taxed - only the PBO is tax free. These provisions were felt to be particularly burdensome, despite the relatively low level of German inflation, and, along with the decline in profitability of firms, helped blunt the growth rate of private pension schemes in the 1970s and early 1980s. (See Deutsche Bundesbank (1984).)

In the United Kingdom, the reform of the state scheme in 1978 had an important influence on private schemes (by setting a "guaranteed minimum pension" (GMP)) and enforced a degree of funding sufficient to cover the GMP. However, funding above this level is not legally required - although trustees are bound by their duty of care to ensure funding is in place - nor is any standard method of calculating funding imposed, or a requirement to include deficits in company balance sheets. There is also no system to guarantee non-GMP pension benefits in the United Kingdom - partly for this reason regulations can be less strict than elsewhere, and managers can offer a high return by taking a higher level of risk.

A plethora of more recent changes have limited overfunding to 5% of projected obligations, (in practice, either the PBO or the IBO), including discretionary provisions giving five years to remove surpluses; enforced a degree of indexation (up to 5%) of pensions up to retirement for early leavers (in contrast to the United States, Japan, and Canada); may make a degree of indexation after retirement compulsory;[29] have outlawed compulsory membership; limited tax-free contributions and benefits; enforced transferability of assets between schemes and may enforce equal pension ages. (For a discussion of related issues in the United Kingdom, see Blake (1992).) A decline of the company pension fund sector is predicted, but there is little evidence of this to date. Few employees have left company schemes, although there has been a sharp rise in personal pensions. And few companies have closed their schemes, even though some have switched to defined contribution or made them less generous for new entrants.

As noted, the interest rate assumed to be earnt on assets is a key aspect of the funding arithmetic. If it is too high, funding may be inadequate; if too low, there may be overfunding and corresponding abuse of tax privileges. In the Netherlands, where funding is compulsory, the government sets a maximum real interest rate assumption of 4%, and an assumption for wage growth. Since in practice Dutch funds have been able to earn over this level, surpluses estimated at 30% were present by 1990. A special levy of 40% is to be enacted on such surpluses in excess of 15% of liabilities, to offset the implied tax evasion. In the US, the accounting standards FASB 87 and 88 have imposed common standards. In Japan contributions are set assuming a 5.5% nominal rate of return on fund assets. In the UK and Canada the government accepts the (varying) judgement of the actuaries, and generally also allow for an assumption of wage growth.

Finally, since many Danish funds (as well as a proportion of funds in Switzerland and the Anglo-American countries) are defined contribution, the issue of funding does not arise. However, the issue of limiting tax privilege does arise, and is dealt with via contribution limits or taxation of returns.

(e) Ownership of Surpluses

Ownership of surpluses in defined benefit pension funds is a key issue in a number of countries, particularly because predator firms may seek to strip surpluses after taking over another firm, although also, as noted above, because the firm may seek to recoup the funds for its own use. On the one hand, this may be seen both as an abuse of tax privileges and (more contestably) as seizing assets held for the benefit of members. On the other, it can be argued that if the fund is only a backup for the firms' promise of pensions, and if the firm is equally responsible for making good any deficit, then the surplus should belong to the firm. It is important to note that the funding rules outlined above define the surplus. Note in addition that such issues only arise for defined benefit funds; in defined contribution funds there is no surplus to strip.

In the US, a 1987 law states that the employer owns all surplus assets so long as certain

standards are complied with. This, following the second line of argument above, is seen as economically reasonable since funds are purely a means to collateralize a (separate) benefit promise. In other words, the employee has rights to a pension, but not to the means of financing those rights. However, there are limits to such ownership, as under ERISA, firms cannot use pension assets as collateral for loans. In the 1980s, many funds with surpluses were terminated and the surplus taken by the sponsor (asset reversion). It can be argued that such behavior implied breach of implicit contracts between employer and employee. Later, substantial tax penalties were introduced to discourage this, although there is nothing to stop firms absorbing surpluses more gradually, by taking contribution holidays.

In the UK, the surplus is again held to belong to the company, which can be recovered by direct withdrawal (subject to a 40% tax) or by a contribution holiday. However, court judgments have severely restricted ability of predators to extract surpluses from takeover target's funds via winding-up or spin-off termination of schemes. The 1990 Social Security Act states that when a plan is terminated, it shall be assumed to provide for indexation up to 5% inflation, thus reducing the potential surplus to be extracted. Moreover, there is increasing support for arguments on the employee's side, namely that pension rights are not gratuities but part of a remuneration package earned by service. This point of view has been supported by recent rulings of the European Court that for the purposes of equal treatment pensions are to be considered as deferred pay (Goode (1992)). The logical conclusion would be to outlaw even contribution holidays and make employers much more restrained in funding.

In the Netherlands, where the pension fund is an executive body independent of the sponsoring firm, usually in the legal form of a financial institution, or in Switzerland, where it is a foundation with joint representation of employer and employee representatives on the board, ownership lies with that body itself. This means the company cannot lay claim to the assets, although surpluses can be returned by reduced contributions.

In Japan the surplus may neither be stripped nor used to increase benefits, but used to operate "welfare facilities". This puts the fund under pressure to smooth its income to ensure such payments continue - which may entail inefficient investment.

(f) Portability

Vesting, treatment of transfers between schemes and of prior service credits, particularly for defined benefit plans, have a key role to play in labor mobility, which in turn may be important for economic efficiency. Indeed, Lazear and Moore (1988) estimate that labor turnover in the US would be twice as high in the absence of pension funds. This is because of the losses in pension benefits that may be incurred by early leavers compared with those staying in one job (US calculations suggest that these may be as much as 50%, see Munnell (1984)). There are obviously also problems of equity in such patterns. Women may be particularly vulnerable to such losses, as they change jobs more frequently and spend fewer years in one job.

Solutions include shorter vesting periods, which ensure that benefits are nonforfeitable on retirement; transfers permitted with full allowance for benefits accrued; or service credits (in the case of final-salary based schemes) indexed till retirement. Note that these problems do not arise with defined contribution, nor does the last arise for career-average based defined benefit plans; hence portability is an argument in their favor; in contrast even with full indexation to prices of accrued benefits in final-salary plans, the early leaver loses out, because his real wage would probably have been higher at retirement.

The arguments for portability, though strong, should not be overstated. Whereas the suggested reforms would make pension plans more attractive to employees, they may reduce the ability of employers to use pension plans to manage their workforces, and hence reduce their attractiveness to them. Provision, when voluntary for the firm, may thus decline. Low labor mobility is not always inefficient; higher labor turnover may have adverse effects on the incentives for firms to train their labor forces, given the "market failure"

that employees may leave once trained, thus wasting the employer's investment. Countries with "lifetime employment" such as Germany and Japan have of course been conspicuously successful economically - although pension arrangements which discourage turnover are probably best seen as a consequence or support for the system, rather than a cause. Nevertheless, could be suggested that a small amount of esistance to labor mobility arising from pension provision, so long as it does not lead to unfair deprivation of pensions, may not be entirely ndesirable.

Vesting standards in the US under ERISA give three alternatives; however, the most common is to demand that companies offer 100% vesting after 10 years of service (the alternatives are 25% vesting after 5 years, rising to 100% after 15 years or 50% vesting when age and service add to 45, increasing to 100% five years later). Recent legislation will reduce vesting to 5 years. There are no common vesting standards in the EC. They vary from 10 years in Germany and 5 years Denmark to 2 years in the UK and one year in e Netherlands. In Sweden the ATP scheme is a ıational one, so the issue of vesting does not arise though it does for the ITP/STP). The most restrictive countries are Switzerland and Japan, both of which appear to assume "lifetime employment". In the former, vesting is graded ıween 5 and 30 years of service (for payments excess of the legal minimum, which is vested mediately), while in the latter, vesting takes 15- years, with early leavers typically penalized hough vesting is quite short for involuntary irement, and for lump-sum distributions as opposed to annuities). Particularly in Japan, restrictive conditions are seen as socially desirable, to support "lifetime employment".

regards service transfers, this is a straightforward matter in countries such as the Netherlands, where benefits are generally indexed to and beyond retirement and transfers occur hrough portability clearinghouses called transfer circuits. A requirement to join the clearinghouse s that the fund be indexed and pensions based on inal salary. In Sweden, there are again no problems for the ATP in this context, as the em is a national one. In the UK, too, past benefits are indexed (up to 5%) prior to retirement,[30] employees have a right to a cash transfer to another pension scheme[31] in line with accrued benefits and restricted transfer circuits exist (e.g., in the public sector). However, difficulties may arise outside such circuits from the non standardization of the valuation methods for liabilities. In the US, Japan, and Canada past benefits are not indexed; however, there is a transfer circuit in Japan enabling workers in Employee Pension Funds to shift their contracted out social security benefits (which are indexed) only between employers. In the US, service transfers are available as a lump sum, which poses the risk that tax advantaged pension assets will be used for other purposes. In Denmark, differing medical examination requirements between schemes are reported to give rise to transfer difficulties.

Transnational moves of employment pose particular problems for pension funds, given the differing tax treatment that may make transfer impossible. The EC have found this insoluble so far, despite the premium put on international labor mobility.

(g) Internal Transfers

Difficulties of early leavers, who implicitly subsidize those remaining till retirement, are not the only case of potentially inequitable internal transfer within defined benefit funds. As noted by Riley (1992), in countries such as the UK, final salary schemes give incentives for managers to award themselves large salary increases in heir last year of employment, thus benefiting particularly at the expense of workers forced into early retirement (given the expense to the pension fund), early leavers and those workers (such as manual workers) whose earnings peak in mid career. More generally, if contribution rates are based on expected average increases in salaries, contribution rates may fall short of costs for those whose salaries rise faster than the average, and vice versa for slow climbers. Finally, given that the rate at which benefits are accrued rises as the worker nears retirement, there are strong incentives for firms to retire workers early, which may not be economically efficient. Understanding of these issues may be hindered by the complex

rules of a defined benefit plan.

A related equity problem, and implicit form of transfer, was that US funds were traditionally only for managers, despite the use of income from the firm as a whole to contribute to their pensions (i.e., not merely reflecting their own productivity), and benefit of tax privileges (i.e., basically schemes were a means of tax-avoidance for managers). This was clamped down on by ERISA, which insisted that all full time workers over 21 should be eligible to allow tax deductibility. But as noted in Section (b), inequity may still arise from differing treatment of social security pensions.

(h) Insurance

As noted, insurance of defined benefit pensions against default risk for the sponsoring firm is a feature of most of the countries studied. Note that insurance of benefits of defined contribution plans is unnecessary, as there is no fixed pension right to guarantee (although investment rules may still be useful to protect members from risk concentration, and insurance may be needed to protect members against fraud, etc). Also funding of defined benefit obligations - or at least assurance of seniority of claims against other creditors in the case of bankruptcy - are the first line of protection of members against default risk. Insurance provides a second line of defence.

But any system of guarantees, including deposit insurance as well as pension insurance, faces the difficulty that it may create incentive structures leading honest recipients to undertake excessively risky investments, which in turn give the risk of large shortfall losses to the insurer. In other words, losses may not arise merely from fraud or incompetence but the incentive structure itself. What is needed are means to control risk, which could (Bodie and Merton (1992)) include an appropriate mixture of monitoring, asset restrictions and risk-based guarantee premia. We consider this a useful and flexible framework for analysis of the regulation of guarantees.

In the case of pension funds, controls could, first, include monitoring of the market value of pension assets, with the right to seize and liquidate them if they fall below a certain minimum funding level. It is hence essential that the insurer have access the assets, the assets have a defined market value, and that there are agreed standards for determining minimum funding levels. Analogous to bank capital, it is also desirable that there be cushion of over funding to protect the guaran- and frequent auditing. A system relying on monitoring might not be efficient with illiqu fund assets, as their wide bid-ask spread imposes costs either on the sponsor or the guarantee agency. A second approach is restricting the asset choice of pension funds to ensure an upper bound on the risk of the assets serving as collateral for the promised benefits, for example, by insisting on immunization of assets equal to the guaranteed benefits, see Section 5(a). A third is setting the premium rate for the guarantee in line with the risk, which depends in turn on the variance of the value of the collateral and the tim between audits (which allow the fund to chang its risk exposure adversely.[32]

The US example (Bodie (1992), Bodie and Merton (1992)), where the Pension Benefit Guarantee Corporation (PBGC) was set up as a compulsory insurance scheme to guarantee basic retirement benefits, shows the difficulties that arise when such controls are not properly applied PBGC premia have traditionally been non-risk related, thus encouraging risk taking; minimum funding rules have proved ineffective, and indeed till recently plan sponsors could freely transfer some of their unfunded pension liabilities to the PBGC by voluntarily terminating an underfunded plan (subject to a provision allowing PBGC to take 30% of the employers' net worth to make up for underfunding[33]); given lack of control over pension fund management, firms in financial distress have faced particularly strong incentives to take risks and reduce funding; courts have ruled that the PBGC has no better claim on assets of bankrupt firm with an underfunded pension plan than other creditors; and fragmentation of regulatory authority and conflicts of interest among government departments (as discussed in Section (k) below) weaken monitoring. Finally the PBGC was set up to serve goals other than purely protecting pension benefits, namely revitalization of depressed industries by assuming part of the burden of pension benefits, and

preservation of defined benefit plans against the trend to defined contribution.[34] These further dilute the effectiveness of its control mechanisms.

As a result of these difficulties, plans that are terminated are often vastly underfunded (typically 60%), having been only 20% underfunded five years before. Sponsoring firms either minimize pension contributions directly or encourage early retirement of workers whose pensions are not funded. Accordingly, the PBGC has a deficit estimated in late-1991 to be over $2.5 billion,[35] and is paying an average of $2352 per year to 325,000 retirees in 1,700 failed plans. Meanwhile Smalhout (1992) suggests that companies such as Chrysler have unfunded liabilities of $4.4 billion, a quarter of schemes are underfunded (to a total of $40 billion) and the worst 50 companies account for $21.5 billion in unfunded liabilities. These data suggest a potential liability on a "Savings and Loan" scale (see Davis (1992) and his references for an outline of the S and L crisis and its relationship to deposit insurance).

Other countries having guarantee schemes, such as Germany, have tended to impose extremely severe asset restrictions on funds to protect the insurance fund against loss, while simultaneously imposing higher costs on plan sponsors than would be necessary in the absence of guarantees. The Netherlands offers partial insurance. If the employer is unable to pay contributions, due to bankruptcy or any other reason, the Industrial Insurance Board will pay contributions for up to a year. There is also a form of insurance for the employee which is absent in Anglo-American countries, whereby if a worker over 40 becomes unemployed, the Pension Insurance Advance Financing Fund will pay supplementary pension contributions as long as the employee has the right to wage related benefits under the employment Act. In Japan, participation in the pension guaranty programme for EPFs is voluntary, with lower guarantees resulting from non payment. But all firms reportedly do contribute, perhaps as a consequence of social consensus.

In the UK, the need for portfolio regulations is mitigated by absence of a guarantee scheme for defined benefit company plans, while imposing greater risk on the beneficiaries in cases such as Maxwell, as discussed below. However, the absence of insurance in the UK need not exclude discretionary assistance by the government on a case by case basis, which may create less moral hazard than a guarantee scheme (there are strong parallels with the issue of deposit insurance vs lender of last resort for banks, see Davis (1992)). In addition, defined contribution schemes run by insurance companies are covered by (mutual) insurance compensation arrangements, covering 90% of the investment.

(i) Fraud

Protection against fraud has come to particular prominence in the UK, given the Robert Maxwell case. Large quantities of his companies' pension fund assets were lent to private companies owned by Maxwell against poor security, or were invested directly in them. When the private companies became insolvent, the assets were lost. The fraud was partly concealed from fund trustees by the fund manager or stock custodian - both again controlled by Maxwell - but was partly legitimate self investment carried out with the knowledge of the (pliant) trustees. In other words, it partly revealed the inadequacy of legal provisions, as well as vulnerability of pension funds to fraud. The case has cast doubt on the use of trust law as applied in the UK, as the means of redress - civil action against trustees by members once things go wrong - were seen as inadequate. This is especially as members lack prudential standards against which to monitor the fund and trustees - and have no regulatory body to do so on their behalf - and may find it difficult to interpret performance measurement data. Also, except in cases of theft and fraud, there is usually an indemnity clause in case of court action against trustees for breach of fiduciary rules. This leaves the employer to resolve the problem - and it may be insolvent. In contrast, in the US fiduciaries in such cases may face heavy personal liabilities.

Independent custodians,[36] less leverage by the employer over the trustees, better independent actuarial information for trustees, more employee trustees, as well as limits on self investment and

more frequent checks on a higher standard of minimum funding, are among other proposed remedies. Independence of custodians, both from trustees and from fund managers, is already the rule in the US. Some in the UK have argued for an insurance scheme similar to PBGC in the US. The discussion above suggests moral hazard is a strong counterargument against general insurance of benefits, but this need not rule out insurance against fraud.

(j) Disclosure to Members

Standards of information for members has come to prominence recently in the UK, and the Maxwell case (above) is likely to bring it further to the fore.[37] Under ERISA in the US, pension funds must provide each plan participant with a summary of the Annual Report outlining the plan and its administration, information on the right to receive pension benefit, and the status of individual pension benefits. In the UK under the 1986 Pension Schemes Regulation, trustees are required to disclose trust deeds and rules on request; annual reports must be provided free of charge, covering information such as the names of trustees, actuaries and fund managers, number of beneficiaries, contributions, increase in benefits to current pensioners, distribution of assets, an actuarial certificate saying to what extent the scheme is financially viable, presenting results of performance measurement of fund managers and how they are remunerated (see Section 4 (d)). Every three years a more detailed valuation report must be included, giving a view of long term viability. It is particularly crucial that members receive such information in defined contribution plans. In Switzerland, similar to the UK, audited annual accounts and an individual benefit statement must be made available to members. In Japan Tamura (1992) reports that disclosure is vestigial; members only receive occasional circulars.

(k) Structure and Mechanics of Supervision

Effectiveness of pension fund regulation is influenced by regulatory structures and procedures which in several countries are somewhat unwieldy. For example, in the US the Department of Labor oversees minimum funding and investment standards as well as dealing with cases of fraud, while the Internal Revenue Service sets maximum funding rules to prevent abuse of tax advantages. Then the Pension Benefit Guarantee Corporation collects insurance premia and pays benefits but has few enforcement powers. So, for example, the tax authorities would prefer minimal funding to prevent loss of tax revenue, while the insurers would seek maximum funding to prevent large insurance claims. Moreover, the tax authorities can grant contribution waivers to firms in financial distress, which leads to underfunding of pension plans, against the interests of the PBGC. Meanwhile fund trustees are responsible for ensuring funding is in place for beneficiaries and have to demonstrate in an audited annual report of income and assets filed with the IRS that they have managed the fund prudently. Also a master custodian has to be appointed to oversee fulfillment of ERISA requirements, keep appropriate records, and provide security against prohibited transfers.

In the UK statutory pension fund regulation is again administered by different bodies, namely the Occupational Pensions Board on behalf of the Department of Social Security and the Pension Schemes Office for the Inland Revenue.[38] As in the US, the tax authorities are concerned to avoid overfunding, but the Pension Board only checks on a three yearly basis whether assets are sufficient to pay the minimal state-guaranteed pension (GMP).[39] Otherwise, as noted, there are no minimum funding rules. The duty to check funding is in place belongs to trustees, as in the US, (they are supposed, under common law, to "act in the best interests of the beneficiaries"[40]) but the wider bounds offered by the funding rules give more responsibility to them to stand up to employers in insisting a scheme be funded. There may be difficulties where trustees are not independent of the employer, which may be the case through a variety of channels, since employers as well as employees and pensioners are beneficiaries of the trust.[41] (Noble (1992)). This was the weakness that partly enabled the Maxwell fraud to occur (he was able to persuade the trustees to agree to imprudent but legal self-investment), and also can lead trustees to accept too readily the case for removing surpluses via

contribution holidays, etc. Also there may be conflicts of interest between scheme members and employer, or pensioners and working members,[42] that trustees may find it difficult to resolve.

In Canada, apart from federal taxation provisions, regulation is carried out at the provincial rather than the national level, and hence pension law can differ between provinces (in practice, Ontario tends to be the leader). This can create particular problems for employees moving between jobs in different provinces - which in turn foreshadows possible future difficulties in the EC. In Switzerland, too, regulation is generally carried out at cantonal level, except for "large" companies, but the federal authorities are tending to oversee and harmonize cantonal supervision.

In most Continental European countries such as the Netherlands, regulation is carried out by a single statutory authority, the Insurance Supervisory Board. Pension funds are legally obliged to provide the Board with detailed information annually on the benefit payments and investments of the fund. It ensures that the commitments of the pension funds are sufficiently covered by their assets. It also involves itself in more general structural issues. If the Board finds procedures or regulations unsatisfactory, it can apply social pressure by making a public complaint. In practice, this is rarely necessary. In some countries such as Germany, the supervisors also check that portfolio regulations are complied with and require a five-year business plan. In Denmark, there are three yearly actuarial reports.

It will be noted from this description that the mechanics of supervision generally entail reliance on annual reports and accounts prepared by auditors and full actuarial reports at longer intervals. However, the Netherlands is unusual in that the authorities conduct on-the-spot inspections of all funds every 10 years. In the US, the Department of Labor runs computer checks to identify plans needing further investigation (or investigations may be triggered by complaints by members). 250 investigators are employed.

(l) Is There a Consensus on Regulatory Practice?

It will be apparent that there is no overall international consensus on good regulatory practice. (See the summary in Table 6.) On the one hand, there appears to be reasonable agreement on tax provisions and ownership of surpluses. For example, most countries accept the arguments for the expenditure tax treatment of pensions, although there are moves in some cases to level the playing field by granting similar treatment to other forms of saving, or even to impose comprehensive income taxation on pension funds. Again, it is generally accepted that surplus assets belong to companies, although their access to them is generally restricted, given the potential tax abuse. On the other hand, there are strong divisions on portfolio regulations (prudent man vs portfolio restrictions); on funding (unfunded vs ABO vs PBO vs IBO, as well as regulatory rules vs trustee responsibility); on insurance; and on vesting and service transfers (between countries insisting on rapid vesting and those assuming lifetime employment). Issues of fraud and information disclosure have come to the fore only in some countries. Another important aspect on which there is no consensus (covered in Section 4(a)) is regulation of the indexation of benefits.

There are no obvious right answers to many of these issues. Historical development clearly plays a major role. When reform is feasible, the "correct" approach depends crucially on the tradeoff desired between costs to the company and associated effects on competitiveness on the one hand; and the interests of the recipients, the perceived importance of labor mobility and the need to avoid insurance losses on the other. However, some a priori suggestions can be made (amplifying comments made above).

For example, it is notable that most countries with strong portfolio regulations offer lower returns than those with prudent man (Section 4(c)) albeit also with lower volatility. Only in the case of self investment would modern portfolio theory agree with the need for quantitative portfolio regulation (although its avoidance may be implicit in a prudent man rule). Funding rules tailored to the nature of the benefits (as in the Netherlands),

such as the FBO or IBO in the case of final salary schemes would seem to offer greater security to members than the alternatives of no funding rules, only covering state pensions, only the accrued obligation or relying on the fallible independence of trustees. It also ensures smoother funding patterns for the sponsor as the fund matures. Insurance against fraud would seem to increase security without the effects of moral hazard (or need for tough restrictions) implicit in overall guarantees. Such overall guarantees may be inferior to discretionary bailouts of failed plans, reserved for extreme cases. When insurance of benefits is chosen, a mixture of controls on risk taking, as recommended by Bodie and Merton (1992) would seem to be justified.

It is also worth noting that many of the issues (vesting, transfers, funding, ownership of surpluses, guarantees of benefits) are absent or less important if there are defined contribution and not defined benefit funds. These need to be weighed against the superior employee retirement insurance and various benefits to employers (such as lower labor turnover and ability to take contribution holidays) offered by defined benefit plans.

Meanwhile regulatory structures and procedures appear to have developed piecemeal in a number of countries. It could be suggested that the Dutch have a reasonable model (one supervisor, annual checks on the adequacy of funding, overview of plan rules, on-site inspections, etc.) for others to follow. Finally, given the long term nature of pension schemes, there is much to be said for continuity of the regulatory framework. Retrospective changes in regulation affecting liabilities are particularly undesirable, given their likely impact on corporate finances.

4. PERFORMANCE

This section reviews the relative levels of benefits provided by the funds, followed by an examination of their portfolio behavior and its underlying determinants. Effects of the latter on overall risks and returns, and the influence of fund management on fund behavior and costs, are also assessed.

(a) Benefits and Contributions

Comprehensive data on benefits paid are not available, and would in any case be distorted by factors such as the inclusiveness of the statistics and the degree to which pension funds cover the different sectors of the income distribution. For example, Dailey and Turner (1990) show that average retirement benefits in the US in 1989 were $6359, but as noted by Munnell (1992) they only benefit a "relatively privileged subset of the population". In Switzerland average benefits are $6236 and Canada $5100, but the latter may be boosted by inclusion of public sector schemes. France ($3203) and Japan ($2304) appear low, the former due to coverage of low paid workers and the latter because only annuities and not lump sums were captured. We suggest it may be better to gauge the nature of benefits offered to the plan participant more directly.

For example, in the United Kingdom the nature of benefits has changed since the 1960s. Final salary based defined benefit plans, 75% of whose members benefit from guaranteed indexation, cover all public sector and the majority of private sector beneficiaries. Indeed, indexation of benefits up to an inflation rate of 5% may soon become mandatory.[43] The typical replacement ratio after 40 years is 50-66%. Lump sum withdrawals at retirement are permitted, up to 150% of final salary. Meanwhile in the Netherlands 90% of pension plans are defined benefit (usually paying 70% of final salary), and 90% of members receive inflation protection. Pensions in Sweden and (in practice) in Switzerland are again indexed. Swedish pensions are based on best years of income (suitably indexed) and not final salaries, which may offer superior equity between managers and manual workers, since the latters' earnings may peak in mid career.

In the United States, where defined benefit schemes are again final salary, there are often discretionary pension increases to compensate for inflation after retirement, although explicit indexation for inflation is less common. Indeed, as pointed out by Bodie and Merton (1992), even the indexing of pensions prior to retirement only holds to the extent that the employee continues to work for the same employer; his wage keeps pace with general wage inflation; and the employer continues with the same plan. Early leavers' accrued benefits are not indexed. Unlike the other countries, preretirement cashouts from a pension plan must not necessarily be invested in another pension scheme, which raises the issue of potential misuse of the tax advantages for non retirement expenditures.

In Canada even discretionary increases of benefits to allow for inflation are relatively rare (93% of private sector participants are in plans with no formal inflation protection); a fixed income related to final salary is promised in retirement. In Germany most pension funds promise an amount dependent largely on duration of employment; final salary schemes are less common than in the other countries. However, indexation is mandatory. In Japan benefits tend to relate to years of service and final basic salary, but the ratio to the latter tends to be less than in the Anglo-American countries; (such benefits are often taken as a lump sum). Only the part of pensions replacing social security is indexed. In Denmark, where funds are in any case defined contribution, there is little explicit indexation.

Inflation indexation of pensions is of course a key policy topic in its own right. The move from career average to final salary pension plans in some countries can be seen as an attempt to correct for effects of inflation prior to retirement (leaving open difficulties for early leavers, and the issue of indexing after retirement). However, in Japan the dependence of pensions on basic salary and not full remuneration may mean that pre-retirement indexation is imperfect. And as noted above, post retirement benefits are rarely

fully indexed in the US, Canada, Japan, and Denmark. Of course, social security pensions are invariably inflation indexed.

Bodie (1991) suggests that automatic indexation may be avoided by employers and not pressed for by employees in countries such as the US because of lack of an asset providing an inflation hedge (unlike index linked gilts in the UK); because via social security, real estate investment, etc, individuals already have enough inflation protection, and providing it would increase costs unacceptable for young workers; or due to money illusion. Bodie finds the third explanation most plausible. However, Blake (1992) argues that if real wages and hence contributions rise at 2-3% per year, and fund managers can obtain real returns of 2%, indexation to prices should be easily attainable. Vittas (1992) disputes this calculation and suggests that real returns need to exceed real earnings growth by 2-3% for indexation to be possible at reasonable cost. Section 4(c) suggests that real returns of 2% in excess of real wage growth are attainable in most countries.

Given the burden on employers as outlined, policymakers in most countries have tended historically to avoid legal provisions enforcing indexation, even where, as in Switzerland and the Netherlands, de facto indexation tends to apply. However, there are signs that this is changing, as in the UK laws will shortly enforce indexation for p to 5% inflation (they already insist on pre-retirement indexation of accrued benefits), and as noted, indexation is mandatory in Germany and weden.

Contribution rates are generally limited by tax law to around 15% of salary, except in Denmark, where they are unlimited,[44] balanced by the real interest rate tax on the funds' yields. For example, in the UK, total contributions are limited to 17.5% of the employee's salary, and e maximum employee contribution is 15% of salary. In Sweden, contributions are 13%. In countries such as Germany, where private pension schemes have limited "supplementary" objectives, ontributions are typically much lower, around 1.5% of salary. In Japan, contributions to TQPPs are limited to 3.2% of salary regardless of the condition of the fund. EPFs are more flexible - contributions are set to obtain the promised benefit given an assumed nominal return of 5.5%.

The distribution of contributions between employer and employee varies widely, although its economic implications need not be significant (employers can reduce salaries to offset their contributions). The proportion paid by the employer is 100% in Japan, 89% in Germany, 87% in the US, 70-75% in the UK, Canada, and the Netherlands, and 58% in Switzerland.

Administrative costs of pension funds are only available for a selection of countries, and are not directly internationally comparable. However, some patterns do emerge from US data (Turner and Beller (1989)), namely that costs are higher for small funds than large, and defined benefit over defined contribution. For funds with assets of $1 million in 1985, costs were 2% of assets for defined benefit, and 1.4% for defined contribution. For plans with assets of $150 million, the costs were 0.7% and 0.2%. Anecdotal evidence for the largest funds in the UK suggests figures as low as 0.1%. Evidence from several countries suggest that the costs of personal pensions are much higher than for company plans, given economies of scale, advertising, commission costs, etc.

The features of pension funds outlined in Sections 2-4(a) are summarized in Table 6.

(b) Portfolio Distributions

The portfolio distribution and the corresponding return on the assets held are the key determinant of the cost to the company of providing a given pension benefit[45] (although obviously the prevailing nature of benefits in a given country, as outlined above, also influence the overall cost). This section discusses portfolio distributions per se; the next assesses their implications for performance.

Changes in portfolio distributions of pension funds over the period 1970-90 are shown in detail in Tables 8 to 20 and summarized in Table 21. It should be noted that the data generally exclude pension funds administered by life insurance

companies. The data for the Netherlands exclude the public pension scheme (ABP), which invests virtually all its funds in loans to the government and local authorities, or government guaranteed loans to private firms. The data are from national flow-of-funds tables and are not always at market value (e.g., United States bonds and Canadian equities are at book value) and may exclude certain assets (e.g., United States property). To maintain comparability, asset holdings combine domestic and foreign assets. Hence equities in Table 14, for example, are both domestic and foreign. (In most cases, foreign asset data was obtained from separate sources.) Finally, in recent years the data may be partly misleading, given increased use of derivatives. A suitably hedged equity may have the characteristics of a bond (see the discussion in Section 5(a)) - although ownership of the company clearly remains with the equity holder.

As background, estimates of real total returns and their standard deviations for 1967-90 are shown in Table 7. The table was constructed using annual average data on summary or market indices of interest rates, yields and asset prices drawn largely from the BIS macroeconomic database. No allowance is made for taxation or transaction costs, which would affect actual returns to investors. Owing to lack of data, a number of bond price indices were estimated from changes in yields. This is of course only a sample over a relatively short period and does not necessarily indicate long run expected returns. For example the United States real equity yield is thought to be over 8% higher than the risk free rate. (Reference: Ibbotson and Sinquefield (1990)).

Among the notable features of the data for domestic assets are that the highest return - and the highest risks - are generally offered by equities, followed by property. Both are generally in excess not only of inflation, but also - crucially for final salary plans - the growth rate of average earnings. Bonds in most countries offer a much lower real return, and generally a highly volatile return (note that the calculations are based on annual holding period returns, ie including capital gains and losses arising from changes in interest rates). The main exceptions are Germany and Denmark, where real returns on bonds have been significantly higher than in other countries. Germany also has the lowest and least volatile inflation rate. Meanwhile, international diversification[46] in equities also offers sizeable real returns, at generally lower risk than sole focus on domestic shares, despite exchange rate risk.

In principle, the portfolio share of liquid assets can be small because withdrawals are predictable (the "contractual annuity" aspect noted in Section 1). German, Japanese, Dutch, Swedish, and Danish funds have accordingly always held less than 4% of assets in this form. The higher levels that have often been observed at various times in other countries (Table 8) are therefore likely to reflect high market returns on liquid assets relative to other assets. This was particularly true for the United Kingdom and the United States in 1974 when the equity market fell sharply. The United Kingdom has returned to roughly its pre-1974 level of short-term assets, while Canada and the United States have built them up considerably. This has largely resulted from the accumulation of market paper, though deposits have grown somewhat (Table9).

These increases coincided with deregulation and expansion of short-term markets (Stigum (1990)). Swiss funds have always held a high proportion of liquid assets, which has latterly expanded to 12%, largely in the form of short term money market instruments (Table 10[47]), due to the shape of the term structure.

Bonds (Table 11) constitute over two thirds of pension fund assets in Sweden and Denmark, largely due to portfolio regulations and the nature of the domestic financial markets. As shown in Table 6, 60% of Danish assets must be invested in domestic debt instruments, while the majority of Swedish assets are to be in listed bonds and debentures (and retroverse loans). In the United States, where regulations make it optimal to hold a large proportion of bonds despite their weakness as an inflation hedge[48], bonds still form around 40% of pension funds' portfolios. Levels similar to the US are maintained in Canada and Japan, while being only 30% in Germany and Switzerland. In contrast, the bond share has fallen sharply in the United Kingdom, from 50%

Table 7: Characteristics of real total returns, 1967-90

Mean (standard deviation) of real total/holding period return (domestic currency)

Per cent	United States		United Kingdom		Germany		Japan		Canada		Netherlands		Sweden		Denmark		Switzerland		Memo: France	
Loans	3.5	(2.9)	1.4	(5.0)	5.3	(1.9)	0.9	(4.3)	4.0	(3.7)	3.8	(3.6)	3.4	(3.1)	6.1	(3.6)	2.5	(2.0)	2.6	(3.2)
Mortgages	2.0	(13.4)	2.0	(5.2)	4.7	(1.4)	3.0	(4.9)	2.4	(12.3)	4.3	(2.6)	2.6	(3.0)	5.8	(3.7)	1.3	(2.3)	3.7	(2.6)
Equities	4.7	(14.4)	8.1	(18.9)	9.5	(20.3)	10.9	(19.4)	4.5	(16.5)	7.9	(28.2)	8.4	(23.3)	7.0	(27.5)	6.2	(22.3)	9.4	(26.9)
Bonds	-0.6	(14.4)	0.8	(11.1)	2.7	(14.9)	0.2	(12.8)	0.0	(12.1)	1.0	(13.1)	-0.9	(8.5)	3.4	(16.1)	-2.2	(17.6)	1.0	(13.1)
Short-term assets	2.0	(2.5)	1.7	(4.9)	3.1	(2.1)	-0.5	(4.6)	2.5	(3.3)	1.6	(4.0)	1.3	(3.5)	1.6	(1.8)	1.2	(2.2)	2.4	(3.4)
Property	3.4	(6.4)	6.7	(11.4)	4.5	(2.9)	7.2	(6.8)	4.6	(6.2)	4.6	(15.0)	-	-	-	-	-	-	-	-
Foreign bonds	1.5	(15.2)	-0.3	(16.0)	3.2	(12.3)	1.5	(14.9)	-1.1	(12.5)	-0.8	(11.7)	0.0	(13.3)	-1.7	(12.4)	-1.6	(14.0)	0.0	(13.2)
Foreign equities	9.1	(17.1)	6.5	(16.4)	10.4	(14.8)	7.8	(19.6)	6.6	(14.9)	6.4	(14.4)	7.8	(14.5)	6.1	(14.5)	6.1	(16.5)	7.2	(13.5)
Memorandum items:																				
Inflation (CPI)	6.0	(3.0)	8.9	(5.3)	3.5	(2.1)	5.5	(5.3)	6.4	(3.0)	4.9	(3.1)	7.7	(3.0)	7.7	(3.2)	4.0	(2.5)	7.1	(4.1)
Redemption yield on government bonds	2.6	(3.1)	1.9	(4.3)	3.9	(1.1)	1.0	(4.4)	2.9	(3.0)	3.2	(2.7)	2.3	(2.8)	5.3	(2.4)	0.9	(1.8)	3.3	(2.8)
Real earnings growth	0.2	(2.1)	2.6	(2.5)	4.0	(3.1)	4.2	(4.2)	1.7	(2.8)	2.4	(3.2)	1.5	(3.5)	2.8	(3.6)	1.9	(2.1)		

Table 8: Short term assets (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	4	8	5	4	7
US	1	7	8	10	9
Germany	3	3	2	1	2
Japan	2	1	2	4	3
Canada	5	6	9	10	11
Netherlands	3	3	2	2	3
Sweden	0	0	0	1	3
Switzerland	7	6	6	7	12
Denmark	3	3	2	1	1

* 1989 for Canada
1987 for Denmark

Table 9: Market paper (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	2	5	3	1	1
US	0	3	3	2	3
Germany	-	-	-	-	-
Japan	-	-	-	-	-
Canada	2	2	5	6	10
Netherlands	2	1	1	1	1
Sweden	0	0	0	1	3
Switzerland	3	2	4	6	10
Denmark	-	-	-	-	-

* 1989 for Canada
1987 for Denmark

Table 10: Deposits (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	2	3	2	3	6
US	1	4	5	8	6
Germany	3	3	2	1	2
Japan	-	-	-	-	-
Canada	3	4	4	4	1
Netherlands	1	2	1	1	3
Sweden	0	0	0	0	0
Switzerland	4	4	3	1	1
Denmark	-	-	-	-	-

* 1989 for Canada
1987 for Denmark

Table 11: Bonds (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	32	24	24	20	14
US	45	42	41	40	36
Germany	19	18	24	32	25
Japan	12	34	51	49	47
Canada	53	50	50	49	47
Netherlands	15	13	10	19	23
Sweden	76	76	74	77	84
Switzerland	25	24	28	31	29
Denmark	72	72	63	67	67

* 1989 for Canada
1987 for Denmark

of gross assets in 1966 to 14% in 1990.

This may reflect different liabilities; in countries such as Canada, only nominal returns are promised after retirement, while in the United Kingdom a degree of inflation protection both before and after retirement is expected. Similar promises are made by the Swedish supplementary national scheme, despite which the bond share is extremely high, suggesting an inefficient portfolio allocation. The fall in the UK bond share also reflects alternative means of diversification; after abolition of exchange controls UK funds sold bonds to buy foreign assets. A decline has also been observed in the Netherlands, from 20% in 1966 to 10% in 1980, although it has recovered since, with the increase in public debt issue. Van Loo (1988) relates this to higher returns and longer maturity (and thus better matching to liabilities) by private placement loans, while the recent recovery in bond holding corresponds to a narrowing of the yield differential. Patterns of bond holding may also relate to asset returns (see Table 7); where (partly owing to low and stable inflation), real returns on bonds and other fixed interest assets are relatively high in Germany, Denmark, and the Netherlands while in other countries bonds have performed poorly. Swiss bonds have done particularly badly, as have those in Sweden, where bonds have a high portfolio share. Much of the past growth of Japanese funds' bond holdings may reflect the high share of public bonds purchased, under government pressure, a practice that has now been abandoned.

The share of government bonds in pension funds' portfolios has grown significantly since the mid-1970s in all of the countries studied except the United Kingdom where there was a contraction in the supply of public debt in the late 1980s (Table 12). The decline in the UK occurred despite the introduction of index linked bonds, which should in principle be an attractive means of pension fund financing (depending on the real yield relative to growth of average earnings). The increases in other countries parallel the size of government deficits and corresponding ex ante real returns on such bonds (although, as shown in Table 7, such returns have not always been realized ex post). Investment of a fifth of the Swedish quasi-public funds' assets in government bonds casts some doubt on their efficacy as a means to protect against future risks to social security, given the bonds are to be repaid by the taxpayer in the same way as they would have to finance future social security burdens.

Except in Germany, where the bank bond market remains buoyant, as well as Sweden and Denmark, where a large proportion of bonds are issued by credit institutions for housing finance, private bond holdings of pension funds have tended to decline (Table 13). Nevertheless, in the United States the share remains over 20%. The share of US funds in total corporate bonds outstanding has also fallen. The general decline partly reflects availability, but also a shift into public bonds (which are more liquid) and equities (which offer higher returns). Notably in the UK and US, pension funds have taken advantage of regulations permitting equity holding and have thus been able to profit from patterns of relative returns which have favored equities over bonds (Table 7).

Since in many countries pension funds may offer real returns (either in the sense of indexation to wages before retirement, or in some cases indexation after retirement), they consider it is sensible to invest in "real" assets such as equity and real estate.[49]

As shown in Table 14, the share of equities in most countries has grown significantly over the period shown, albeit at levels in 1990 varying from 1% in Sweden to 63% in the UK. As noted, German funds are limited to a maximum of 20% by regulation, Swiss and Japanese to 30% - hence at 18% and 27% respectively in 1990, the German and Japanese ceilings are almost binding. An exception to the patterns of growth has been the United States, where levels in 1990 were only slightly above those in 1970. In the Netherlands shareholding remains low - 20% - despite absence of portfolio restrictions. This may relate to the narrowness of the domestic equity market and risk aversion of pension fund trustees. Proportions in the United Kingdom, the United States, and Canada were strongly affected by price instability in the mid-1970s whereas the 1987 crash had little effect on equity proportions. Reflecting portfolio regulations, the equity share

Table 12: Government bonds (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	18	18	22	18	11
US	7	9	14	22	20
Germany	9	6	13	20	17
Japanø	11	16	15	13	5
Canada	38	34	40	42	39
Netherlands	10	7	5	13	14
Sweden	12	17	24	30	22
Switzerland	-	-	-	-	-
Denmark	11	6	4	14	11

* 1989 for Canada
1987 for Denmark

Ø Government-guaranteed bonds only.

Table 13: Private bonds (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	14	6	2	2	3
US	38	33	26	19	16
Germany	10	13	11	12	8
Japan	-	-	-	-	-
Canada	15	17	12	8	8
Netherlands	3	4	3	3	4
Sweden	64	59	50	47	63
Switzerland	-	-	-	-	-
Denmark	61	66	59	52	56

* 1989 for Canada
1987 for Denmark

Table 14: Equities (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	49	30	52	62	63
US	45	42	41	43	46
Germany	4	5	9	12	18
Japan	6	10	9	16	27
Canada	22	25	21	28	29
Netherlands	11	11	5	11	20
Sweden	0	0	0	0	1
Switzerland	3	5	9	12	16
Denmark	0	0	3	6	7

* 1989 for Canada
1987 for Denmark

Table 15: Mortgages (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	-	-	-	-	-
US	6	3	2	2	2
Germany	19	22	15	12	9
Japan	0	4	11	2	1
Canada	11	12	11	6	4
Netherlands	8	6	6	4	4
Sweden	-	-	-	-	-
Switzerland	15	13	10	9	8
Denmark	6	2	3	8	6

* 1989 for Canada
1987 for Denmark

in countries such as Sweden and Denmark is exceptionally low, despite the Danish tax on real returns (Section 3(a)), which encourages substitution of equities for bonds.

Funding regulations can influence the equity share, for example in the United States where a drop in market values can cause underfunding which has to be reflected in the employer's profit and loss account. As discussed below, this encourages holding of bonds and/or forms of hedging.

Accounting conventions can also have an effect on equity holdings. In Japan, equities are held at book value, and a fixed return on the fund (based on interest and capital gains) is targeted for every year This gives adverse incentives to sell well performing equities as general share prices fall and retain those showing price declines (Tamura (1992)). In Germany and Switzerland, Hepp (1992) suggests that application of strict accounting principles, which are more appropriate to banks than pension funds, restrains equity holdings by funded schemes independently of the portfolio regulations (evidenced, particularly in Switzerland, by the fact that funds' equity holdings are far below the ceilings permitted). These conventions, for example, insist on positive net worth of the fund at all times, carry equities on the book at the lower of book value and market value and calculate returns net of unrealized capital gains. However, Lusser (1989) suggests that Swiss funds are also inhibited from equity investment by lack of expertise, lack of market transparency and limits on transferability of shares.

In contrast, the UK accounting standard permits long-run smoothing and focusses on dividends rather than market values, and hence enables funds to accept the volatility of equity returns. The concern of some commentators in the UK is rather whether equity holdings are too high given the risks; however, note that 18% of the 63% equity share in 1990[50] was actually in foreign equities, thus reducing risk somewhat. No other country has anything comparable to this portfolio share of equities.

A further factor that may influence equity holding is maturity of the fund, as the need to pa pensions puts a greater focus on incom generation, i.e., bonds, as opposed to capit growth, i.e., equities. This may be an importan factor in the future in the UK and US.

Pension funds in all countries show a declining share of mortgages in recent years (Table 15); in Canada and the Netherlands weakness in the housing market has stimulated this trend. However, note that Swedish and Danish funds 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 57% of Swedish funds' assets in 1990, while Danish funds in 1987 had 63% of assets in mortgages or mortgage association bonds. These imply an enormous exposure to potential effects of recession and falling house prices. They may also imply a draining of resources from private industry (as contributors) as well as a diversion of personal sector saving, depending on the post tax interest rates payable by mortgage borrowers.

Loans face greater liquidity risk than bonds, while having the advantage of being tailored precisely to the needs of borrower and investor (longer maturities, etc.). They constitute a large proportion of Dutch and German pension funds' assets (Table 16), reflecting the structure of financial markets as well as returns. Loans by German funds are largely to banks and companies (including the sponsoring company); Dutch funds lend predominantly to the public sector. Swedish and Swiss funds, that used to rely heavily on loans, now only do so to a limited extent. In Sweden the decline (both in "retroverse" loans to participating companies and promissory note loans) is related to the increased efficiency of the domestic capital market in intermediating funds. In Japan, the share of loans has again fallen sharply, although these medium-term floating-rate yen loans to firms were consistently the most profitable investment in Japan in the 1970s. It can be argued that this highlights a general point, that protection of fund managers from external competition (as was the case in Japan till recently) may lead to a sub-optimal investment strategy from the point of view of plan beneficiaries. (see also Section (d)).

Table 16: Loans (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	0	0	0	1	0
US	-	-	-	-	-
Germany	31	33	37	36	36
Japan	52	30	22	15	13
Canada	0	0	1	0	0
Netherlands	46	52	63	52	39
Sweden	22	24	26	22	10
Switzerland	33	31	27	21	14
Denmark	1	1	4	1	1

* 1989 for Canada
1987 for Denmark

Table 17: Property (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	10	15	18	10	9
US	-	-	-	-	-
Germany	12	12	9	7	6
Japan	27	21	6	3	2
Canada	1	1	2	3	3
Netherlands	16	15	14	11	11
Sweden	0	0	0	0	1
Switzerland	16	20	18	18	17
Denmark	-	-	-	-	-

* 1989 for Canada
1987 for Denmark

The same comment appeared for a long time also to apply to declining investment by Japanese pension funds in property (including equipment and real estate trusts) (Table 17), which has fallen from almost 30% of the portfolio in 1970 to 2% now, although the current property crash now casts doubt on this judgement. Property holdings in Germany, the Netherlands, and the United Kingdom, (where much of the accumulation followed weakness of the equity markets in the mid-1970s) have also declined recently. Once UK equity returns recovered and exchange controls were abolished, property investment declined owing to its lack of liquidity and lower returns than the alternative of foreign equities. As in Japan, in the light of the property crash in the UK in the late 80s, this strategy proved sensible. Dutch holdings were made less attractive by a tightening of rent and tenure controls. Canadian holdings are small, and restricted to 7%. The principal exception to the picture are the Swiss funds, which retain around a fifth of their assets in property. As noted by Schmähl (1992b), this focus may drive up the price of land and does not contribute to capital formation. Lusser (1989) also criticizes this approach, and suggests funds will face decreasing returns on (domestic) property in the future, as the population declines.

n principle, international diversification can offer a better risk/return tradeoff to fund managers, by reducing the systematic risk of investing in domestic markets arising from the cycle or long term shifts in the profit share. It will be of particular importance in small markets with a low umber of liquid stocks - where domestic nvestment would hence imply a high degree of ndustry risk. Alternatively it can be seen as a means of hedging against risks of imported inflation (which vary with the openness of the economy). It will also allow investment in industries not present in the domestic economy. In a longer-term context, international investment in countries with a relat ely young population ay be essential to prevent battles over resources between workers and pensioners in countries with an aging population. As a by-product, international diversification should also improve efficiency of global capital markets, subject to ıitations funds impose on themselves on investing in LDCs, and the risk of heightened volatility arising from short term herd-like shifts of funds between markets, see Section 5(d). For further discussion, see Davis (1991).

Of course, international investment poses additional risks compared with domestic investment. Exchange rate risk means that the returns from foreign assets may be more variable than for domestic instruments, especially in the short term. Transfer risk may affect the ability to repatriate returns. Settlement risk in some securities markets may be large, with a high proportion of delayed and failing transactions. Liquidity risk that transactions may move the market against the fund may be significant in narrow markets. There may also be restrictions on investment given concerns over foreign control and disruptive capital inflows.[51]

Table 18 shows that foreign asset holdings have grown sharply over the 1980s in the United Kingdom and Japan. In both countries, this pattern followed abolition of exchange controls, at a time when the economies were generating current account surpluses and verseas investment returns looked attractive. In Japan, restrictions on overseas investment were also progressively eased over the 1980s. There is a contrast, however, in that UK foreign assets are virtually all equities, whereas Japanese funds invest heavily in foreign bonds, see Table 19. Meanwhile Dutch funds have long held a significant proportion of assets abroad, partly due to the large volume of pension fund assets compared with domestic security and real estate markets. Growth was much less marked in the other countries (Table 18); in Germany and Canada this is partly for regulatory reasons.[52] Data for Sweden and Denmark are not available, but their foreign asset holdings are believed to be extremely small.

The characteristics of pension funds' portfolios, which result from the asset selection discussed above, are shown in Table 21. The exceptionally high level of real assets for UK pension funds, and the low levels in Scandinavia, are particularly notable. Reflecting their heavy investment in loans, German and Dutch funds have relatively low levels of marketable securities. These

Table 18: Foreign assets (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	2	5	9	15	18
US	0	0	1	2	4
Germany	0	0	0	1	1
Japan	0	0	1	5	7
Canada	-	3	4	5	6
Netherlands	7	8	4	9	15
Sweden	-	-	-	-	-
Switzerland	-	-	-	3	5
Denmark	-	-	-	-	-

* 1989 for Canada
1987 for Denmark

Table 19: Foreign assets of pension funds end-1988

	Foreign assets ($bn)	Percent of total assets	Foreign bonds as percent of foreign assets	Foreign equities as percent of foreign assets
UK	53.8	13.9%	6%	94%
US	62.8	4.0%	14%	86%
Germany	0.2	0.4%	93%	7%
Japan	65.2	7.1%	(50%)+	(50%)+
Canada	6.9	5.3%	7%	93%
Netherlands	15.0	14.4%	41%	59%
Switzerland	9.0	4%	70%+	30%+
Memo: France	1.2	4.0%*	15%	85%

* Percent of securities holdings only
\+ Estimated

Data for Sweden and Denmark not available.

Table 20: Other assets (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	0	0	2	4	6
US	3	5	8	6	2
Germany	11	6	3	1	1
Japan	-	-	-	-	-
Canada	8	1	2	2	2
Netherlands	-	-	-	-	-
Sweden	3	0	0	0	0
Switzerland	1	1	1	1	1
Denmark	23	25	28	24	25

* 1989 for Canada
1987 for Denmark

Table 21: Characteristics of pension funds' portfolios

		United Kingdom	United States	Canada	Japan	Germany	Netherlands	Sweden	Denmark	Switzerland
		as a proportion of total assets[a]								
Marketable securities[b]	1970	0.85	0.90	0.77	0.21	0.23	0.28	0.76	0.72	0.31
	1980	0.79	0.86	0.73	0.64	0.34	0.15	0.74	0.66	0.41
	1990	0.78	0.85	0.86	0.74	0.43	0.44	0.88	0.74	0.55
Real assets[c]	1970	0.61	0.45	0.23	0.37	0.17	0.28	0.00	0.00	0.19
	1980	0.70	0.41	0.20	0.16	0.18	0.19	0.00	0.03	0.27
	1990	0.72	0.46	0.32	0.29	0.24	0.31	0.02	0.07	0.33
Capital-uncertain assets[d]	1970	0.93	0.90	0.76	0.51	0.36	0.42	0.76	0.72	0.44
	1980	0.94	0.82	0.70	0.7	0.42	0.29	0.74	0.66	0.55
	1990	0.96	0.82	0.79	0.76	0.49	0.54	0.86	0.74	0.62
Long-term Fixed-interest-bearing assets[e]	1970	0.32	0.51	0.65	0.14	0.69	0.61	0.98	0.76	0.58
	1980	0.24	0.43	0.64	0.54	0.76	0.72	1.00	0.70	0.55
	1990	0.14	0.38	0.51	0.47	0.70	0.66	0.94	0.74	0.43

(a) Categories overlap, so they do not add up to unity.
(b) Equities, bonds and market paper.
(c) Equities and property.
(d) Equities, property and bonds.
(e) Bonds, mortgages (for Canada, the United States, the Netherlands, Denmark, Sweden and Germany), other loans (for Germany, Denmark, Sweden, Switzerland and the Netherlands).

observations apart, for the United Kingdom, the United States and Canada, the table reveals a comparative lack of change in the characteristics of pension funds' assets, which may in turn be related to unchanging aims and regulation. The main shifts have been a move from fixed interest to real assets by United Kingdom pension funds and into marketable and capital uncertain assets by Canadian funds. This observation suggests that many of the portfolio shifts discussed above did not imply changes in objectives, but rather an adjustment to market conditions within an unchanged set of goals in terms of real return, marketability, etc. Portfolios in Sweden and Denmark are also stable - but in this case perhaps due to the tightness of portfolio regulation and the conservatism of fund management. Portfolios in Germany, the Netherlands, and Japan have been somewhat more fluid; one cause of this, notably in Japan, was the increased issue of government bonds, with a concomitant shift out of property and loans.

(c) Returns on the Portfolio

The patterns of portfolio distributions (Tables 8-20) and risks and returns on assets (Table 7) can be used to derive estimates of the returns and risks on portfolios, and hence the cost to the firm of providing a given level of pension benefits. The method is simply to weight the annual real rate of return on each asset by the relevant portfolio share, thus giving on aggregation a series of annual portfolio rates of return. Transactions and management costs are ignored; actual returns would be lower if these were significant (see Section (d)). The average and standard deviation of these series are given in Table 22. (The data in Table 22 cover the period 1967-90 and average returns, especially for the US and Canada, are affected by the high level of stockmarket prices in 1966. Appendix II shows real rates of return over the period 1970-90. It can be seen that for the US average real returns amounted to 4% over this period, twice the level reported for the longer period 1967-90.)

Annual holding period returns on marketable fixed - rate instruments are used, as in Table 7, instead of redemption yields. In our view, the holding period returns are the more relevant measure for an ongoing portfolio, since they take full account of losses or gains due to interest rate changes (although other assumptions regarding holding periods could also be made). The estimates suggest that pension funds in the United Kingdom obtained the highest real return over the period 1967-90, Sweden, Switzerland, Canada, and the United States the lowest. These results must be reflected either in funding costs for sponsoring firms or the level of benefits offered and it is notable that UK funds tend to offer superior benefits to North American funds (Tab' 6). The result of course partly reflects risk an the share of equity and property, the Unit- Kingdom having the highest standard deviation - returns (together with Denmark), and by far the highest share of real assets (Table 21). But as noted in Section 1, compared with other financial institutions, pension funds are well placed to accept a degree of volatility. This is particularly the case for defined benefit funds where there can be risk sharing between younger and older members.[53] Meanwhile, Swedish, Swiss, United States, and Canadian funds held high proportions of bonds, which performed poorly over this period.

Interestingly, portfolios in Germany and the Netherlands had a high real return and low volatility, despite their focus on bonds and loans. This relates to relatively high returns on fixed rate instruments in those countries (Table 7). The high returns may appear to justify the conservative asset distribution of German and Dutch funds. Growing integration of capital markets, however, should mean this asymmetric performance is unlikely to be repeated, and hence portfolio regulations locking German funds into this type of distribution remain difficult to justify. Moreover, Table 25 (see below) shows that real returns for German and Dutch funds could have been boosted significantly by an increased share of equities. Investment in international equities would ensure that the associated increase in risk was mitigated.

Several observations can be made regarding these results. The publically sponsored Swedish fund does poorly, despite the structure of independent fund boards. A further test of ownership effects, splitting local government and private funds in the

Table 22: Pension fund returns (1967-90)

Mean (Standard deviation) of annual real total returns (domestic currrency)
Percent

	US		UK		Germany		Japan		Canada		Netherlands		Sweden		Denmark		Switzerland	
Using holding period returns on bonds (all countries) and fixed rate mortgages (US & Canada)																		
	2.2	(11.9)	5.8	(12.5)	5.1	(4.4)	4.0	(9.4)	1.6	(9.8)	4.0	(6.0)	0.2	(7.6)	3.6	(12.7)	1.5	(6.4)
Average earnings	0.2	(2.1)	2.6	(2.5)	4.0	(3.1)	4.2	(4.2)	1.7	(2.8)	2.4	(3.2)	1.5	(3.5)	2.8	(3.6)	1.9	(2.1)
Portfolio return less average earnings	2.0		3.2		1.1		-0.2		-0.1		1.6		-1.3		0.8		-0.4	
Government bonds	0.6	(14.4)	0.8	(11.))	2.7	(14.9)	0.2	(12.8)	0.0	(12.1)	1.0	(13.1)	-0.9	(8.5)	3.4	(16.1)	-2.2	(17.6)
Market paper	2.0	(2.5)	1.7	(4.9)	3.1	(2.1)	-0.5	(4.6)	2.5	(3.3)	1.6	(4.0)	1.3	(3.5)	1.6	(1.8)	1.2	(2.2)
Equities	4.7	(14.4)	8.1	(18.9)	9.5	(20.3)	10.9	(19.4)	4.5	(16.5)	7.9	(28.2)	8.4	(23.3)	7.0	(27.5)	6.2	(22.3)
Memo: using redemption yields on fixed rate instruments	3.9	(7.6)	6.3	(10.7)	5.5	(3.0)	2.9	(5.7)	4.1	(5.0)	4.3	(5.5)	2.8	(2.9)	5.8	(3.0)	2.2	(2.8)

UK and US, is shown in Appendix. Public funds again achieve lower returns. The Swedish and Swiss are also both compulsory, thus in principle reducing competitive pressures. The Japanese, Swiss, and Germans have generally had little competition in fund management (see Section 4(d) below). But as shown by the Germans, good economic performance - or international diversification - can overcome a number of handicaps.

Comparison of the risks and returns on pension fund portfolios with Table 6 shows the benefits of diversification in terms of lower standard deviations on the portfolio than individual assets. However, the returns cannot be directly compared, as pension fund returns are free of tax, while assets held directly would not be. It should also be noted that Table 22 only shows an estimate of returns to funds from "passive" holdings of the relevant index for each asset, weighted by portfolio share. Appropriate stock selection could in principle give a higher return - although as discussed below, in practice active asset management often lowers returns, given transactions costs.

Comparison, in Table 22, of the results with risk free yields suggests that the funds generally outperformed government bonds, albeit only narrowly in Denmark. However, in Canada and Sweden the portfolio return is below that on market paper (it is open to doubt whether the markets were big enough to absorb pension funds' size, of course). Returns are generally below those on equities, but at a benefit of much lower risk.

The most crucial test is ability of a fund to outperform real average earnings, given that defined benefit schemes are basically indexed to them. This is hence the key indicator of the costs of the scheme to the sponsor. For the period 1967-90, the headroom is sizeable (over 2% pa) in only two countries, the US and the UK, although the US result relies on the estimate of almost zero real wage growth (net of fringe benefits) over the past 25 years. It remains positive in the Netherlands, Germany and Denmark. The differential between returns and earnings growth is negative, though barely so in Canada, Japan and Switzerland and more significantly so in Sweden. A negative differential implies a need for higher contributions or for regular top ups in order to meet specified targets.[54] It was noted above that this may relate to inefficient asset allocations.

Table 23 shows the results of illustrati calculations on the relation between costs providing pensions, average earnings and real returns (based on Vittas (1992)), as applied to the results of the sample shown in Table 22. The Table shows the implied replacement rate th would be attainable given the real returns and growth rates of wages shown in Table 22, assuming indexed pensions, a 10% contribution rate, 40 years in service and 20 years retirement. The table illustrates clearly the benefits of higher return relative to real earnings; assumin pensions are indexed to prices, the UK funds can obtain a replacement ratio of 66%, the Swedes only 16%. Clearly, given their lower returns, pension funds in Sweden as well as Switzerland, Canada and Japan would require highe contribution rates in order to achieve simila replacement rates to those of the UK funds (Table 2 in Appendix II shows a much more favorable combination of real returns and earnings growth for the period 1971-90 in most countries. This reflects the better performance of stock market in the 1980s and the deceleration in earnings growth. It should, however, be stressed that what really matters is average returns and earnings growth over 40 or even 60 years.)

Table 24 shows the real returns on pension fund portfolios over five-year subperiods, thus offering an additional indication of the risk of pension funds. As above, the patterns are influenced both by portfolio distributions and the differing returns on domestic financial markets. And as noted, the degree to which the latter differentials may continue with open and globalized financial markets is open to doubt. Subject to these caveats, the table shows that German funds have earned a positive real return throughout, whereas in other countries returns were negative in 1971-5. In Denmark, Canada, and the US, returns were also negative before 1970, and in Sweden, Japan, Canada, and the US in 1976-80. In the 1980s a catchup occurred, although returns on

Table 23: Implied replacement rates with indexed pensions

Percent	Indexation of pensions to prices	Indexation of pensions to wages
United States	37.6	36.9
United Kingdom	66.4	52.6
Germany	40.0	27.6
Japan	28.4	18.9
Canada	23.1	19.4
Netherlands	40.5	32.2
Sweden	16.1	13.7
Switzerland	21.6	17.8
Denmark	33.2	25.3

Note: This table uses the simple model developed by Vittas (1992) to calculate the implied replacement rates if the pension schemes were run as defined contribution plans and the real rates of return and real rates of earnings growth were those of the period 1967-90. The model is based on a 10% contribution rate, 40 years of active service and 20 years of retirement life.

Table 24: Real pension fund returns in sub periods (using holding period returns on bonds)

	1966-70	1971-75	1976-80	1981-5	1986-90	Memo: average
UK	4.2 (11.5)	-2.8 (19.4)	4.9 (5.2)	12.4 (7.3)	10.1 (12.7)	5.8 (12.5)
US	-5.4 (6.5)	-0.8 (13.8)	-1.9 (6.9)	8.1 (13.0)	11.2 (12.2)	2.2 (11.9)
Germany	5.0 (3.3)	3.3 (2.7)	3.3 (4.4)	7.7 (4.9)	6.3 (5.9)	5.1 (4.4)
Japan	0.1 (5.3)	-0.5 (10.9)	-1.2 (5.3)	10.9 (2.1)	13.8 (7.8)	4.0 (9.4)
Canada	-3.3 (1.4)	-1.2 (11.7)	-1.0 (4.0)	6.1 (15.1)	7.9 (6.7)	1.6 (9.8)
Netherlands	1.7 (3.3)	-1.4 (5.5)	2.0 (3.0)	10.5 (4.0)	6.3 (5.4)	4.0 (6.0)
Denmark	-1.9 (8.7)	-1.3 (12.7)	0.8 (4.4)	17.7 (14.6)	-1.8 (10.3)	3.6 (12.7)
Sweden	1.2 (8.2)	-3.5 (6.7)	-5.3 (5.6)	3.9 (4.9)	4.7 (9.3)	0.2 (7.6)
Switzerland	0.8 (0.0)	-0.5 (6.3)	4.0 (8.0)	3.0 (5.4)	-0.2 (7.2)	1.5 (6.4)

Table 25: Mean (standard deviation) of real total returns on diversified portfolios

Per cent	Domestic[1]		Domestic & international[2]		Memo: Col 2 less Average Earnings
United States	1.4	(12.1)	1.9	(11.4)	1.7
United Kingdom	4.9	(16.4)	4.5	(14.9)	1.9
Germany	6.3	(11.2)	5.8	(10.5)	1.8
Japan	5.7	(14.2)	4.7	(12.5)	0.7
Canada	2.4	(11.9)	3.0	(11.1)	1.3
France	3.7	(16.3)	3.8	(14.6)	n/a
Netherlands	4.5	(17.4)	4.1	(15.5)	1.1
Sweden	3.8	(13.5)	3.7	(12.1)	2.2
Switzerland	2.0	(16.5)	2.0	(14.5)	0.1
Denmark	5.2	(18.9)	4.5	(16.4)	1.7

1 50% domestic equity, 50% domestic bonds.
2 40% domestic equity, 40% domestic bonds, 10% foreign equity, 10% foreign bonds.

Note: International diversification should cause a convergence in returns by increasing below average returns and lowering those above average. This would occur if purchasing power parity held all the time. In fact, large deviations between exchange rates and purchasing power parities may prevent this convergence from materializing, at least in the short to medium run until corrections in exchange rates take place.

Swedish and Swiss funds are consistently below the Germans, despite similar portfolios, largely because German bonds have returned a positive real yield. Of course, it can be argued that a five year horizon is irrelevant to the time scale of pension funds (given a working career that lasts 30-40 years). However, it may be of relevance when strict funding and accounting rules are applied.

Finally, Table 25 shows the returns on artificial portfolios of holding 50% equity and 50% bonds, and of international diversification. This shows what could occur if portfolio restrictions did not exist. As noted, equity holdings are generally below this (Table 14). Compared with Table 22, the results confirm that returns may be boosted by raising the share of equity, at some cost in terms of risk. Meanwhile foreign investment always reduces risk, though in some cases there is a trade off with returns (this generally relates to the changes in the exchange rate over time. With a structural depreciation, for example, as in the UK, returns on foreign assets are boosted, compare Table 7.) Several of the countries which fell below a satisfactory return on assets relative to average earnings (such as Canada, Denmark, and Sweden) would have found pension provision less costly if they had followed such a rule. German funds would also have boosted their headroom considerably.

Summarizing Sections (b) and (c), support is given to a prudent man rule, backed by flexible accounting and funding standards (perhaps focussing on income rather than market value) to back holding of high-return but volatile assets. Except for a fund with mostly retired members, a shift into deficit in one year should not interrupt payment of pensions. These policies in turn should help minimize the cost to the sponsor of providing a given level of benefits. Since foreign investment is shown invariably to reduce risk, albeit often with a slight reduction in return, limits on such holding are suggested to be particularly counter productive.

(d) Fund Management

The returns calculated above all assume that funds hold the market index of the relevant asset in each year of the sample. In most cases this may not be so, as some form of active portfolio management is widely adopted. This warrants a discussion of the economic issues in fund management, costs, and the implied effects on pension fund returns.

Fund management is a service entailing management of an investment portfolio on behalf of a client - in this case a pension fund. Management may be carried out internally, that is, by employees of the fund, or externally[55] by a financial institution such as a bank or insurance company. Such delegation raises principal-agent problems, as unless the manager is perfectly monitored and/or a foolproof contract drawn up, he may act in his own interests (e.g., in generating excessive commission income) and contrary to those of the fund. One can suggest a priori that such monitoring will be costlier when managers lack reputation or relationships, which otherwise constitute assets that would be depreciated by adverse behavior. Also internal managers should be less susceptible than external, given a greater degree of control that can be imposed via employment contracts, etc.

Various features of fund management in countries such as the UK can be seen as ways to reduce principal-agent problems. For example, managers are offered short (3-year) mandates, with frequent performance evaluation; fees related to the value of funds at year-end and/or performance related fees.

The level of management fees (excluding transactions costs) charged by fund managers depends on the competitive structure of the market; for example in the competitive UK market a fund would pay no more than 22 basis points on £100 million. In the US, fees are higher at around 40 basis points. This difference may relate to greater ability to cross subsidize from retail business in the UK and /or higher risk of loss of mandate in the US, which necessitates higher fees to break even. Fees in countries such as Switzerland and Germany, with relatively uncompetitive fund management sectors, are far higher - 100 basis points or more. In Japan, several structural features ensure low levels of competition in fund management. Until recently, only trust banks and life insurers could manage

funds. In house management is restricted to bonds. New entrants, only recently permitted, can only invest new inflows. Accordingly, trust banks charge 60-180 basis points, while life insurers charge 2-5% of the inflow.[56]

However, even more than administrative costs, the crucial influence on pension funds' costs is of course the efficacy of asset management. Here again, the countries with uncompetitive fund management sectors may lose out; for example in Japan the asset return target is fixed (8%) and there is little incentive to exceed it. Similarly in Switzerland there are few rewards for exceeding a low return (and considerable costs, given the accounting system, in holding volatile assets that could put the fund below actuarial balance).

Where fund management is a competitive sector, as in the Anglo-American countries, portfolio management is typically a two stage process, with traditionally a strategic decision regarding allocation to different assets and national markets being followed by a lower level decision over the precise assets to be held within these categories. The latter may include passive indexation of the market. (However, more recently, there is evidence that fund mangers are picking core holdings of stocks at a strategic level, and picking national markets at a tactical level, with the use of tock index futures (see below, also Davis (1991) nd Howell and Cozzini (1991).)

The traditional strategic choice, typically taken jointly by managers and trustees, is illustrated by the data in Sections (b) and (c). The results suggest that there is a tradeoff, as would be expected, between return and risk and considerable benefits from diversification. This in turn points to the need for appropriate measures of risk-adjusted returns and identification of sources of portfolio performance in order to evaluate fund managers' performance (Blake (1990), Tamura (1992)).

As regards the traditional short term asset allocation decision, which tests ability of active management ("stock picking") to outperform indices inclusive of fees and transactions costs, the evidence is almost uniformly contrary to the efficacy of active management of funds within asset categories. This is in line with the efficient markets hypothesis, which suggests that, given prices already incorporate all available information, there is no net benefit from spending extra cash to try to beat the index. Nevertheless, as noted by Grossman and Stiglitz (1980) and Cornell and Roll (1981), the efficient markets hypothesis does not rule out small abnormal returns as an incentive to acquire information, but those acquiring costly information should have only average net returns after the costs of acquiring information are taken into account. In practice, as shown below, active managers underperform.

Data for the UK are shown in Table 26. These show that even in the home market, funds tend to underperform the index, but underperformance is particularly severe in foreign markets. This in turn justifies an indexed approach to national stocks, where the fund manager's skill is employed in picking undervalued markets rather than stocks, and employing stock index futures to gain rapid exposure to such markets. As discussed below and in Howell and Cozzini (1991), this is increasingly the approach adopted by large international investors in countries such as the UK. Table 27 shows that average returns are lowest for external managers, which is in turn inversely correlated with turnover. These are consistent with the principal-agent problems set out above; managers least under control have higher turnover and lower returns.

Similarly, Lakonishok et al (1992) show that most US investment management is again active, and that fund managers consistently underperform the market, for example the equity proportion of US funds (excluding the management fee) underperforms the S&P 500 index by an average of 1.3% pa over 1983-9, or 2.6% if returns are value weighted. If managers overperform in some periods this is virtually never sustained. The authors suggest that the persistant use of active management despite such evidence is related to agency problems. In particular, they suggest that these may arise within the management structure of the sponsor; corporate treasurers seek to bolster their own positions vis a vis their managers, and hence seek fund managers that can offer good excuses for poor performance,

Table 26: UK Pension funds: Long term returns on equity relative to benchmark indices 1981/89

	1981	1982	1983	1984	1985	1986	1987	1988	1989	Average
USA	-3.5	-4.2	-4.1	-8.3	-2.7	-3.0	-3.7	-3.4	-0.5	-3.7
Japan	8.5	6.9	9.3	-15.4	-8.7	-1.1	-13.6	-8.9	5.3	-2.0
Cont Europe	-6.8	5.7	0.8	-5.3	-4.6	-4.0	-3.0	-0.4	1.7	-1.8
World	-3.8	-3.6	1.9	-8.5	-1.9	-2.6	-10.1	-5.8	6.7	-3.1
UK	0.5	1.2	-0.5	-1.6	-0.5	-1.2	-0.8	-1.0	-0.1	-0.4

(1) Prior to 1987, local indices for US and Japan, MSCI for Europe. After 1987, FT indices.

Source: WM

Table 27: UK Pension funds: Performance and Turnover by Management Method, 1986-90

	Nominal Annual returns (%)	Activity (1)
Internal	11.1	64%
Part internal/external	10.9	118%
2 or more managers	10.6	119%
Financial conglomerates	10.8	106%
Life company managed	11.2	96%
Life company segregated	10.4	117%
Independent managers	10.6	118%

(1) Activity is the element of turnover in excess of net investment of new money, as percent of assets.

clear stories about portfolio strategies and other services unrelated to performance. They avoid indexation, as this would reduce their own day to day responsibilities, as well as internal asset management, as this would give them too great a responsibility for errors. The authors suggest these agency costs are additional to the difficulties (as noted above) which arise between a (rational profit-maximizing) sponsor and the fund manager, and that a shift to defined contribution plans would help overcome the difficulties.

The main implication of these analyses is that indexation, as discussed below, will be optimal for most pension fund assets, with the caveat that the benefits arising from active management are likely to increase with the number of funds adopting such predictable passive strategies, and with the inefficiency of the market more generally. As discussed below, widespread indexation may also weaken incentives to monitor corporate management. Meanwhile, to the extent indexation is not used, a reliable measure of fund managers' performance as a means of control is seen as essential. Performance measurement services - whose data generated the results reported above - are well developed in the Anglo-American countries but vestigial in Continental Europe and Japan. Indexation does not, of course, remove the need for selection of asset categories in the light of liabilities and expected returns, as well as choice of national markets. To the extent these activities remain profitable, they suggest that there is greater efficiency within than between markets.

5. EFFECTS ON CAPITAL MARKETS

This section discusses the impact of pension funds on innovation, market structure, demand for capital market instruments, volatility and the overall development of capital markets.

(a) Innovation

The impact of pension funds on the development of capital markets varies from country to country. For example, as regards innovation, in the United States ERISA codified the legal status of defined benefit corporate pension funds and imposed minimum funding requirements, sharply increasing demand for hedging by pension funds.[57] This has stimulated the development of immunization strategies (to match assets to liabilities) based on long-term bonds. The incentive to immunize in defined benefit schemes arises from the asymmetry of treatment of pension deficits and surpluses (Section 3 (d)), which implies that the corporate guarantee of the accumulated benefit obligation (ABO) is a put option on the investments of the pension fund with an exercise price equal to the present value of the ABO. To minimize the cost of the option, there is an incentive to immunize the liability via an investment strategy of duration matching.

The requirement of a fixed duration for investment instruments has stimulated innovations tailored to funds' needs such as zero coupon bonds, collateralized mortgage obligations and guaranteed income contracts (offered by life insurers); immunization strategies also spurred development of markets for index options and futures. For example, pension funds writing call options on equities can be seen as converting them into short-term fixed-income securities for matching purposes. Another strategy is holding assets in excess of the legal minimum in equities, as long as their proportion is reduced when the market value of pension assets approaches the ABO. This strategy is known as portfolio insurance or contingent immunization, and has stimulated development of index options and futures markets (as well as being blamed for market volatility, for example at the time of the 1987 crash).

Bodie (1989) suggests that fixed duration securities (and associated strategies) have little role in terms of household utility maximization, as they are unable to hedge against the inflation risk to future consumption. Hence an individual - or equivalently a defined contribution pension plan given the distribution of risk to the employee - would not seek such instruments but instead would just diversify, seeking to maximize return for a given risk. The only difference would be that in a tax free pension plan, there is an incentive to focus on the least tax-advantaged securities such as corporate bonds (subject to inflation risk). Consistent with this analysis, Berkowitz, Logue (1986) found that returns on defined benefit plan were below other US diversified portfolios over 1968-83, where the shortfall in returns was identified as the "insurance premium". (Although as noted by Lakonishok et al (1992) in Section 4(d), the shortfall could also be due to agency problems.)

Meanwhile United States funds have been in the vanguard of developing passive indexation strategies (which appear justified in the light of persistent underperformance by active fund managers, as discussed above). In 1990 41% of US funds employed such strategies, with index funds accounting for a quarter of total US funds' assets.

In the United Kingdom, the contribution of pension funds to innovation is less clear cut. Many trust deeds used to prevent funds from using derivatives, though these restrictions have been relaxed more recently. Taxation was also a discentive until the late 1980s (use of derivatives was counted as "trading" and taxed). There also appears to be a more general difference in attitudes between United Kingdom and United States managers to innovation. (See Davis (1988).) This may be related mainly to the less asymmetric and more flexible accounting treatment of funds in the UK, where there is no sudden cutoff point where liabilities must enter the balance sheet. Also minimum funding standards only apply to a subset of pensions (the GMP). Thus the option/guarantee effect described above for the US does not apply

particularly strongly, and funds have so far been happy to hold an overwhelming proportion of unhedged equities. However, Blake (1992) suggests that as funds mature and raise their holdings of bonds in order to reduce the risk of not meeting liabilities when they fall due, mmunization strategies will come to the fore.

However, one area in which UK funds have already been particularly active is use of derivatives in international investment. As iscussed in Davis (1991), stock index futures are seen as particularly useful in tactical asset allocation, facilitating rapid shifts between different national markets, which would later be translated into stocks. Derivatives might also be used for long term strategic movements into markets or stocks, if they enable such shifts could occur without moving the market against the fund. This will be the case if the derivatives arkets are more liquid than the underlying (as, for example, in Japan, where in mid-1991, outstanding futures contracts represented three times the daily number of shares traded on the stock market). Also temporary adjustments in posure could be obtained by purchase and sale index futures without any transaction in the derlying (overlay strategies), thus avoiding disturbance of long-term portfolios, see Cheetham 1990). Such strategies also facilitate unbundling" of fund management into currency, market and industry exposure. Finally, pension funds might invest cashflow awaiting long term nvestment, in derivatives, as it ensures the manager is always invested and will not miss an urn.

Market Structure

roader effect of the development of pension unds and other institutional investors is on l market structure. Their key demand is dity, that is, ability to transact in large size out moving the price against them, and at low ransactions costs. They are unconcerned by the irmness of investor protection regulation, as they iave sufficient countervailing power to protect their own interests against market makers and other financial institutions. Specialized wholesale markets which focus transactions and increase dity, usually centered on well-capitalised position-taking market makers ready and able to facilitate large trades, will hence tend to be attractive to pension funds. Because liquidity is a form of economy of scale, it tends to make it difficult for other markets or financial centres to compete with such markets, even with similar technology. London's SEAQ International is a classic example; it currently carries out 50% of French and Italian equity trading and 30% of German, for example. Its relative liquidity is reflected in transaction sizes - $275,000 compared with $25,000 in Paris and $50,000 in Frankfurt. Similarly, growth of pension funds in the US has led to development of off-exchange "block trading". The growth of such exchanges may entail a tiering of markets, with order-driven and heavily regulated domestic markets retained for retail investors and for small company stocks. Liquidity may be aided by reduction in commissions, that institutions are well-placed to press for. Increases in liquidity should in turn be beneficial more generally to the efficiency of capital markets, and lead to a reduction in the cost of capital.

(c) Demand for Capital Market Instruments

Institutional investors can influence the demand for capital market instruments in several ways; by influencing the rest of the personal sector's portfolio distribution between bank deposits and securities, by the institutions' own portfolio choices, and by increasing the total supply of saving.

In the Anglo-American countries, econometric results (Davis (1988)) suggest that the growth of institutions has been accompanied by a shift by persons from securities to deposits, not matched in Germany and Japan.[58] Hence securities are increasingly held in the Anglo-American countries by large, informed, risk-averse investors facing low transactions costs. Such a capital market should sensitively reflect information on firms' performance.

This is confirmed by econometric analysis (Davis (op cit)) of the portfolio distributions of pension funds, which show they are strongly influenced by relative asset returns, particularly where there are few regulations governing portfolio

distributions and low transactions costs, as in the United Kingdom and the United States. Adjustment to a change in such returns is generally rapid. This implies an efficient allocation of funds. These results do not all hold where transactions costs are high and regulations are strict - e.g., in Germany, Japan, and Canada. In these countries adjustment to a change in returns is somewhat slower and allocation of funds less efficient. The results also contrast with those for households and companies (Davis (1986)) where adjustment to changes in returns tends to be slow, due to higher transactions costs and poorer information.

Most of the literature suggests that institutionalization has a significant but not major effect on total personal saving, increased saving via institutions being partly offset by declining discretionary saving, (see Feldstein (1978), Munnell (1986) and the review in Smith (1990).) although some recent studies, such as Hubbard (1986) suggest a much larger effect. In theory, while the scale of benefits of a pension system may have an effect on personal saving, funding as such should not. (As noted, funding is rather a transfer of securities from the sponsoring firm to the market, which collateralises the liabilities, reduces risk of non-payment (because of diversification) and gives scope for voluntary increase in pensions when returns are high.) The effect that does occur may result from liquidity constraints on some individuals (especially the young), who are unable to borrow in order to offset obligatory saving via pension funds early in the life cycle. Pension saving may be partly offset at a national level by tax subsidies to private saving, especially if they are financed by public dissaving. However, a switch from social security to funding would probably have a major effect on saving, given the former has been shown significantly to depress saving in a number of countries.[59]

Bernheim and Shoven (1988) show that pension funds may change the volatility and relation between saving and real interest rates. Data from the US show that a rise in real rates may reduce saving if it makes more schemes fully funded (target saving) and reduces the need for contributions. There is also evidence for this in the UK in the 1980s.

(d) Volatility and Short Termism

A further qualitative question is whether institutionalization increases capital marl volatility. Some commentators in the Unit States blamed fund managers' portfolio insuran strategies for causing volatility at the time of the 1987 Crash, although this is disputed. Regul performance checks against the market (as frequently as monthly in the United States, b less in the United Kingdom) may induce "herding" among funds to avoid performing significantly worse than the median fund. The Japanese also appear to suffer from such herding, despite a less competitive environment for managers.

Interviews with fund managers suggests this ma be an important cause of volatility not only i domestic but also in international markets. S: Davis (1988) (1991). As noted in Howell an Cozzini (1991), the rise of global asset allocatio as a tool of fund management, and the development of markets such as those for stock index futures have stimulated and facilitated massive increases in short term cross borde equity flows. One equity transaction in three in Europe now involves a foreign transactor; and trading in stock index futures often far exceeds that in the underlying. Although the investors desire to reduce risk by adopting such strategies, the focus of funds on a small number of leveraged instruments often leads to destabilization of markets and sharp swings in asset prices. Nor need the behavior be confined to equity markets. Besides the fact that equity flows themselves have a direct effect on the exchange rate, evidence in mid-1992 suggests that fund managers switched to cash in the light of relative returns, and were at least partly responsible for the prevailing exchange rate tensions (a forex manager in a bank has around $20 million at his disposal; a fund manager can have billions). Indeed Howell and Cozzini (op cit) suggest that international regulatory bodies need to tighten supervision of international securities flows, to prevent deleterious effects on real economies.

Regular performance evaluation is also said to

underpin the short-termist hypothesis, that willingness of funds to sell shares in takeover battles (to maintain performance) discourages long erm investment or r&d. Conclusive evidence is scant, but there is widespread agreement that other ways besides takeovers of exerting corporate control should be more widely used by institutions, such as appointment of non-executive directors to represent shareholders' interests, or irect involvement of pension funds in management.[60] The development of portfolio indexation has important implications in this context, since the longer term relationships, close monitoring of company performance and large shareholdings needed for these alternatives to takeover to operate will not be present.

related point is that pension funds and other stitutional investors may not invest in small rms, given illiquidity of their shares, difficulty and costs of researching firms without track records and limits on the proportion of a firm's equity that may be held. They may also lack the business expertise to supply risk taking venture capital, given the need for close monitoring of the lients of such finance. It can be argued that e problems would be overcome if, given a greater degree of tax neutrality between types of saving, more funds were directed through banks rather than institutional investors. On the other hand, it may be best to avoid the associated tendency of banks to monopolize the financial markets.

ese potential drawbacks, it should be noted, ult from the nature of capital markets and from institutionalization generally, rather than from ension funds per se (though they are clearly a component of institutionalization). Any edies should therefore be a feature of general nomic and financial policy and not pension olicy - policies bearing solely on pension funds ., taxing short term capital gains) would dvantage them without solving the problem life insurers, mutual funds etc would be unaffected).

Development of Securities Markets

ountries with large pension fund sectors tend to ave well-developed securities markets, while others (Germany, Italy) do not. There is a question of which comes first?

Although pension funds could develop on the basis of loans or property investment, their greatest comparative advantage is in the capital market. Loans require monitoring so the customer relationship may give banks a comparative advantage here. Trading and risk pooling are more efficiently undertaken in the capital markets where transactions costs are lower, although these need not be domestic markets if there are no exchange controls and funds can invest in developed capital markets elsewhere. Moreover, if one of the spurs to development of protection in retirement is income equalization[61] (as well as rising average incomes), this may with a well-developed capital market simultaneously provide the means for development of funded schemes (reduction of personal equity holdings by the wealthy) which is absent in a system dominated by banks. States might be more likely to opt for a generous social security scheme in the latter case.

Unlike pay-as-you-go social security schemes, where there can be an immediate transfer of income to those who have not contributed (who are old at the outset), in funded private schemes the assets are built up while they are maturing, and this stimulates investment and the development of securities markets. This effect is of course offset if others reduce securities holders or saving differentially in the case of funded and social security pensions. The discussion above is also relevant here, for example in that it suggests funds may increase market efficiency.

Given their focus on real returns, pension funds should be particularly beneficial to development of equity markets. Development of equity markets in turn is seen as beneficial in providing risk capital for growing enterprises,[62] as well as offsetting the potential fragility and/or dependence on bank finance which stems from high debt/equity ratios (see Davis (1992)).

The analysis of this paper suggests that focus on equities by funds can be stimulated by flexible accounting rules, encouragement of indexed benefits and institution of a prudent man rule

instead of portfolio regulations. Absence of insurance of benefits can help to avoid the need for strict rules on portfolios and on provisioning. Some would suggest that there is also a need for guarantees of shareholder rights (e.g., equal treatment in takeovers, rights of pre emption over new share issues, equal voting rights) in order for pension funds to hold equities willingly. Lusser (1989) suggests that such problems help to inhibit Swiss funds from equity investment. In practice the causality may be reversed; a dominant pension fund sector will ensure satisfactory treatment for shareholders is maintained. And indeed, even Swiss funds have become more active shareholders in recent years. However, experience in countries such as the Netherlands (Van Loo (1988)) suggests there is no one to one relation between pension funds and equities, even with appropriate regulation as outlined, if funds adopt a very risk averse strategy.

6. CONCLUSIONS

In this final section we offer, first, a broad summary of the content of the paper; second, we focus on prospects for pension fund growth in industrial countries and, third, we assess issues of potential relevance for countries setting up pension funds de novo. The author's views on the various policy choices are noted in this last section; the reader should, however, bear in mind that in most cases such judgements are a question of choosing an appropriate point on a tradeoff between alternative benefits or costs.

(a) Summary

Section 1 discussed the economics of pension funds, distinguishing defined benefit and defined contribution plans and outlining the features of pension funds largely by contrast to other types of financial institutions. It was suggested that regarding pension funds as offering employee retirement insurance was a fruitful way to assess them economically, although other approaches such as the tax shelter, labor economics and corporate finance approaches could also offer insights.

In Section 2 the features of pension funds in the main industrial countries were outlined in the light of Section 1, and their place in the pattern of retirement provision clarified. It is noted that the arguments for funding are not unidirectional, and case can in some circumstances be made for pay-as-you-go. International comparison (as detailed in Tables 1 and 6) shows four broad groups of countries, one with long-established funded defined benefit schemes (Netherlands, UK, US, Canada), one with nationally-directed or provided compulsory funded schemes (Sweden, Switzerland), a third with relatively small funded sectors, but significant levels of unfunded corporate pension liabilities (Germany, Japan), and an exception, Denmark, with significant nded defined contribution schemes. The key determinant of the growth of private retirement saving via institutions such as pension funds is the scope of social security.

Section 3 outlined the regulation of pension funds, and suggests it is a crucial determinant of the attractiveness of pension fund saving relative to other forms of private provision for retirement. Taxation is an obvious example of regulation that can stimulate pension fund growth, but it is also shown how provisions such as portfolio regulations, funding rules, ownership of surpluses, portability, insurance and protection against fraud can influence the attractiveness of pension funds either to the sponsoring firm or the members. There is little international consensus on the appropriate scope or even role of many of these regulations. There are tendencies for countries to group together on regulatory issues, as they do on the structural features noted above. For example, the Dutch/Anglo-American group tends to have "prudent man" asset management regulations and short vesting. In contrast the Germans, Swiss, and Japanese have portfolio regulations and longer vesting periods. (See Table 6.) Features such as the structure and mechanics of supervision are also shown to vary widely between countries. Some a priori suggestions regarding best practice were made.

Section 4 reviewed the performance of funds. The relative level of benefits offered, and their indexation against inflation, vary widely and not only in response to the relative generosity of social security. The resultant levels of contributions also vary. The bulk of the section is devoted to analysis of portfolio distributions, as comparative data for 10 asset types is considered. The influences on distributions, as well as risk and return, are shown to include the nature of liabilities, regulation, accounting standards and the supply of certain financial instruments. Estimates are made of returns on the portfolio; it is shown that a focus on real assets such as equities and property has generally boosted returns, but that variations between countries in real returns on debt instruments have sometimes more than offset this. Hence the German funds come second only to the UK, because real returns on bonds and loans were never negative in the 70s. Such an analysis ignores the role of transactions costs and the portfolio management process, which it is suggested may pose problems to pension funds due to high annual charges and/or poor investment performance for active

managers.

The influence of pension funds on the capital markets was assessed in Section 5. To a degree that varies between countries, they are shown to have stimulated innovation, promoted liquid market structures, boosted the demand for capital market instruments (by increasing saving) as well as making demand more sensitive to return and risk, and aided the broader development of capital markets. However, they have also prompted some concern over their contribution to capital market volatility at both a domestic and international level, and to short-termism of nonfinancial companies.

(b) Prospects for Advanced Countries

Growth prospects for pension funds differ sharply between the countries studied. In Sweden and Switzerland, there is little prospect for growth, with 90% coverage and schemes largely mature. In the Anglo-American countries and the Netherlands[63] most company funds are mature and therefore any significant growth is likely to stem from broadening of the coverage of private pensions across the labor force. The success of personal pensions in countries such as the United Kingdom indicate considerable scope for this. In Denmark, Japan, and Germany, immaturity of company schemes indicates further growth is likely.

But more generally, in many countries (notably in continental Europe) future demographic pressures on pay-as-you go social security are likely to lead governments to seek to stimulate growth of private pensions as a substitute for social security. If such countries were to develop schemes equivalent to those in the United Kingdom, the sums involved would be sizable. For example, if French pension funds were to reach the size of their UK counterparts in terms of shares of personal sector assets, they would total $235 billion. Similar calculations for Germany give $400 billion in assets, which compares with the $355 billion market capitalization of the German stock market. In practice, personal sector financial wealth would probably be boosted by a switch from pay-as-you-go to funding, so the increase in value of funds - and consequent stimulus to capital markets - would probably be significantly greater. It is notable that in the Anglo-American countries, where social security is less comprehensive, the ratio of personal financial wealth to GDP is around 2, whereas in France and Germany it is below 1.5. If French financial wealth reached the same level as the UK in relation to GDP, as well as pension funds attaining the same share of personal wealth, the stock of pension assets would be over $1100 billion. To a degree depending on portfolio regulations and the investment climate, this should in turn boost demand for equities (as discussed above).

Current proposals for EC reform are also of relevance (see Commission of the European Communities (1991), Kollias (1992)). The EC proposes legislation to liberalize funded retirement provision, although the process is still at a consultative stage. A draft Directive has been drawn up on funded pension schemes which addresses the following issues: first, the freedom to offer services across borders (in other words, administration and fund management can be conducted in another member state); and second, the liberalization of investment throughout the Community (altnough this freedom should already exist, especially perhaps for personal retirement provisions, under the Capital Liberalization Directive). Meanwhile, discussions continue on a third proposal contained in a recent consultative paper, namely the freedom for pension schemes to operate across national boundaries on the basis of home state authorization and for individuals to join schemes in other member states. This is seen as the most difficult issue, particularly due to need for countries to agree on funding standards, as well as fiscal differences; but it is also the most important for labor mobility and the completion of the single market. A first step may be to cover only migrant and "frontier" workers, that is, those living in one state and working in another. Agreement on these three issues could clearly facilitate development of pension funds in continental European countries currently dependent on pay-as-you-go schemes.

A subsidiary objective in a number of European countries, which growth of pension funds may assist, is development of equity markets.

Following the calculations above, if funded sectors developed in France and Germany on a par with those in the UK, and equity proportions were similar to US funds, the increase in demand for equities would be $106 billion and $184 billion, respectively. (Note, however, that in global terms these might be partly offset by the maturity of UK and US funds, which may induce a relative switch into bonds from equities by such funds.)

(c) Issues and Recommendations

As outlined by Vittas and Skully (1991), there are a number of questions to be faced by countries seeking to set up or develop pension funds. These include the role of contractual savings institutions in retirement income provision; their impact on saving and capital markets; their effects on economic efficiency and social equity; the role of government in promoting them; the case for preferential fiscal treatment; the need for compulsion; and the appropriate regulatory framework. This paper has sought to address these questions by reference to the adopted solutions in the major industrial countries. We conclude by highlighting some of the main issues brought out under each of these headings, **and seek to come to a judgement on some of the key questions.**

The primary role of pension funds is a supplementary one in each of the countries studied; there are no cases where they provide the only form of old age support, although the height of the social security safety net varies widely, and this in turn has a crucial effect on the development of funded schemes (Section 2). **We onsider such a mixture sensible, given the conflicting arguments for funding as opposed to pay-as-you-go**

The impact on saving and long term financial resources is to boost the former, albeit not in a one-to-one manner, while pension funds also stimulate the development of securities and equity markets under certain conditions (Sections 4 (b), (c) and 5 (e)). As regards the development and functioning of capital markets, pension funds may be beneficial by promoting innovation, liquidity and efficiency, while also influencing the market structure - subject to certain side effects (volatility, short-termism) (Section 5 (a), (b) and (d)). These effects may be stimulated by certain regulations such as those for funding (Section 3 (d)) but also blunted by factors such as portfolio regulations and the structure and behavior of the fund management sector (Sections 3 (c) and 4 (d)). **These are strong arguments in favor of developing private funded schemes. The benefits to the capital market would be absent in the case of book reserves, and hence external funding is seen as more desirable. The side effects, if considered sufficiently undesirable, should be dealt with in the context of economic policy more generally. They are general features of equity markets and/or institutional investors rather than pension funds per se.**

The implications of development of pension funds for economic efficiency include their effect on labor mobility (Section 3 (f)) and distortionary effects of their taxation (Section 3 (a)), as well as the above-mentioned consequences for the capital market. Social equity is affected by the rules on internal transfers and equity of treatment (Section 3 (g)), coverage (Section 2 (c)), rules in relation to tax privileges (Section 3 (a)) and the safety net of social security (Section 2 (b)), as well as the degree of choice and disclosure (Section 3(j)) and the scale and indexation of benefits offered (Section 4 (a)). **Appropriate regulatory design, as outlined in Section 3(l) is needed to minimize these difficulties. We consider that indexation, at least up to a certain level (subject to a "prudent man" asset management rule being in operation) and rules facilitating a degree of portability are particularly desirable. Arguments against perfect portability (e.g., reduced incentives of employers to train workers) should not be disregarded, however.**

The role of government in promoting pension funds has been shown to be a crucial one. In particular, the level of state benefits[64] and the ability of employees to opt out of the state scheme and personal pensions (Section 2); changes in taxation of pensions and alternative assets (Section 3(a)), legislation on the nature of benefits (Section 4 (a)) and legislation on provisioning (Section 3 (d)) all have a crucial role to play in

making the setting up of funds attractive to firms (assuming their establishment remains voluntary). More indirectly, the provision of a stable macro environment and steady economic growth, via its influence on the returns on capital market instruments (Section 4 (c)) will also influence the cost of providing funded pensions. The government also faces certain key choices in influencing the development of pension funds, of which the most crucial is perhaps the defined benefit/defined contribution choice. The choice of comes down to the balance between the economic advantages of defined benefit noted in Section 1 (superior insurance) and the practical difficulties with defined benefit that were discussed in Section 3 (ownership of surpluses, transfers, etc). A choice must also be made between book reserves and separate funding. **In our view, defined benefit plans retain an advantage over defined contribution, given their superior "employee retirement insurance", especially if regulations are set to overcome the key problems. Only companies have proved able to offer defined benefit plans. And more generally, for both types, company based schemes are superior to personal pensions given lower transactions costs and avoidance of market failures. Finally, separate funding is felt superior to book reserves, not only because of the effects on the capital market but due to the concentration of risk in book reserves.**

The case for preferential fiscal treatment is outlined in Section 3 (a), and as shown, most of the countries studied have found it persuasive. The myopia argument was suggested as the most crucial, although reducing the burden of social security and increasing saving may also play a role. Whether there is a case for special treatment of pensions relative to other forms of saving may depend on the view taken that contractual annuities have unique features in retirement income provision, absent from other forms of saving. **We consider these arguments persuasive, and hence suggest that pension funds should be tax advantaged even if other forms of saving are not.**

These link in turn to the arguments for compulsion. Compulsion is needed if the view that individuals are myopic is taken seriously; and the evidence seems quite strong. It could be argued that if fund are compulsory, then relative tax advantages are not needed, and all forms of saving should ideally receive expenditure tax treatment. Compulsion will also have an effe on the corporate sector, since it will impose an unavoidable burden on companies, which in turn could affect international competitiveness of the economy. These effects would make measures to minimize costs, such as a prudent man rule (Section 3 (c)) and competitive fund management (Section 4 (d)), all the more urgent. **We feel that compulsion in social security is sufficient; an efficient company pension sector, with appropriate tax incentives, should be sufficient to attract employers and employees.**

Some of the regulatory preconditions for development of pension funds, which are covered in Section 3, have already been noted in this summary. They require a balance between cost to the sponsor, economic efficiency, equity and benefit security. Funding rules, adequate institutional structures (independent trustees etc.), effective regulatory structures, rules on treatment of surpluses, portability, vesting, indexation and protection against fraud are clearly essential. More contestable are the need for quantitative portfolio restrictions (Section 3(c)) and benefit insurance (Section 3(h)). Apart from self investment limits, the former may reduce returns and increase risk, thus increasing costs unduly relative to a prudent man rule, while the latter may entail either incentives to boost risk or require stringent and costly portfolio restrictions to protect the insurer. **We suggest that the following rules provide an appropriate balance; a degree of mandatory indexation of pensions; prudent man rules on asset allocation, with a ban on self investment (except for portfolio indexation purposes); minimum and maximum funding rules tailored to the nature of the obligations (given indexation, the IBO), but which do not discourage equity holding by penalizing temporary shortfalls; independence of the fund from the employer; insurance against fraud; disclosure to members; indexation of accrued benefits for early leavers; and vesting periods of around five years. A Dutch-style supervisory structure**

(one regulator, annual checks on funding, oversight of rules, occasional on-site inspections) appears a good model to follow.

Finally, the advantages of pension funds relative to other forms of saving include the superior retirement insurance they offer, as outlined in Section 1, as well as reduction of the demographic difficulties associated with pay-as-you-go social security, as discussed in Section 2. Of course, the choice of funding itself raises numerous policy issues, referred to in Section 2(a), such as inter- and intra- generational equity, pressure on domestic rates of return, the costs of tax exemption for funded pensions, and the costs to existing workers in the transition (when they have to pay both for their own funded schemes and the previous generation's pay-as-you-go pensions). Also there are important questions whether the difficulties of an aging population are really avoided by funding, if funds are invested in domestic assets. The last point can be answered in two ways; first, property rights may be a more secure basis for retirement than taxation, and, second, the difficulties can in principle be avoided by investing in countries with younger populations.[65] **On balance, it is suggested that pension funds are a suitable means of old age support for countries at an appropriate state of development - where traditional means of family support for the old are breaking down, and there is a reasonable degree of capitalist industrial development in which to invest - to supplement basic social security. A degree of freedom to invest internationally is an essential counterpart, to avoid demographic difficulties and pressure on rates of return.**

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NOTES

1.The estimates are based on macro data for portfolios of the entire pension fund sector and the returns on the capital market as a whole, and hence do not provide a precise indication of performance of individual funds.

2.In principle, such risks can be reduced by gradually switching to less risky assets such as bonds or deposits prior to retirement.

3.It is suggested by Vittas and Skully (1991) that the "premia" for this insurance include restrictive vesting and transfer conditions.

4.These may be particularly severe for personal pensions, where asymmetric information is likely to be severe, and hence inappropriate products may be sold and/or investment performance may be poor. The main countervailing force is likely to be the institutions's desire to maintain reputation.

5.Indeed, Friedman and Warschawsky (1987) show that annuity markets in the US are far from actuarially fair, due to adverse selection, although they suggest a bequest motive is also needed to explain observed patterns of (low) purchase of annuities.

6.Defined benefit funds nonetheless impose some types of risk on workers, notably sensitivity of pensions to earnings late in the career, in the case of final-salary plans (Section 3(g). In some countries, they may also be vulnerable to inflation (see Section 4(a)).

7.In practice there are some insurer-provided defined benefit plans in countries such as Switzerland, but they benefit from being compulsory, and are also provided through non-financial companies only, which reduces adverse selection.

8.Justifications for provision of social security benefits include paternalism, overcoming the problem that individuals may not cater for their own retirement due to myopia; information inefficiencies, whereby government helps each individual to save for retirement by providing a base level of benefits, without needing to gather information on the precise nature of each individual's preferences; overcoming adverse selection problems, that may plague private annuity markets - the main private sector protection against the risk that individuals will run out of retirement savings before they die; and overcoming free rider problems, that individuals will not save for retirement if they know there is a safety net, and thus they should be forced to contribute to it. (See Bodie and Merton (1992).) Several of these parallel the case for compulsory or tax-advantaged private pension funds (Section 3). Also governments, via the power to tax, have ability to pay pensions that are inflation indexed, and may find social security a convenient means to redistribute income

9.Such redistribution may be justified, for example, if the growth rate is rapid and the young are much more productive than the elderly.

10.Because of their redistributive element, pay-as-you-go schemes generally have to be compulsory.

11.Swedish pension fund assets shown in the table, which are also very large, relate to the national supplementary (ATP) pension scheme, and are included for comparative purposes.

12.The paper does not discuss long-term saving in detail, although it clearly determines the size of total wealth of which pension wealth forms a part. It is likely to depend on factors such as income growth (old age security appears to have a large income elasticity of demand), demographic factors (the proportion of the population in the high-saving groups aged 35-65) inflation

and social security provisions.

13.Note that in practice the effective retirement age has tended to fall in most industrial countries, as employers seek cheaper and supposedly more flexible younger workers. Final salary schemes may have accelerated this tendency, as assuming wages of the employee would otherwise have risen, early retirement saves on pension payment rates.

14.Many workers also take further employment at a lower wage and status, after "retirement".

15.There is no obligation for such provisions to cover all pension promises.

16.Sometimes called "support funds".

17.It is, of course, compulsory once it forms part of a contractual collective agreement.

18.However, in the United Kingdom the 'personal equity plan' scheme makes a move towards reducing the tax disadvantages of direct equity holdings. Growth of funds has not accompanied a reduction of equity holdings in Japan or Germany; there is no capital gains tax in Japan, while in Germany it only applies to short-term gains.

19.Private pensions in France are also compulsory but operate on a pay-as-you-go basis.

20.Blake (1992) quotes an equivalent figure of £15 billion for the UK.

21.Similar patterns are apparent in Germany, where in a 1982 survey of pensioners, three quarters of former senior managers but only half of former wage earners received private pensions.

22.Note, however, that some of the assets backing unfunded commitments in Germany and Japan are in the form of cross-shareholdings with other firms, i.e., there may be some degree of diversification. Conversely, any rundown of such holdings when pensions are paid may contribute to the unwinding of many of the associated relationships.

23.For example, in France, pension funds must invest at least 34% of their assets in state bonds.

24.Estimates of returns are presented in Section 4(c).

25.In practice, life insurers are more strictly regulated, see Davis (1991).

26.Paradoxically, and despite their indexed obligations (Section 2), they tend to invest conservatively in fixed interest assets (Section 4).

27.The Germans have sought to exempt Pensionskassen from the Pension Funds Directive on the grounds they are insurance companies, but this may be inconsistent with their existing derogation from the Insurance Directives.

28.As discussed below, German schemes are forced to index but unable to fund the IBO tax free.

29.Such rules makes it optimal to hold "real assets" to avoid underfunding.

30.The part of pensions which replaces the state pension is fully indexed in line with average earnings up to retirement.

31.Another company scheme, a personal pension, an annuity or rights in the state earnings related pension scheme.

32.Given the speed with which pension funds can change their risk exposure, it could be argued that anything short of continuous monitoring could lead to this hazard.

33.Clearly, if underfunding exceeds 30% of net worth, the operation is profitable for the firm.

34.To the extent that PBGC insurance leads to imposition of high charges on well funded plans to subsidize underfunded ones, it could be directly counter productive to this goal, as financially sound sponsors wind up their defined befit plans.

35.Bodie and Merton (1992) suggest this is an underestimate, as it is based only on plans that have defaulted to date, rather than estimates of losses on currently insured plans that will default in the future.

36.Custody services include safekeeping, settlement, tax, dividend receipts, dealing with rights issues and stock lending.

37.Note, however, that published accounts did not hide the high level of self investment by the Maxwell funds. The problem for members was of understanding the associated risk - and the difficulty of redress.

38.In addition, the investment management regulatory bodies regulate insurance companies and other financial institutions offering pensions, asset managers and those offering advice to individuals regarding pensions.

39.It also assesses whether funds meet the standards to contract out of the state earnings related pension, checks revaluation and preservation of rights for early leavers, etc.

40.Their fiduciary duties are to hold the assets in trust for members, act impartially, keep accounts, check funding is in place, and seek expert advice when necessary.

41. Since they get the surplus assets in the case of winding up.

42.For example, when a mature scheme is underfunded, and pensioners may prefer it to be wound up (since the ABO gives them all they wish), while the employees may prefer to take the risk that the employer will fund the shortfall later on.

43.In practice, it has been announced that except for plan terminations, the requirement for indexation will not be brought into effect until the implications of the European Court judgment on equal pension ages (the "Barber Judgment") have been clarified.

44.In practice, Danish contributions tend to be around 10-15%.

45.For example, Vittas (1992) shows that in a defined contribution plan with a contribution rate of 10%, 40 years' contributions, 20 years' retirement and real wage growth of 2%, real returns of 3% will only obtain a replacement rate for an indexed pension of 33%, while a 5% real return obtains an indexed pension of 60% of final salary.

46.Foreign yields were constructed using the country's effective exchange rate and the average of yields in the UK, US, Germany, Japan, and Canada (excluding the country in question for its own foreign return).

47.The data in Tables 9 and 10 add up to those in Table 8.

48.See Section 5(a). Bodie suggests that given such rules, it is a paradox that US defined benefit funds invest in equities. He suggests it is perhaps because management sees a plan as a trust for employees, and manages assets as if it were a defined contribution plan (i.e., for employee welfare), with a guaranteed floor given by the benefit formula.

49.However, Bodie (1990) disputes the utility of equity as an inflation hedge and suggests investment in equities can be seen merely as boosting expected returns for the benefit of members.

50.It reached 84% at end-Q1 1992.

51.Merton (1992) has suggested that using stock index swaps may be a way for LDCs to achieve the benefits of inward international diversification by pension funds from major countries without transfer of capital resources. By separating capital flows from risk sharing, it avoids capital imbalances or foreign intervention in domestic capital markets.

52.For a discussion of life insurance companies' and pension funds' foreign investment see Davis (1991).

53.Hence high volatility for Danish (defined contribution) funds is more serious than in the UK, where funds are largely defined benefit.

54.If reform of the portfolio rules is not possible, and subject to administrative costs, one might question whether pay-as-you-go might not be a better solution in those countries.

55.In Germany, pension funds may not delegate fund management.

56.Fund managers in Japan are themselves subject to restrictions on diversification, and may not have more than 50% of their managed assets overseas.

57.See Bodie (1991a).

58.However, King and Dicks-Mireaux (1987) found little effect in Canada.

59.See Feldstein (1977). However, analysts in countries such as Germany dispute this effect (Pfaff et al (1979)) and suggest social security had no effect on saving.

60.Charkham (1990).

61.Others may be lower population growth, increased life expectancy and social change which reduces the role of the extended family.

62.Large firms already able to access the international capital markets would be less affected.

63.However, Huiser (1990) asserts that there will be further growth in the Netherlands, despite the large size of existing Dutch funds.

64.Note many ldcs also have pay-as-you-go social security.

65.In practice, pension funds are unwilling to invest in LDCs given illiquidity, transfer risk, settlement risk, etc (see Davis (1991).

APPENDIX I

RETURNS ON LOCAL GOVERNMENT AND PRIVATE FUNDS

The data for the UK and US allows a futher comparison of effects of ownership and management methods to be made, this time in the same markets, in that local government funds data can be identified separately from private-sector funds.

Mean (standard deviaton) of annual real total returns (domestic currency)

UK:	Local authority funds	4.9	(13.4)
	Private funds	5.6	(13.0)
US:	State and local funds	1.2	(12.6)
	Private funds	2.7	(11.7)

* 1967-1988 for the UK

In each case, local government funds obtain lower returns than private funds. This can be related to more conservative portfolio distributions. UK local authority funds held an average of 52% equity over the sample, while private funds held 56%. For US funds the difference is more dramatic; 25% and 53%. Interestingly, the risks in real terms were higher for the local government funds, given the volatility of real returns on bonds (see Table 7).

APPENDIX II

This appendix provides average real returns calculated over the period 1971 90 as well as the changes that would be implied by standardized portfolio structures.

Table 1: Characteristics of real total returns, 1971-90

Mean (standard deviation) of real total/holding period return (domestic currency)

Per cent	United States		United Kingdom		Germany		Japan		Canada		Netherlands		Sweden		Denmark		Switzerland		Memo: France	
Loans	3.9	(2.6)	1.2	(5.4)	5.2	(2.3)	0.9	(4.7)	4.2	(3.3)	3.9	(3.9)	3.0	(3.3)	6.5	(3.5)	2.4	(2.1)	2.4	(3.5)
Mortgages	3.1	(14.2)	1.8	(5.7)	4.5	(1.5)	2.7	(5.2)	3.4	(13.2)	4.3	(2.8)	2.4	(3.1)	6.3	(3.7)	1.2	(2.5)	3.3	(2.7)
Equities	5.9	(14.9)	10.8	(31.8)	9.3	(20.4)	11.2	(21.0)	5.0	(17.8)	8.6	(30.1)	9.3	(23.7)	9.4	(29.4)	4.7	(22.2)	9.6	(28.8)
Bonds	1.2	(15.0)	1.6	(11.5)	2.6	(15.1)	0.0	(20.3)	1.1	(12.8)	1.8	(11.5)	-0.6	(8.6)	4.5	(17.0)	-1.7	(18.7)	1.3	(13.9)
Short-term assets	2.1	(2.7)	1.5	(5.3)	2.9	(2.3)	-0.7	(5.0)	2.6	(3.6)	1.7	(4.3)	0.9	(3.7)	1.7	(1.6)	1.1	(2.3)	1.9	(3.4)
Property	3.9	(5.5)	5.7	(13.0)	4.5	(2.8)	6.6	(7.2)	5.2	(5.8)	4.6	(15.0)	-	-	-	-	-	-	-	-
Foreign bonds	2.2	(16.0)	-0.4	(16.8)	3.8	(12.2)	2.9	(15.8)	-1.2	(13.9)	-0.1	(12.2)	0.6	(13.9)	-1.0	(12.9)	-1.6	(14.9)	0.4	(14.3)
Foreign equities	9.6	(18.2)	6.2	(17.1)	10.6	(16.0)	8.6	(20.5)	6.4	(15.9)	6.7	(14.9)	7.4	(14.5)	5.9	(14.7)	5.2	(17.1)	7.2	(14.2)
Memorandum items:																				
Inflation (CPI)	6.3	(3.2)	9.8	(5.4)	3.8	(2.2)	5.5	(5.8)	6.9	(3.0)	4.9	(3.3)	8.4	(2.6)	7.9	(3.4)	4.2	(2.6)	8.0	(4.0)
Redemption yield on government bonds	2.8	(3.4)	1.9	(4.3)	4.0	(1.4)	1.5	(4.7)	3.3	(3.1)	3.3	(2.9)	2.2	(3.0)	5.7	(2.2)	0.7	(1.9)	3.0	(3.0)
Real earnings growth	0.5	(2.2)	2.4	(2.5)	3.6	(2.5)	3.0	(3.5)	1.1	(2.7)	1.4	(2.6)	1.1	(3.4)	2.5	(3.7)	1.6	(2.0)		

Table 2: Pension fund returns (1971-90)

Mean (Standard deviation) of annual real total returns (domestic currrency)
Percent

	US		UK		Germany		Japan		Canada		Netherlands		Sweden		Denmark		Switzerland	
Using holding period returns on bonds (all countries) and fixed rate mortgages (US & Canada)																		
	4.0	(12.2)	7.4	(15.9)	5.2	(4.7)	4.9	(10.0)	2.7	(10.5)	4.3	(6.3)	0.0	(7.7)	4.9	(13.4)	1.5	(7.7)
Average earnings	0.5	(2.2)	2.4	(2.5)	3.6	(2.5)	3.0	(3.5)	1.1	(2.7)	1.4	(2.6)	1.1	(3.4)	2.5	(3.7)	1.6	(2.0)
Portfolio return less average earnings	3.5		5.0		1.6		1.9		1.6		2.9		-1.1		2.4		-0.1	
Government bonds	1.2	(15.0)	1.6	(11.5)	2.6	(15.1)	0.0	(20.3)	1.1	(12.8)	1.8	(11.5)	-0.6	(8.6)	4.5	(17.0)	-1.7	(18.7)
Market paper	2.6	(2.7)	1.5	(5.3)	2.9	(2.3)	-0.7	(5.0)	2.6	(3.6)	1.7	(4.3)	0.9	(3.7)	1.7	(1.6)	1.1	(2.3)
Equities	5.9	(14.9)	10.8	(31.8)	9.3	(20.4)	11.2	(21.0)	5.0	(17.8)	8.6	(30.1)	9.3	(23.7)	9.4	(29.4)	4.7	(22.2)
Memo: using redemption yields on fixed rate instruments	4.8	(7.9)	7.5	(13.8)	5.4	(3.3)	3.5	(2.7)	4.1	(5.5)	4.5	(5.8)	2.6	(3.1)	6.5	(2.5)	2.1	(4.1)

Table 3: Mean (standard deviation) of real total returns on diversified portfolios 1971-1990

Per cent	Domestic[1]		Domestic & international[2]		Memo: Column 2 less Average Earnings
United States	3.5	(13.4)	4.0	(13.2)	3.5
United Kingdom	6.2	(19.6)	5.5	(17.1)	3.1
Germany	5.9	(14.9)	6.2	(13.3)	2.6
Japan	5.6	(16.9)	5.6	(15.6)	2.6
Canada	3.1	(12.1)	3.0	(11.7)	1.9
France	5.4	(19.7)	5.1	(17.3)	n/a
Netherlands	5.2	(18.4)	4.8	(16.4)	3.4
Sweden	4.3	(13.5)	4.2	(12.1)	3.1
Switzerland	1.5	(16.9)	1.5	(14.9)	-0.1
Denmark	6.9	(20.0)	6.0	(17.4)	3.5

1 50% domestic equity, 50% domestic bonds.
2 40% domestic equity, 40% domestic bonds, 10% foreign equity, 10% foreign bonds.

Note: International diversification should cause a convergence in returns by increasing below average returns and lowering those above average. This would occur if purchasing power parity held all the time. In fact, large deviations between exchange rates an purchasing power parities may prevent this convergence from materializing, at least in the short to medium run until corrections in exchange rates take place.

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