

INVESTMENT OF MANDATORY FUNDED PENSION SCHEMES

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Introduction

The steadily-worsening financing difficulties of pay-as-you-go social security pension systems¹ in both developing and OECD countries is leading to renewed interest in advance funding of pensions² as a complement or even a substitute³ for pay-as-you-go. Given the belief that individuals may not voluntarily save for old age, and in order to durably reduce future government liabilities, mandatory schemes are often favoured⁴. A crucial issue in this regard is the investment of assets by mandatory funded schemes. If investment provides an inadequate rate of return, pensions may be insufficient to ensure satisfactory living standards for retirees. Such inadequate rates of return may arise if investment is in low yielding assets, or if there are excessive administrative costs. Meanwhile, if investments are excessively risky, pensioners risk poverty if they retire in unfavourable market circumstances, even if the mean rate of return is high. Such excessive risks may arise notably if assets are inadequately diversified. A poorly-designed funded scheme may indeed be worse than the pay-as-you-go scheme that it replaces or supplements.

In this context, this article seeks to set out principles and issues for the appropriate investment of assets by mandatory funded pension schemes, drawing on relevant country experience as well as theory. It makes particular, but not exclusive reference to the situation of developing countries, and notably to the "Latin American model" of pension funding which was pioneered by Chile. It does not address the equally important issue of how to deal with an existing - dysfunctional - pay-as-you-go scheme⁵ during a switch to funding. Not the least important aspect of this is to lower the contribution rate sufficiently to leave room for contributions to a funded scheme.

The paper is structured as follows; Section 1 sets the scene by looking at the basic arithmetic of pay-as-you-go and funding (the Aaron condition) thus highlighting the crucial role of investment performance in the success of a funding strategy. Section 2 then outlines four real-world models of

¹ As noted by Vittas (1994), difficulties of social security in developing countries often have less to do with the ageing of the population - itself often some time in the future - but rather major faults in design and implementation, which encourage strategic manipulation, (including evasion of contributions, false disabilities and early retirement) as well as entailing perverse and capricious redistribution.

² For abroad analysis of the issues related to pension systems see ILO (1999), forthcoming, for which an earlier version of this article served as background.

³ Given the uncertainty regarding returns on financial assets, total abolition of pay-as-you-go may be ill-advised, with a mixed system being most appropriate (World Bank 1994).

⁴ Arguments in favour of compulsion include overcoming 'myopia' and the potential relief to social security provided by coverage of all workers who would otherwise rely on social security (although a safety net is still needed, as in Chile and Singapore). Experience e.g. of the US and UK show that consequences of voluntary provision are that aggregate coverage is only around 50%, and coverage being focused on men, unionists, high income workers, white collar workers etc. Coverage of low income workers may have a more powerful effect on national saving than voluntary coverage which leaves them out. Tax advantages are more evenly spread, and can be reduced. Portability and vesting conditions can be standardised, enhancing labour mobility. Market failures in annuities markets linked to adverse selection may be more readily overcome. On the other hand, competitiveness may be adversely affected. Also low income workers, who would not otherwise have saved, may lose out due to lower consumption over their working lives.

⁵ See Vittas (1994), World Bank (1994).

mandatory funded pension provision, of which the Chilean is one; the others are so-called national provident funds (such as Singapore and Malaysia), mandatory occupational pension funds (as in Australia and Switzerland), as well as social security trust funds, which provide a form of back-up for social security pay-as-you-go pensions (as in Sweden). Section 3 of the paper goes on to examine the financial and economic preconditions for funding, covering the general pattern of financial development and focusing on the point in this process at which funding becomes feasible. Section 4 examines management issues, including general issues in investment, administrative costs and the issue of politicisation of investment that may be a notable risk for publicly managed funds. Section 5 focuses on regulatory issues for pension funds, in relation to each of the models which are presented. The issue of regulatory capability for developing countries is also considered in this context. Section 6 considers the performance of existing systems, viewed in the light of the various regulatory and structural factors outlined above, and compares them to various benchmarks. The conclusion seeks to outline the risks faced by members of mandatory funds, and in doing so to indicate the relative strengths and weaknesses arising from the main policy choices; decentralised versus centralised management and in the case of the former, occupational versus personal funds.

1 The basic arithmetic of funding

Recall first the basic arithmetic of funding as opposed to pay-as-you-go. According to the so-called "Aaron's rule" (Aaron 1966), under a pay as you go "defined contribution" plan, with wage based contributions, the pension paid per annum to the worker after retirement depends on how fast the wage bill (contribution base) grows, which will in turn depend on population growth and productivity, and also on the ratio of pensioners to workers (the dependency ratio). Under full funding for defined contribution, workers accumulate capital from their wages to pay their own pensions, so the pension paid per annum depends on the rate of return which accumulated assets earn⁶ together with the number of years of retirement relative to working age (the "passivity ratio" or "retirement ratio"). Alternatively formulated, "defined benefit" contribution rates under pay-as-you-go for a given population, replacement rate and a pension indexed to wages depend on the system dependency ratio (pensioners as a proportion of contributing workers). Under full funding, the contribution rate under similar defined benefit assumptions depends on the difference between the growth rate of wages and the rate of return at which accumulated assets appreciate, and the passivity ratio (the ratio of retirement to working life) which the accumulated assets must cover.

So in each case, if the dependency rate equals the passivity ratio, the schemes will be equivalent if the growth rate of wages equals the rate of return on financial assets. If the rate of return is higher, there is an advantage to funding, other things being equal. If the dependency ratio exceeds the passivity ratio, the advantage is compounded. Note in this context that the burden of the ageing of the population is conceptualised as the dependency ratio being set to rise sharply relative to the passivity

⁶ This may be either the domestic or global rate of return, depending on the scope of investment restrictions and exchange controls.

ratio. Allowing for population growth, the "rate of return" to pay-as-you go increases to that of wages plus population growth (i.e. total earnings). As noted by World Bank (1994), if a country is dynamically efficient, without excess capital, the rate of return on financial assets should always exceed the growth rate of total earnings (or, with constant factor shares, that of GDP⁷). Hemming (1998) notes that while the real interest rate can be below the GDP growth rate for a time, this cannot be a permanent feature of the economy. If it were, debt would build up in response to the resulting incentive to borrow and the real interest rate would be forced above the growth rate⁸. Calculations presented in Davis (1995a) shows that over the period 1966-90, a 50-50 mix of equities and bonds would in many OECD countries have realised a real return 2% or more in excess of real earnings growth (see also Section 6)⁹.

In this context, the crucial point of the article is as follows: *whether potential rates of return on financial assets are actually realised by a funded pension system depends on the efficiency of the investment process (including not only asset selection but also the burden of administrative costs). Pensions actually obtained also depend on whether assets may be used for other non-retirement purposes such as for education or housing. Moreover, the risk of investment in financial assets - which is disregarded by the Aaron condition - may also play an important role in retirement income security. This is because it influences both the value of assets at the time of retirement and - an issue not dealt with in detail here - the potential for the cost of annuities¹⁰ to be prohibitive at the time of retirement.*

2 Investment in the context of four models of funded mandatory pensions

Mandatory funded pension systems tend to be of four main types, namely personal defined contribution funds managed on a decentralised basis by investment management companies; personal defined contribution funds invested centrally by public institutions (so-called provident funds); mandatory occupational funds, which are usually defined contribution as a minimum requirement; and social security buffer funds, which are basically an adjunct to defined benefit pay-as-you-go pension systems. With the exception of social security trust funds, such mandatory retirement saving schemes are an intermediate form between social security and voluntary occupational pension funds in that like the former they are compulsory and rights are freely transferable between jobs, but like the latter they are funded and are essentially means to force young people to shift consumption to their old age.¹¹ In

⁷ With constant factor shares, real earnings grow at the same rate as GDP, which in turn is determined by productivity and population growth.

⁸ See Fischer and Easterly (1990).

⁹ For other economic costs and benefits of funding vis-a-vis pay-as-you-go, see Davis (1998c).

¹⁰ Note that indexed annuities can only be provided where there is a supply of index linked debt instruments, as in the UK and Chile.

¹¹ Such funds are typically defined contribution (no country has a mandatory funded defined benefit pension system) and seek by use of individual and actuarially fair accounts to avoid redistribution. Since contributions benefit the individual worker directly, there is less incentive to avoid them than in the case of pay-as-you-go social security (although evasion could intensify for the case of contribution rates well in excess of desired saving rates). They should, by their funded approach, aid development of capital markets via increasing

this section we seek to outline the salient features of each of these types of scheme, focusing on individual countries which provide examples of practice for further study (see the summary data in Table 1). In the rest of the article the country examples will be referred to repeatedly to illustrate the policy issues and challenges arising in the context of investment.

2.1 Personal defined contribution funds invested by management companies

The main features of these schemes are that funds for retirement are held in individual accounts, and managed by private, competing asset management firms selected by the individual. To illustrate this point in practice, we outline the example of Chile. This is the longest-established such fund, although others have been introduced, notably in Peru, Colombia, Argentina and Uruguay (for details see Mitchell and Barreto 1997) Others are planned, notably in Latin America and Eastern Europe.

As discussed elsewhere in the book, the Chilean system, set up in 1981, is a decentralised mandatory retirement scheme which replaced an insolvent social security scheme. The system is defined contribution; it requires employees to contribute 10% of their salaries (an extra 3% covers fees and compulsory term life insurance). Tax treatment is similar to pension funds in most OECD countries, with contributions and investment income tax free, and pensions taxed. Although the system is designed to replace social security, with no intentional redistribution, in fact the government guarantees a minimum pension of about 22% of average earnings to those retiring after 20 years' contributions, so is obliged to make up the difference with the pension fund return if it falls short. There is also a government backup for those who are destitute, of 12% of average earnings. Existing old age security obligations are being honoured by a reduction in the budget surplus and by use of so-called recognition bonds which offer a real return of 4%.

As regards investment issues, assets are invested on an individual basis by private investment management companies on a basis of one account per worker. Workers are allowed to transfer if they are dissatisfied with the manager's performance. Fund management companies (known as AFPs) are only allowed to offer one type of pension account. On retirement, workers are obliged to either buy an indexed annuity with the bulk of their accumulated funds - a system facilitated by long-standing and credible use of indexed debt in Chile - or to carry out "programmed withdrawals" to again seek to protect against longevity risk. As discussed in Section 5, there is a complex regulatory structure to protect workers - and the government given its minimum pension guarantee. The total value of funds has grown from zero in 1981 to 39% of GDP in 1995 and is expected to reach 80% of GDP by the end of the century.

the supply of long term assets - assuming that portfolio restrictions do not force them to be invested in government bonds - by monitoring corporate performance and, subject to the degree of crowding-out of discretionary saving, by increasing saving *per se*. Credibility and actuarial fairness should also reduce labour market distortions compared with social security. On the other hand, a defined contribution structure leaves the individual vulnerable to poor investment performance - there is no guarantee of a given level of benefit beyond a 'safety net'.

2.2 Personal defined contribution funds invested by public institutions (provident funds)

The main feature of these schemes are that funds for retirement are accumulated and invested solely by the government. The examples chosen for illustration are Singapore and Malaysia.

The pension fund in Singapore (Asher 1998) is again a compulsory, defined contribution fund, set up in 1955. Funds invested in 1996 were S\$74 bn, equivalent to 56% of GDP¹². The fund is administered by the government investment agency, the Central Provident Fund (CPF), although the actual investment of the accumulated monies is carried out by the Government of Singapore Investment Corporation (GSIC) and the Monetary Authority of Singapore (MAS). The investment of the CPF is in nontradable government bonds and liquid bank deposits with the MAS. The MAS then invests the assets as foreign exchange reserves, and the GSIC in foreign equities. The current contribution rate (divided equally between employers and employees) is 40%; workers over 55 pay lower rates, and the very low-paid are exempt. Contributions are tax free up to a limit and all withdrawals are tax free, a tax shelter estimated to be worth 1% of GDP. Since 1987 workers have been required on retirement to purchase life annuities providing 25 % of average earnings; the rest may be withdrawn as a lump sum. A certain proportion may also be used for housing and education. Withdrawals are also allowed for personal investment in approved securities once a sum of S\$50,000 is in the account. Redistribution within the system is avoided, but there is nevertheless some inequality since only high earners have sufficient resources to take the opportunity to invest in higher yielding instruments.

The Malaysian fund (Bateman and Piggott 1997) is similar to that in Singapore. It was set up in 1951 in response to the challenge of providing a system of retirement income provision from scratch, and the fact that whereas Malaya was well provided with banking facilities, it faced a lack of long term private investment sources domestically, and owing to political instability in the region could not rely on foreign capital inflows. It contrasts with Singapore in that funds are invested by the government in local development projects and not solely foreign assets. Contribution rates are currently 23% (of which 12% is from the employer). Only lump sum benefits are provided; early withdrawal for house purchase is again permitted. In 1996, assets were 47.1% of GDP as against 17.2% in 1978. Coverage was 86% of workers, although only 50% of workers had contributed in the previous year. Historically, most assets have been held in the form of government securities, which are on-lent for development purposes by the EPF Board, under the direction of the Minister of Finance. More recently, the governments' need for financing has declined and the EPF has diversified.

2.3 Mandatory occupational defined contribution funds

In a number of OECD countries, it is compulsory for firms to provide defined contribution pensions to their employees, and select managers to invest the monies. Defined benefit funds often continue to

¹² This amount excludes members' freely-invested balances of a further S\$11 bn.

exist under such regimes. Self employed individuals are obliged to contract with life insurance companies for their pension savings. Two examples are Switzerland and Australia.

The Swiss pension system (Hepp 1990) consists of the state social security scheme¹³ (AHV/IV), the compulsory occupational pension schemes (BVG/LPP) and individual saving. The formation of the BVG/LPP schemes stems 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). The BVG requires companies basically to set up a defined contribution plan, decentrally invested either internally by foundations set up for that purpose or by banks or insurance companies externally. BVG together with social security will offer a defined benefit target (90% of retirement income for the low paid, 60% at average earnings, 25% for top earners). Contributions are tiered, ranging from 7% for young workers to 18% for those approaching retirement. When instituted in 1985, the BVG scheme was grafted onto existing private pension schemes, which already covered 85% of the workforce. After institution of BVG in 1985, this rose to 90% (it excludes the unemployed, some part time and temporary employees, and those under 18). Many individual company funds offer defined benefits, which may target a higher replacement ratio than that quoted above. The BVG system is complemented by a large personal pension sector for the self employed.

The system of retirement income provision in Australia (Bateman and Piggott 1997) is shaped by a series of reforms culminating in the introduction of a "superannuation guarantee charge" (SGC)¹⁴ in 1992, which makes membership of a defined contribution¹⁵ private pension fund a right and condition of employment, with employer contributions set at 5% of earnings, to rise to 9% by the end of the century, for those employers not already paying above such levels. This was originally planned to combine with a projected employee contribution of 3% with a 3% matching contribution from the government (mooted in 1995) to give a target contribution rate of 15% - this has now been abandoned. Related reforms reduced tax concessions, reduced the attractiveness of lump sums relative to annuities¹⁶ and improved vesting and portability conditions. The main reasons for the SGC reform were future demographic difficulties, the ethos of privatisation and concerns regarding saving. It is hoped that the SGC will raise saving by 3-4% per annum in the next century (Edey and Simon 1996). Well developed financial markets were an important precondition for the reforms. As a consequence

¹³ Social security in Switzerland is pay-as-you-go and offers a restricted flat rate benefit of up to 20% of average earnings, depending on years of contributions, and an earnings-related scheme offering 20% of lifetime average earnings uprated for inflation, but subject to a ceiling. Vittas (1993) suggest that Swiss pension system is very well designed, and a good example in some ways to other countries considering pension reform.

¹⁴ Support for the reform - notably by the unions - was assisted by the relatively low level of state pensions. The Australian social security system provides an unfunded basic pension unrelated to earnings, payable to all (i.e. it does not depend on labour force participation) subject to residence, age, and tapered income and asset limits (i.e. there is some means testing). The replacement rate is low - around 23-25% of average earnings in the 1980s - and given the flat rate, the replacement ratio for those earning above average earnings is extremely low. Nor is there any formal indexation mechanism.

¹⁵ Existing defined benefit funds were not obliged to switch to defined contribution.

¹⁶ Bateman and Piggott (1997) cast doubt on the efficacy of these incentives.

of these reforms, since 1983, when overall coverage stood at 40%¹⁷, both coverage and assets have increased dramatically; it is estimated that in 1993, 92% of full time workers were covered and national saving is thought to have increased. There remain some concerns about the structure of provision; for example, annuities are not paid from the funds themselves, leaving pensioners vulnerable to the vagaries of private annuity rates. Most pensioners still take lump sums, thus putting their retirement income security at risk, and this option increases adverse selection for those taking annuities. Also the imposition of compulsory pension funds on small firms has incited them to cut employment, lower wages and employ more casual workers.

2.4 Funded defined benefit social security pensions

The rationale for a social security trust fund is typically to cover the period when pay-as-you-go social security would require increased contributions or lower benefits, as the demographic transition to an older population takes place. They are intended to be temporary in the sense that they become exhausted once this period ends. Whereas there are "trust funds" to cover social security obligations in a number of countries, including the US and Japan, it is only in Sweden that they invest in a range of private sector securities and not merely in government bonds¹⁸. The Swedish system is hence considered particularly appropriate for study. The funded social security scheme is known as the "National Supplementary Pension Scheme" (ATP Scheme), set up in 1960. This is effectively a form of funded, earnings related social security, which complements a basic, flat rate, pay-as-you-go social security scheme. It covers 90% of the workforce. The aim is to accumulate significant 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.¹⁹ The fund is administered independently 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 assets²⁰. In 1995 assets were over 30% of GDP.

3 Financial and economic preconditions for developing funded pension schemes

Having introduced the main types of mandatory funded pension system, and their principal features and differences, we assess the preconditions that developing countries must fulfil before introducing

¹⁷ Restrictive portability, vesting and preservation features are thought to have limited pension funds' attractiveness prior to the early 1980s (Bateman and Piggott 1997).

¹⁸ As noted by Grubbs (1995), the US Pension Benefit Guaranty Corporation and the Thrift Savings Plan for government employees both invest in private sector securities, in the latter case indexing its equity holdings and thus avoiding political considerations in investment.

¹⁹ However, the ceiling up to which pensions replace wages at this rate is only indexed to price inflation, thus leading in future to declines in average replacement ratios as incomes of more workers exceed the ceiling.

²⁰ There are also supplementary private schemes in Sweden arranged through collective bargaining, and which cover virtually the entire labour force, 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 provided solely through a mutual insurance organisation (AMF).

such schemes. Financial market development is the main focus of the section. It may however be added that this may not be the only criterion; funded schemes, being non-redistributive, are for example unable to deal with the extreme poverty typical of many developing countries. In Brazil, for example, only 2-3% of the population of 150 million earns more than \$700 per month. In fact, any form of contractual saving requires a certain level of income and wealth in the population, as poor households cannot afford to put aside large sums for their future needs. The issue addressed below is whether a higher-income developing country, which has sufficient income and wealth to justify contractual savings institutions, can in fact do so given the financial-market and macroeconomic environment. Further relevant issues linking to regulatory capabilities are discussed in Section 5 below.

3.1 The pattern of financial development

We begin with an overview of the financial development process, to give a 'menu' of situations in which a switch to funding might be considered. The processes whereby an economy develops from an informal financial system through banking to securities markets can be analysed by use of the theories of corporate finance. Whereas an entrepreneur can begin a firm by relying on his own funds and retained earnings, rapid growth of his enterprise requires access to external finance. The simplest form of this is from his family, who will be able to monitor him closely and hence protect their own interests. Beyond this, banks tend to be the first to offer funds, as they have a comparative advantage in monitoring and control of entrepreneurs lacking a track record, for example in terms of access to information, ability to take security and to exert control via short maturities. Obviously, they are also able to offer benefits to depositors in terms of pooling across investments and 'liquidity insurance', that is, ability to offer access to deposited funds at any time, at a positive interest rate. This may then dominate the alternatives of extremely undiversified finance of enterprises or hoarding.

Share issuance becomes important when companies' bank debt becomes sizeable in relation to existing own-funds, as the high resultant level of gearing gives rise to conflicts of interest between debt and equity holders, as for example owner-managers have the incentive to carry out high risk investments. Banks may also protect themselves by means of covenants or even the acceptance of equity stakes, which internalises the associated agency costs. Apart from banks, at the initial stages of development of share markets, securities are typically held by wealthy individuals as an alternative, diversifiable, liquid, higher return albeit riskier alternative to bank deposits. Insurance companies may also develop, however. Corporate bond markets are only viable when firms have a very high reputation, as this then constitutes a capital asset, that would depreciate if the firm engaged in opportunistic behaviour. High credit quality is needed because bond market investors are likely to have less influence and control over management than equity holders or banks, even if one allows for the existence of covenants. Rating agencies help to alleviate associated information problems, but do not thereby open the bond market for firms with poor reputations or volatile profitability.

Evidence from history suggests that the progress of an economy through these stages depends on a number of preconditions. Partly these relate to macroeconomic and structural factors. Notably, high and volatile inflation hinders financial development. However, without a satisfactory framework for enforcing property rights and financial contracts, as well as for providing public information, securities markets cannot develop; forms of relationship banking with equity stakes held mainly by banks in borrowers are likely to be the limits of financial development. Institution of limited liability for equity claims, a structure for collateralising debt, satisfactory accounting standards and appropriate protection against securities fraud (listing requirements and insider trading rules, for example) are also important for public securities markets (see Stiglitz 1993). The development and satisfactory regulation of the banking system may be a precondition for growth of securities markets, given the role of banks in providing credit to underwriters and market makers, even when they do not take on security positions themselves.

3.2 Preconditions for developing funded pension schemes

In the current context, the issue arises as to whether securities markets are a precondition for development of funded pension systems or whether funded systems may emerge first, and then stimulate capital market development²¹. Although funded systems 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 there. Trading and risk pooling are more efficiently undertaken in the capital markets where transactions costs are lower. Hence capital markets facilitate development of funded pensions, at least on a decentralised basis. One could go further and say that countries must have at least fairly established financial markets before a private pillar can be put in place, as well as considerable regulation and supervision to avoid fraud and excessive risk taking (IMF 1998). A problem even of well-run schemes in countries where capital markets are moderately developed is lack of annuities - and lump sum withdrawals, which are the only alternative, are often dissipated. (Mitchell (1997) considers the issues for insurance sectors and their supervisors of ensuring adequate annuities markets in Latin American countries.)

Many developing and transition economies have fledgling stock markets with few securities traded, a paucity of financial instruments, few regulatory safeguards, inadequate information disclosure and a patchwork of government subsidies and financial instability which make securities and companies difficult to value. In transition economies, even basic legal systems protecting property rights and ensuring legal rights in bankruptcy may not be established. Meanwhile, where there are few companies, there is little possibility of diversification. Inflation can be very high and volatile, which renders financial assets vulnerable to real losses. Share and bond prices are typically volatile and vulnerable to effects of purchases and sales by foreign investors, as well as insider manipulation. This is indicated by the data in Table 2, which compares developing and advanced-country equity price

²¹ Note that these arguments are broadly "closed economy" based, a bias that may be justified given the tendency of institutions to invest domestically even in globalised financial markets.

movements. For emerging markets, it indicates higher volatility and also high kurtosis - a tendency for extreme movements to be relatively common. The data of course cannot show some additional difficulties such as wide spreads and low liquidity which also characterise emerging markets.

It can be argued that in such situations, accumulated pension funds would risk to be used as a captive source of financing government deficits, to bail out state enterprises or if free to invest in non government assets would be channelled into speculative or risky assets (real estate, loans to related parties, equity stakes in related firms) (Vittas and Michelitsch 1994). Also countries without securities markets may lack the human capital and regulatory capacity needed to run a funded pension system.

On the other hand, it can be argued that there is a potential dynamic link of decentralised funding and securities market development that may permit funding also to be introduced at an early stage in financial development. Even if they initially invest largely in government bonds and bank assets, pension funds may in due course, and given appropriate easing of regulations, spur further growth of capital markets. This may be in terms of market structure, the role of fund management strategies, liquidity and volatility of markets and demand for capital market instruments. Consider fundamentals; 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 pension schemes the assets are built up while they are maturing, and this stimulates investment and the development of securities markets. Individuals are forced to start saving at an earlier age; aggregate saving may increase. Saving as such tends to become more long term; and given their focus on real returns, institutions should be particularly beneficial to development of equity markets, including privatisations. Certainly there seems to be a correlation in OECD countries between equity market capitalisation and the size of the institutional investor sector²². Equally, funded systems are ready customers for long term corporate bonds and securitised debt instruments. A further benefit is increased allocative efficiency in the economy as a whole.

Build-up of funds from pension schemes can be rapid. If labour income is 50% of GDP, a compulsory pension scheme covering 50% of the labour force at a contribution rate of 10% will accumulate funds equivalent to 2.5% of GDP annually. If the nominal rate of return is equal to GDP growth, and initially pension payments are low, 25% of GDP could easily be accumulated in long-term financial assets in 10 years. Increases in coverage or contribution rates as well as higher asset returns may of course increase these growth rates further.

These quantitative elements in turn lead to qualitative benefits including financial innovation and modernisation of the infrastructure of securities markets which should help reduce the cost or increase the availability of capital market funds, and hence aid industrial development *per se* as well as facilitating privatisations. There may be important indirect benefits in this context, as pension funds press for improvements in what Greenwald and Stiglitz (1990) call the "architecture of allocative

²² Simple estimation for the EU-15, the US, Japan and Canada gives a correlation of xxx.

mechanisms", including better accounting, auditing, brokerage and information disclosure. Modern banking and insurance supervision, new securities and corporate laws, junior equity markets and credit rating agencies may also develop. In addition, the "endogenous growth" effects of an increase in capital investment on labour productivity, which can raise the economic growth rate may be particularly powerful in developing countries if a switch from pay-as-you-go to funding induces a shift from the labour-intensive and low productivity "informal" sector to the capital-intensive and high productivity "formal" sector (Corsetti and Schmidt-Hebbel 1994). Equity market development per se has been shown to enhance overall economic development (Demirguc-Kunt and Levine 1996).

An often-quoted example of the beneficial effects of funding is that of Chile. Holzmann (1997) points to the fact that pension funds grew from zero in 1980 to 39% of GDP in 1995. This accompanied an expansion of overall financial savings from 28% of GDP in 1980 to 68% in 1993 (Fontaine 1997), with pension savings accounting for a third of this total. Initially funds invested mainly in debt securities owing to regulatory prohibition of equity investment, but not solely those of the government - also bank CDs and mortgage bonds. Debt maturities increased as a consequence of the development of pension funds to 12-20 years by 1990. Equity investment was permitted in 1985 and holdings have grown to over 30% of assets. This accompanied and encouraged a marked expansion of equity market capitalisation from 32% of GDP in 1988 to 90% in 1993. In 1991 the AFPs held 1/3 of public bonds, 2/3 of private bonds and 10% of equities. Holzmann (1997) shows econometrically that the development of financial markets in Chile correlates with strong development of the real side of the economy, via rising total factor productivity and capital accumulation.

Fontaine (1997) also notes that pension fund development facilitated internal resource transfers, enabling the Chilean government to service its international debts without extreme fiscal adjustment which was elsewhere damaging to the real economy, by providing a domestic source of borrowing without requiring excessively high interest rates (in fact the debt was generally CPI-indexed). Correspondingly, public sector debt rose from 5% of GDP in 1980 to 28% in 1990. Later, the demand of pension funds enabled debt conversion - by both private and public institutions - to occur smoothly. In addition, the fact that pension funds were not permitted to invest internationally till 1989, and then only in a limited way, is considered to explain why the capital markets in Chile grew in size and depth so rapidly. Again, given the existence of domestic long-term institutions, Chile is probably better insulated from the shifting behaviour of international investors, as witness the lower correction in 1992 than for other Latin American markets. Hansell (1992) suggests development of funds has been a major factor behind Chile's bonds being rated investment-grade, the first Latin American country to be so rated since the debt crisis. Disclosure standards are reportedly higher than elsewhere in Latin America. On the other hand, they have been rather unsuccessful at ownership dispersion, one reason being unwillingness of closely held companies to accept dilution of control. And the rating regulations have till recently prevented funds investing in start-up companies and venture capital.

However, some further preconditions may need to be fulfilled for pension funds to have these beneficial effects (Vittas 1994). Local personnel skilled in asset management (as well as support staff such as actuaries, accountants, auditors, financial management experts, attorneys and computer specialists) may be scarce, implying a need for joint ventures with foreign firms. Pension funds, even if they benefit from tax privileges, may only be attractive when other financial assets such as deposits and bonds are (effectively) taxed, which is not often the case in developing and transition economies²³. Erratic changes in fiscal treatment are very damaging. Laws governing prudence, self dealing, and other aspects of fiduciary behaviour and concerning settlement of property disputes and bankruptcies are necessary prior to introducing funding to prevent excessive financial risks (Turner and Rajnes 1995). To be effective, social security and pension reform requires a streamlining of the regulatory framework, including not only pension providers themselves (see Section 5) but also providers of other financial services such as insurance, payment services, the securities markets and in the legal, accounting and auditing areas.

A sound banking sector is an essential precondition for pension reform, as funded pensions typically hold some bank assets, so weak banks threaten retirement income security (Mitchell 1997); banks are also necessary (as providers of collateral, clearing, settlement etc. services) for security markets to grow and provide alternative pension fund investments. On the regulatory side, such a stable banking sector requires a system of licensing, supervision, closure and a lender of last resort facility. Efficient and liquid government bond markets are also essential, given the role such bonds have as pension fund investments early on in financial-sector development. Also, a strong insurance sector - and a profession of actuaries - is needed in order to provide a competitive annuity market which is an essential counterpart to a defined contribution pension fund sector, if individuals are to be protected against longevity risk.

Finally, the way funds are invested is crucial - as discussed in the rest of this article. If funds are used as a captive source of funds for governments, the beneficial effects may be lost. Equally, funds must use external and not book-reserve funding, as in Germany and Japan after the war. Finally, as noted by Vittas (1994), sound macroeconomic policies and financial stability are essential counterparts. Institutional investors such as pension funds and life insurers cannot function properly in a highly inflationary environment unless they are based on real assets such as equities and property, and/or fully indexed debt contracts (as in Australia, Brazil, Canada, Chile, the UK and US). Full indexation may nonetheless be problematic in hyperinflationary conditions. More generally, it may be noted that high inflation²⁴ and volatile real interest rates tends to inhibit growth of securities markets.

3.3 International investment and financial development

²³ It is clear, in contrast, that tax breaks have powerful effects on takeup of voluntary pensions in OECD countries, as witness strong growth in countries with tax privileges such as the US, US and the Netherlands, as compared to weak growth in Germany.

²⁴ High inflation is destructive of saving generally, especially if real interest rates on bank deposits become negative owing to administered rate-setting.

Clearly, difficulties relating to domestic capital market development may to some extent be overcome by allowing pension funds to invest offshore. International investment may also have external benefits such as helping funds to take advantage of modern accounting, regulatory and risk pricing techniques (Mitchell 1997). The Singapore fund invests solely offshore, while most other provident funds do not, and Chile has only recently liberalised (see Section 5).

Important, and conflicting, issues are raised, notably for developing and transition countries. On the one hand, international investment may be seen as a loss of potential to develop domestic capital markets. It may also be seen as posing a risk of capital flight (see Section 5.3). On the other, it may be seen as beneficial to pension funds as volatility of returns could be reduced (see Section 4). In addition, it will forestall the point at which pension fund investment becomes so large as to face diminishing returns domestically²⁵. Also there may be a benefit at a national level if national income is subject to frequent terms-of-trade shocks owing to the position of being largely dependent on commodities for export earnings, while export earnings account for a large proportion of GDP, as is common in developing countries. Hence, holdings of assets offshore can actually help to contribute to greater stability of national income (Fontaine 1997). On balance, we favour a liberal approach.

Finance-theory arguments for international investment (Davis 1995b) apply particularly strongly to emerging markets. Such markets may be highly vulnerable to macroeconomic shocks such as high and variable inflation that are damaging to the value of domestic financial assets. If the domestic currency tends to depreciate owing to inflation, real returns on foreign assets will be boosted temporarily. As noted, the domestic stock market may itself be poorly diversified, being dominated by a small number of companies, or unduly exposed to one type of risk. Small markets - particularly in developing countries - may be inherently volatile. There may be industries offshore which are not present in the domestic economy, investment in which will reduce unsystematic risk. International investment may also be stimulated by the unavailability of certain instruments in the home market.

3.4 Do the requirements differ between the models of mandatory funding?

In the case of personal defined contribution funds managed on a decentralised basis by investment management companies, it may be suggested that the general arguments presented in Section 3.2 above apply most directly. Whereas a certain level of financial development is required, e.g. a banking sector and a rudimentary securities market, there may well also be strong feedback effects from the growth of funds to capital market development. Whereas they may initially focus investment on government bonds, they may diversify over time, thus enhancing the development of markets for corporate bonds and equities. On the other hand, the population must be well enough educated to

²⁵ Other policies are to invest in human capital, which is complementary to physical capital, to shift labour to the formal from the informal sector and to encourage capital intensive technological change (James and Vittas 1995).

make sensible decisions regarding investment, and the need for skilled personnel and regulatory capabilities is acute.

For personal defined contribution funds invested centrally by public institutions (so-called provident funds), the switch to funding can in principle be made at an earlier stage in financial development. As the government directs and invests the funds itself, there is in principle no need for a pre-existing securities market or even a banking sector. In Singapore, as noted, funds are invested solely abroad; in Malaysia they have historically gone largely to domestic development projects. However, the difficulty for financial development is that such a system may also inhibit development of securities markets, leaving a country in a state of financial underdevelopment relative to what could have been achieved. And except in exceptional cases such as those assessed here, funds may be wasted on government consumption or unprofitable investments (see Section 4.4).

As regards mandatory occupational funds, such a system is typically introduced late in the process of financial development, in countries where there is a widespread pre-existing system of voluntary occupational pension funds (Davis 1998b). Such a system clearly requires well-developed securities markets in order to develop, although feedback effects on domestic capital markets are also likely to arise as the system develops. Social security buffer funds, which are basically an adjunct to defined benefit pay-as-you-go pension systems, also require a degree of financial market development if they are not to be invested solely in government bonds.

4 Management issues for mandatory retirement funds

4.1 Issues in investment

In this section we outline the main investment issues for different types of funded pension schemes (see also Davis 1995c 1996a). Such information is important background for an evaluation of actual or planned systems in the world today. In a basic sense, institutions active in investment in mandatory funded systems face the same problem in investment as other agents in the economy, be they households, companies, banks or the government. This is to achieve an optimal trade-off of risk and return by allocation of the portfolio to appropriately diversified combinations of assets. The precondition for such an optimal trade-off is ability to attain the frontier of efficient portfolios, where there is no possibility of increasing return without increasing risk, or of reducing risk without reducing return. Any portfolio where it is possible to increase return without raising risk is inefficient and is dominated by a portfolio with more return for the same risk. The exact trade-off chosen will depend on liabilities per se, as well as preferences and constraints on investors.

As discussed further in Section 5, in some cases there may be artificial restrictions on portfolios which prevent asset managers from achieving the frontier, instead of a "prudent man rule" requiring the institution to diversify (see Davis 1998a). Equally, tax considerations may change the nature of

the trade-off, and different accounting rules can generate different 'optimal' portfolios, although market value accounting is needed to produce an appropriate portfolio in an economic sense.

Portfolio considerations, linked notably to the bond/equity choice, arise strongly for all pension funds. A first point is that (as noted in Section 1) for pension funds the portfolio distribution and the corresponding return and risk on the assets held, in relation to the growth of average earnings, determine the replacement ratio obtainable by purchase of an annuity at retirement financed via an occupational or personal defined contribution fund (as well as the cost to a company of providing a pension in a defined benefit plan). Implicitly, liabilities are typically defined in real terms. This link of liabilities to earnings points to a crucial difference with insurance companies as well as households, in that pension funds face the risk of increasing nominal liabilities (for example, due to wage increases), as well as the risk of holding assets, and hence need to trade volatility with return. In effect, their liabilities are typically denominated in real terms and not money fixed, and hence their assets should be similar. This implies a particular focus on equities and property, although bonds or liquidity are also useful for short maturity liabilities such as pensions in payment. In this context the ratio of active to retired members is a key underlying factor for portfolio distributions of both defined benefit and defined contribution funds. Blake (1994) suggests that given the varying duration²⁶ of liabilities it is rational for immature funds having "real" liabilities as defined above to invest mainly in equities (long duration), for mature funds to invest in a mix of equities and bonds, and funds which are winding-up mainly in bonds (short duration). Moreover, as shown by Black (1980), for both defined benefit and defined contribution funds, there is a fiscal incentive to maximise the tax advantage of pension funds by investing in assets with the highest possible spread between pre-tax and post-tax returns. In many countries this tax effect gives an incentive to hold bonds. It may be noted that the risk of a portfolio of equities²⁷ may be reduced sharply, at little cost in terms of return, by holding a proportion of bonds.

Defined contribution funds may be public, occupational or personal. In a defined contribution pension fund there is no guarantee regarding assets at retirement, which depend on growth in the assets of the plan. The portfolio distribution may either be chosen solely by the sponsor and the investment managers it employs (for occupational funds) or employees may choose their own asset manager or even decide the asset allocation themselves (for personal funds). Apart from such shifting to lower

²⁶ Duration is the weighted average maturity of a stream of cash flows (using relative discounted cashflows as weights).

²⁷ Issues arise from the underlying justification for a strategy of equity investment; is equity a hedge against inflation, and hence raising the share of equity reduces costs, or does it merely raise expected returns, and offering benefits of diversification, see Bodie (1995), Tepper (1992). Also of interest is the suggestion that the premium in returns of equities over bonds is more than can be explained by relative risk (Mehra and Prescott 1985), which if correct implies that risk-neutral investors such as pension funds can gain from holding equities. Blanchard (1993) notes that the premium is tending to decline, but remains positive. In addition, there is evidence that purchasing shares at regular intervals, as is typical of a pension plan, may significantly reduce risk, by evening out rises and falls in valuation. Nevertheless it is important to note that finance theory shows equities should not be assimilated with long term indexed bonds - there is no guarantee of value, whether real or nominal, at any time in the future. At most, the value of equities is uncorrelated with inflation, rather than providing a hedge. Moreover, inflation may be a threat to returns on equities, as they are vulnerable to loss of value at times of hyperinflation.

risk assets for older workers as they approach retirement, to reduce risk of market volatility shortly before retirement sharply reducing pensions, a defined contribution pension plan should in principle seek to diversify, aiming to maximise return for a given risk, and thus following closely the standard portfolio optimisation schema outlined above. As noted by Blake (1997), it is necessary to determine the degree of risk tolerance of the scheme member; the higher the acceptable risk, the higher the expected value at retirement²⁸. Since the objective is typically as high as possible a replacement ratio at retirement, while contributions are usually a fixed proportion of salary, the fund must if possible seek a return in excess of average earnings growth. The superior returns on equity, despite higher volatility will likely ensure a significant share of the portfolio is accounted for by them, while risks - notably in developing countries - may be minimised by international diversification.

It may be noted that the focus of the individual on maximising returns may be greater than that of a corporate sponsor, which may rather be concerned to maintain relationships with financial institutions - since the company bears no risk itself. A further issue which may affect investment patterns is the possibility of "excessive risk aversion" in investment²⁹ (i.e. risk aversion that actually threatens the value of pensions). Where employers choose the asset mix, such risk aversion would likely stem from fear of litigation when the market value of a more aggressive asset mix declines; where employees choose the asset mix it is more direct risk aversion. Employee representatives on the trustee board may seek to avoid foreign investment for political reasons to ensure "safeguarding of domestic employment". As for occupational funds, households directing their own investments may be subject to excessive risk aversion.³⁰

Unlike defined contribution funds, defined benefit funds are typically public or occupational but not personal (given the need for a sponsor or guarantor against shortfalls). For such defined benefit funds, appropriate investment strategies will depend on the nature of the obligation incurred, whether it is indexed or nominal and the demographic structure of the workforce. In all cases, the liabilities will be influenced by interest rates, real earnings, and inflation. Second, investment strategies will be influenced by the minimum funding rules imposed by the authorities. Third, there is an incentive to overfund to maximise the tax benefits, as well as to provide a larger contingency fund³¹. Corporate sponsors are likely to focus closely on investment management performance given their direct liability for any shortfalls. As noted by Blake (1997), minimum funding level and limits on overfunding

²⁸ Blake (1997) conceptualises this as maximising risk adjusted expected value; the expected value of pension assets less a risk penalty, defined as the ratio of the variance of the funds assets to the degree of risk tolerance.

²⁹ There is some evidence for such risk aversion. Certainly, in the US defined contribution plans and defined benefit plans both hold around 50-60% in equities (Pensions and Investments 1997), but beneficiaries of defined contribution plans are often forced to invest a high proportion in their own companies' stock. The proportion of freely-held equities is only 33%, i.e. considerably less than defined benefit funds.

³⁰ This seems to be often the case in the US, see Rappaport (1992).

³¹ The importance of pension liabilities as a cost to firms, and hence the benefit from higher asset returns, is underlined by estimates by the European Federation for Retirement Provision that a 1% improvement in asset returns may reduce companies' labour costs by 2-3%, where there is a fully funded, mature, defined benefit pension plan.

provide tolerance limits to the variation of assets around the value of liabilities. If the assets are selected in a way that their volatility matches that of liabilities, and if changes in asset values are highly correlated with changes in liability values, there is a "liability immunising portfolio", which immunises the portfolio against risks of variation in interest rates, real earnings growth and inflation in the pension liabilities. Such a choice, which determines the overall asset allocation between broad classes of instrument, may be assisted by a so-called asset-liability modelling exercise which seeks to take into account in particular the maturity structure of liabilities relative to projected contributions and asset returns.

Further elucidation of the investment approach of defined benefit funds may be obtained by considering different types of funding rules. The 'wind-up' definition of liabilities, the 'solvency' level at which the fund can meet all its current obligations³² absent any projections of salary, is known as the accumulated benefit obligation (ABO). The assumption that rights will continue to accrue, and be inflation-indexed up to retirement, as is normal in a final salary plan, gives the projected benefit obligation (PBO). The indexed benefit obligation (IBO) assumes indexation after retirement. An important argument in favour of funding the PBO over the ABO is that it ensures advance provision for the burden of maturity of the plan, when there are many pensioners and fewer workers, by spreading costs over the life of the plan (Frijns and Petersen 1992). This may be better for the financial stability of the sponsor. If the fund seeks to fund the accumulated benefit obligation, and the obligation is purely nominal, with penalties for shortfalls, i.e. with no indexation, it will be appropriate in theory to match (or "immunise") the liabilities with bonds of the same duration to hedge the interest rate risk of these liabilities, or at least to hedge using derivatives against the risk of shortfall when holding more volatile securities such as equities. Unhedged equities will merely provide unnecessary risk to such funds (Bodie 1995), although they may be useful to provide extra return over and above the minimum funding level.

With a projected benefit obligation target, an investment policy based on diversification may be most appropriate, in the belief that risk reduction depends on a maximum diversification of the pension fund relative to the firm's operating investments (Ambachtsheer 1988).³³ Moreover, if the liability includes an element of indexation, as is normal with defined benefit schemes which offer a certain link to salary at retirement, then fund managers and actuaries typically assume that may be appropriate to include a significant proportion of equities and property in the portfolio as well as bonds, to minimise the risk of longer term shortfall of assets relative to liabilities - implicitly diversifying between investment risk and liability risk (which are largely risks of inflation), see also Daykin (1995). An essential counterpart to such an approach is that regulators allow gradual

³² Projections of inflation will be needed when benefit indexation is a contractual or legal obligation. Another important factor in determining the ABO is whether early leavers' benefits are guaranteed in real terms, as in the United Kingdom, Ireland and the Netherlands.

³³ This approach, while being fully consistent with a prudent man rule, highlights the high-risk nature of book reserve or pay-as-you-go provision for private firms.

amortisation of shortfalls, or even focus in solvency calculations on income from assets rather than market values, as in the UK (Davis 1997).

4.2 International investment

Holding a diversified portfolio of assets in a domestic market can eliminate unsystematic risk resulting from the different performance of individual firms and industries but not, in a national market, the systematic risk resulting from the performance of the economy as a whole. In an efficient and integrated world capital market, systematic risk would be minimised by holding the global portfolio, wherein assets are held in proportion to their distribution by current value between the national markets (Solnik 1988). In effect, the improvement in the risk/return position from diversification more than compensates for the additional element of volatility arising from currency movements. Several ways may be envisaged whereby a strategy of international diversification should reduce risk. Crucially, to the extent national trade cycles are not correlated, and shocks to equity markets tend to be country specific, the investment of part of the portfolio in other markets can reduce systematic risk for the same return. Consistent with this, Harvey (1991), shows that markets tend to have correlations of 0.16 to 0.86, with a majority in the range 0.4 to 0.7. In the medium term, the profit share in national economies may move differentially, which implies that international investment hedges the risk of a decline in domestic profit share and hence in equity values³⁴. In the very long term, imperfect correlation of demographic shifts should offer protection against the effects on the domestic economy of ageing of the population. Finally, since human capital is nondiversifiable, and labour income and domestic capital market returns are correlated, diversification internationally can reduce risk to the individual.

Whereas a large advanced country such as the United States can provide a reasonable menu of instruments and securities to permit a purely domestic portfolio and a reasonable degree of diversification, as noted a small developing country will be much less able to do so and hence international investment may be essential to avoid exposing pensioners to unnecessary risks. Such an argument does, of course collide with the desire to retain saving for domestic purposes to aid overall development.

4.3 Performance measurement

The development of performance measurement is a prerequisite for effective investment. Performance measurement entails a precise calculation of the returns on a pension fund over a given period, followed by further assessments which may include calculations of risk; of performance relative to other pension funds; performance relative to the market; and performance relative to an absolute

³⁴ This will be of particular importance to defined-benefit pension funds where liabilities are tied to wages and hence rise as the profit-share falls. Similarly, at an individual firm level, investment in competitors' shares hedges against a loss of profits due to partial loss of the domestic market.

benchmark. In general, performance measurement is valuable in ensuring that investment is efficient relative to the opportunities available. The uses to which such information may be put vary between the various models of mandatory funding.

In personal defined contribution funds managed on a decentralised basis by investment management companies, performance measurement is essential to enable individuals to assess whether their funds are being well-managed. When they conclude this not to be the case, their option to shift from one company to another ensures a form of competitive pressure is enforced on managers to perform well, lest they lose their customers. However, it may be suggested that such a system is open to some dangers if individuals switch on the basis of short term rather than longer term performance. This process may induce "herding" behaviour by funds (see Davis 1995d), as they all seek the same portfolios so as not to be distinct from one another (if the risk of losing clients in the case of under performance is greater than the chance of gain from superior performance). It may be added that research on the UK and US (see Blake et al (1997) and Lakonishok et al (1992)) suggests that active pension fund managers tend to underperform the market, and hence particularly given lower fees, pension investors may be better off with index funds. Regulators also require performance measurement in the case of a system such as that in Chile (see Section 5) as there is regulation of returns, with excessively high and low returns being penalised.

As regards personal defined contribution funds invested centrally by public institutions (provident funds and social security buffer funds), the issue of performance measurement applies first to parliamentary oversight of the overall performance of such funds. Second, if part of the portfolio is delegated to independent managers, there is a concern to ensure that they are investing efficiently. Social security buffer funds, which are basically an adjunct to defined benefit pay-as-you-go pension systems are in a similar situation. The results of performance measurement in the cases of Singapore and Malaysia in practice rarely reach the public domain (Asher 1998).

Concerning mandatory occupational funds, the issue of performance measurement arises most strongly in the case of defined benefit funds, where sponsors bear the risk of shortfall. In such cases there is a clear interest in assessing the quality of asset management in order to ensure that costs are minimised. Such incentives to monitor asset manager performance are much weaker in the more usual case of mandatory defined contribution funds, where the ultimate risk is with the employees, while employers select the asset managers. This may account for lower returns than for defined benefit funds (see Section 6). On the other hand, some aspects of regulation may call for measurement e.g. of the return credited to occupational funds' accounts each year (Section 5).

4.4 Administrative costs

Administrative costs of pension funds reduce realised investment returns, thus lowering the pension in the case of defined contribution funds and increasing the cost to the sponsor for defined benefit. They

of course need to be considered in the light of investment performance (see Section 6) which may compound or offset differences in costs. It may be of interest before commenting on various funded schemes to note at the outset that pay-as-you-go social security schemes in OECD countries typically have costs of 3% of expenditures and an average of 28% in developing countries (Mitchell 1996).

The issue of personal pension costs arise strongly for Chile. There a major problem is that ability of investors to switch managers, which is necessary in order to ensure competition among management companies, generates high promotional expenditures (30% of total costs). This contributes to high overall management expenses equivalent to 15% of contributions, 1.5% of wages and 1.6% of fund assets (James and Vittas 1995)³⁵. These nonetheless represent an advance on the start of the programme when costs were proportionally much higher - 14.5% of assets in 1982. These fees are composed of fund management fees, costs of administering contributions and pension payments, advertising costs and administrative fees for switching accounts. Moreover, as the structure of commission charges includes a flat fee as well as an ad valorem fee, low income workers are credited with a much lower rate of return than high income ones. Annuity charges are also a source of inequality, with larger commissions often being charged to low income workers. On the other hand as noted by Mitchell and Barreto (1997), the Chilean system remains small (the size of a large occupational defined benefit fund in an OECD country) so further scale economies may be envisaged³⁶.

There is a major contrast with efficient³⁷ provident funds, as in Singapore or Malaysia. In Singapore, total operating costs in 1990 were 0.5% of annual contributions and 0.1% of accumulated assets. This also compares favourably with employer-based pension funds in OECD countries (see below), although the ratio to contributions is affected by the very high contribution rate of around 40%. In Malaysia, operating costs in 1991 were about 1.7% of annual contributions, around a tenth of those quoted for Chile above and only 2/3 of the cost of the US social security system. According to Bateman and Piggott (1997) this links to the existence of a single investment fund.

³⁵ Diamond (1993) quotes a higher figure of 2.9% of wages and 30% of contributions.

³⁶ On the other hand, evidence from the UK tends to confirm the result for Chile that the costs of personal pensions are very high, given lack of economies of scale, expenses of management, advertising, and compliance with the regulatory regime - as well as possible monopoly rents. Note in addition that UK personal pensions are usually not transferable without major cost. Blake (1995) suggests that an initial transfer into a personal scheme may cost 25% of the transfer value, with annual commissions of 2.5% of the annual premium. The Institute of Actuaries consider that 10-20% of contributions may be absorbed in fees over the entire span of a personal pension contract. In a detailed survey of 90 providers, Walford (1993) estimated that the various charges would reduce returns on a 5-year pension plan by 13% on average, but with quite a wide distribution from 8.5% for the 10% of firms with the lowest charges, and 18% for the worst 10%. Annuity fees, which do not apply for occupational defined benefit plans, impose a further burden. Meanwhile, expense ratios for US 401(k) plans holding mutual funds are 80-188 basis points, with an extra 6-32 basis points for an annuity option (Mitchell 1996).

³⁷ As noted by Vittas (1993), the provident fund in Zambia is estimated to have absorbed 6.8% of assets and over 50% of contributions in 1988.

Details of administrative costs of occupational pension funds are available for a selection of OECD countries. They suggest generally that the administrative costs for occupational funds, as for Australia and Switzerland, are intermediate between those of centralised public funds and personal accounts. The data imply the existence of economies of scale in asset management and pension administration, which has been confirmed by various studies. US data, for example, (Turner and Beller 1989) show that costs are higher for small occupational funds than large, and for defined benefit relative to defined contribution. For funds with assets of \$1 million in 1985, costs were 2% of assets per annum for defined benefit, and 1.4% for defined contribution. For plans with assets of \$150 million, the costs were 0.7% and 0.2%. An alternative way of expressing costs is in terms of contributions. Andrews (1993) notes a figure of 8.3% of contributions for US defined benefit funds and 4% for defined contribution. In the UK, Hannah (1986) quotes administrative expense to cash flow ratios of 6% for medium sized firms with insured schemes, 2% for large defined benefit schemes, and 1% for social security. The data from the latest survey by the UK Government Actuary (outlined in Davis 1997) shows that schemes with less than 11 members had average costs of 9% of income, which fell to 3-4% for schemes with up to 10,000 members and 1.4% for schemes with 10,000 and over. Costs as a proportion of assets were 1.1%, 0.3-0.5% and 0.1% for the corresponding size classes.

4.5 Politicisation of investment

A mandatory pension system may face political problems in investment, particularly if it is centralised (Thompson 1992). In some cases, the effects of politicisation may be so severe that the benefits of funding are not realised. Notably, its management could be subject to political interference. Investment in government bonds, which is typical of such funds,³⁸ has ambiguous consequences.³⁹ Funds which are accumulated may simply be used to finance government consumption this leaving no assets to pay pensions. Even if used to fund investment, finance may be diverted to unprofitable projects for political reasons. Government bonds which are not indexed are vulnerable to monetisation by inflation. Also lack of international investment, which is typical of social security trust funds, leaves them dependent on the performance of the domestic economy. Also at a macro level, a large provident or trust fund may induce fiscal laxity, thus actually reducing national saving.

Although investment is believed to be relatively efficient, political risk manifests itself in the Singaporean CPF first, in terms of a total lack of transparency in actual investments, extent of diversification and the returns realised, and second, in terms of the pre-emption of a significant proportion of the realised rate of return on the (foreign) investments of the CPF by the government (Section 6). In Malaysia, funds of the EPF have apparently been used to finance government sponsored privatisation and infrastructure projects, mainly via corporate bonds, which may entail

³⁸ The Swedish ATP fund is an exception, being invested largely in private-sector debt instruments.

³⁹ As pointed out by Bodie and Merton (1992), it is not clear that governments' willingness to repay bonds 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.

inefficient resource allocation; it is being allowed to provide financing for housing at what may be subsidised rates; it was mooted to use the EPF to support the stock exchange; and more recently to recapitalise distressed banks and companies in financial difficulties (Asher 1998).

But it should be noted that the schemes in Singapore and Malaysia, as well as Fiji and other Asian and Pacific countries are examples of how such schemes may be made to succeed, despite direct or indirect government control - even though as noted in Section 6, real returns remain rather low. As reported in World Bank (1994), the vast majority of other such schemes have invested mainly in public bonds (issued by governments or nationalised industries) at low interest rates, which during periods of inflation turned sharply negative. Real rates of return of -20% to -50% have been recorded in countries such as Zambia and Nigeria. Egypt and Ghana have also experienced low or negative returns. Notably in Africa, high operating costs reduced returns further. The use of funds to finance government consumption or wasteful investment meant the funds may have *reduced* economic growth, and hence income security of pensioners; they may also have entailed redistribution to privileged groups able to lobby for government expenditure that benefit them.

Similar problems may afflict public pension plans in OECD countries. Mitchell and Hsin (1994) noted that public pension plans at a state and local level in the US were often obliged to devote a proportion of assets to state specific projects to "build a stronger job and tax base" (Goldman Sachs 1993). These funds in turn tended to earn lower overall returns than others, suggesting inefficient investment. Second, funds having more retiree trustees tended to earn lower returns, possibly as they enforced a more cautious investment policy, or because of lack of expertise. Third, having more elected members of the board tended to reduce funding ratios, as did retiree members and fiscal stress - the deviation of regional unemployment from the national average. More generally, it was observed in the 1980s that US public pension funds had lower funding ratios than private ones, despite the pressure from corporate profitability on the latter. Again, public pension plans in both the US and UK tended to earn lower returns than their private sector counterparts over long periods (Davis 1995a). His estimates suggested that returns were 70 basis points lower for UK local authority funds than for private funds and 150 basis points lower for US state and local funds than for private ones.

Funding through private occupational pension funds or individual arrangements avoids some of these political difficulties. Fund managers may focus on maximisation of return for a given risk, which will ensure efficient allocation of funds in the capital market.⁴⁰ By being more able to invest internationally, they may avoid being constrained by limited investment opportunities in the home economy and reduce risk. But even in the case of decentralised funds, political difficulties need not be entirely avoided. One aspect may be that regulatory authorities impose strict minimum portfolio holdings of government bonds which in effect force pension funds to subsidise government finances (see Section 5), which in developing countries often implies sharply negative rates of return in real

⁴⁰ The impact of institutional investors such as pension funds on the capital market is discussed in Davis (1996b).

terms. More overt influence cannot be ruled out, although the structure e.g. of the Chilean system gives a political constituency to oppose it.

It may be noted in conclusion (Auerbach 1995) that international investment is a promising way to avoid politicisation.

4.6 Corporate governance issues

Pension fund development in the context of mandatory funded pension schemes may have important implications for corporate governance, both for funds themselves and for the economy as a whole. It is likely to become of particular importance for funds as they grow large relative to the economy, as is likely to be the case when coverage in mandatory and contributions sizeable. Then stakes in companies will become 'large', limiting the scope for funds to discipline managers and maintain equity returns by selling their stake (especially in thin markets, as are typical of developing countries, sale of large stakes will be at a major cost in terms of a fall in market prices). Rather, funds will need to put pressure on corporate management directly to perform adequately, and accordingly gather and process information to monitor management performance. Such pressure will be feasible if the legal system supports investors' rights over managers' interests - and empirical evidence suggests that such systems tend in turn to produce higher returns to shareholders (La Porta et al 1996).

Note however that in most of the countries studied in this paper the focus of investment is largely government bonds (as in Singapore and Malaysia) or government bonds, corporate bonds and debt instruments (Switzerland, Sweden). In such countries, pension funds act as passive creditors and are involved in corporate governance issues only when firms face financial difficulties. Even then they may take a passive role in restructurings, following rather the lead of banks. In Chile, equities holdings are growing, but despite this and despite the concentration of funds (60% are held in three funds), little attention has historically been paid to corporate governance issues⁴¹. Even where equity investment is important, as in Australia, pension funds have small and diversified holdings in large numbers of companies. They tend to act as passive shareholders and active investment managers and rely on the take-over sanction for discipline of corporate management.

5 Required regulation and necessary regulatory capabilities

5.1 The case for regulation

Whereas politicisation is a key issue for centralised funds, regulation is crucial for decentralised ones. Without adequate regulation, the benefits of funding may not be realised. Regulation is of particular importance given the compulsory and long term nature of mandatory funding. It is appropriate to

⁴¹ It may be noted, however, that Chilean funds have become more active in the corporate governance field recently (Valdes-Prieto 1998).

commence by restating the general case for financial regulation, and how this fits with the concept of a mandatory pension system. A case for public intervention in the operation of markets arises when there is a market failure. There are three key types of market failure in finance, namely those relating to information asymmetry, externality and monopoly.

As regards information asymmetry, if it is difficult or costly for purchasers of a financial service to obtain sufficient information on the quality of the service in question, they may be vulnerable to exploitation. This may entail excessively risky, fraudulent, negligent, incompetent or unfair treatment as well as failure of the relevant institution per se. Such phenomena are of particular importance for retail users of financial services such as those provided by pension funds, because clients are seeking investment of a sizeable proportion of their wealth, contracts are one-off and involve a commitment over time. Equally, such consumers are unlikely to find it economic to make a full assessment of the risks to which pension funds are exposed. In developing countries, clients may be particularly ill-informed. Government has a particular responsibility when individuals are obliged to take on pension contracts. Information asymmetries are clearly less important for wholesale users of financial markets (such as pension funds themselves in their dealings with investment banks), which have better information, considerable countervailing power and carry out repeated transactions with each other. A partial protection against exploitation, even for retail consumers is likely to arise from desire of financial institutions and corporate sponsors to maintain reputation. Nevertheless, it can be argued that given such information asymmetries, regulation should inter alia enforce prudent management of pension assets, preventing their being concentrated, and ensure that funds accumulated should be sufficient to cover accrued obligations and not vulnerable to expropriation by company management or take-over raiders.

Externalities arise when the actions of certain agents have non-priced consequences for others. Given the matching of long run liabilities and long run assets, externalities in the form of 'runs' are less likely for pension funds than other types of financial institution. There remain possible externalities from failure of pension funds, notably to the state, whether as direct guarantor or as provider of pensions to those lacking them. These give additional justifications for pension fund asset regulation, in particular those which ensure minimum funding. Equally, positive externalities may give reasons for governments to encourage pension funds, such as desire to economise on the costs of social security or foster the development of capital markets.

A third form of market failure may arise when there is a degree of market power. This may clearly occur for pension funds, particularly when membership is compulsory; attention to the interests of members is of particular importance in such cases, whether or not there is also asymmetric information. As argued by Altman (1992), employers in an unregulated environment offering a pension fund effectively on a monopoly basis will structure plans to take care of their own interests and concerns, so for example will institute onerous vesting rules⁴² and better terms for management

⁴² It is of interest that unregulated funds in the third world do indeed institute such rules (Davis 1995a).

than workers. They will also want freedom to fund or not as they wish and to maintain pension funds for their own use, regardless of the risk of bankruptcy. They will not take care of retirement needs of some groups in society such as those changing job frequently, young workers and women with broken careers due to childbearing.

Some would argue that pension funds should be regulated independently of these standard justifications, notably when they are mandatory, for example to ensure tax benefits are not misused, and that the goals of equity, adequacy and security of retirement income are achieved - in effect correcting the market failures in annuities markets that necessitate pension funds and social security. Regulation may also be based on the desire for economic efficiency, for example removing barriers to labour mobility and fostering efficient capital markets.

5.2 Necessary regulatory capabilities

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

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

Furthermore, developing countries need to strengthen the supervisory and intervention powers of regulators. They must be independent of the regulated institutions. To ensure systemic stability, and compliance with solvency, investment and consumer protection rules, regulators have to exercise

effective supervision via off-site surveillance and on site inspections. They need effective intervention powers to enforce corrective measures. They must establish objective criteria for entry and exit, setting out authorisation criteria for insurance companies and pension fund managers, establishing rules for the exit of insolvent firms and opening the market for new entry from domestic and foreign firms. Markets dominance by a small number of government controlled insurance companies is a recipe for low returns. Openness to new entry⁴³ while ensuring stability may require moderate but not excessive capital requirements.

One possible model for the structure of regulation is Chile. The supervisory structure for pension funds in Chile is simple, in that divisions of a single agency, the superintendency of AFPs, carry out all relevant tasks, including on-site inspections. It employs 100 professionals (lawyers, auditors, examiners etc.). Investment transactions are reported daily, while monthly reports are made of financial positions and performance. Although three AFPs have failed so far, there have been no losses to the associated pension funds. Another model is the Netherlands, where regulation of pension funds is carried out by a single statutory authority, the Insurance Supervisory Board and 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. Also the Netherlands is unusual in that the authorities conduct on-the-spot inspections of all funds every 10 years.

5.3 Portfolio regulations

Quantitative regulation of portfolio distributions seeks ostensibly to protect pension fund beneficiaries against “imprudent” investments. In this context, limits are often imposed on holdings of assets with relatively volatile nominal returns, such as equities and property, as well as foreign assets, even if their mean return is relatively high. For occupational funds, there are also often limits on self investment⁴⁴, to protect against the risk of insolvency of the sponsor.

For advanced countries, apart from the control of self investment, the degree to which such regulations actually contribute to benefit security is open to doubt, since pension funds, unlike insurance companies, may face the risk of increasing liabilities as well as the risk of holding assets, and hence need to trade volatility with return⁴⁵. Moreover, appropriate diversification of assets can

⁴³ This openness may help to create a contestable market, wherein a seeming oligopoly situations may be characterised by competitive behaviour on the part of existing firms, because of the potential for new firms to enter in a "hit and run" manner in response to excess profits.

⁴⁴ These limits do not, of course, apply to reserve funding systems such as those common in Japan, Germany, Luxembourg and Sweden, where 100% of assets are invested in the sponsor.

⁴⁵ Indeed, in several countries, a false parallel seems to be drawn by regulators between life insurers and pension funds.

eliminate any idiosyncratic risk from holding an individual security or type of asset, thus minimising the increase in risk. Again, if national cycles and markets are imperfectly correlated, international investment will reduce otherwise undiversifiable or "systematic" risk (see Davis 1995a). Certainly motives such as ensuring a steady demand for government bonds, or protection of benefit insurers may, according to some commentators, also play a part. Restrictions will also restrict the benefits to the capital markets from the development of pension funds. And, in the case of restrictions which explicitly or implicitly⁴⁶ oblige pension funds to invest in government bonds, which must themselves be repaid from taxation, there may be no benefit to capital formation and the "funded" plans may at a macroeconomic level be virtually equivalent to pay-as-you-go.

Even for defined contribution funds, it is hard to argue a sound case for such rules, given the superior alternative of prudent man rules (see below). There seems little evidence that defined contribution investors need "protecting from themselves" i.e. prevented from taking high risks. Indeed, in practice, experience suggests that investors in individual defined contribution funds tend to be too cautious to develop adequate funds at retirement, see Rappaport (1992), while companies running defined contribution funds may invest excessively cautiously to avoid lawsuits. Portfolio limits would, however, appear to be particularly inappropriate for defined benefit pensions, given the additional "buffer" of the company guarantee for the beneficiaries and risk sharing between older and younger workers, and if benefits must be indexed. Clearly, in such cases, portfolio regulations may affect the cost to companies of providing pensions, if it constrains managers in their choice of risk and return, forcing them to hold low yielding assets and possibly increasing their risks and costs by limiting their possibilities of diversification⁴⁷. The model for liberal regulation is the prudent man rule which enjoins prudent diversification, also including allowance for international investment. The last point is particularly important for a country with a small and undiversified capital market.

Some possible exceptions may be made to this argument in developing countries with emerging securities markets. There could be a rationale for portfolio regulations initially if fund managers as well as regulators are highly inexperienced and the markets volatile and open to manipulation by insiders. Risk may easily become excessive in such cases. Also compliance with portfolio limits is more readily verified and monitored than for prudent man rules. One key aspect may be that such regulations should not impose minimum requirements on holdings of certain assets, which may lead pension reserves to be used as a captive source of government financing. Following the general case above, regulation should become more liberal as financial markets become more sophisticated and mature.

Further issues arise in the context of capital outflow controls in developing countries. As noted by Fontaine (1997), exchange controls have in the past been - justifiably - imposed during foreign

⁴⁶ For example, by closing down all alternative investment strategies such as international diversification.

⁴⁷ Technically, portfolio restrictions are likely to prevent managers reaching the *frontier of efficient portfolios*, which indicates where return is maximised for a given risk.

exchange crises to deal with capital flight, to avoid a sharp and costly overshooting of the currency, but often kept in looser form once normal conditions were re-established. Even when general exchange controls have been eased, they may be retained on pension funds. Reasons may be on the one hand fear of allowing scarce domestic saving to flow offshore, and hence that opportunities for capital market development are missed, as well as ensuring pension funds contribute to ease the fiscal cost of moving from pay-as-you-go to funding, such that the resulting deficit does not crowd out private spending. But note that these are temporary justifications. Another may be to have temporary controls on funds' outflows - given their size and ease of control - during periods of sharp upward or downwards pressure on the real exchange rate⁴⁸. Note that the latter justifies purely a flow control and should not impinge on the stock of foreign currency assets.

As regards national experience, in Chile, investment rules seek to ensure adequate diversification by setting maximum limits on different assets, and not a prudent man rule. There is however no direction of investment to "priority" areas. Up to the early 1990s these rules set maxima of 50% for government bonds, 30% equities, and only 3% for foreign assets in the form of AAA-rated bank debt⁴⁹. Equities and corporate bonds held had to meet stringent rating requirements. Rules also set limits on fractions of funds invested in individual companies, both in terms of the companies' market capitalisation and the funds' own assets⁵⁰. It was considered that the danger with unrestricted investments would that firms would seek to boost yield to attract clients, at a cost of excessive risk. Following the idea of sequencing as set out above, an easing recently took place. Foreign investment is allowed to expand from 3% to 20%⁵¹, funds are allowed to invest in foreign bonds and equities and not merely bank deposits, and the maximum for domestic government bonds is now 45%. AFPs can invest in a much wider range of companies, and in venture capital, a move which it is hoped will raise interest in flotation of family-owned companies in Chile⁵². The reform is also expected to introduce new instruments such as mortgage-backed securities, convertible bonds and revenue bonds, the last aimed at facilitating institutional investment in infrastructure projects. Scope for AFPs to use derivatives will be increased.

In Singapore there are no formal portfolio restrictions, as the government takes the bulk of CPF contributions to invest in government instruments. Both the MAS and GSIC invest assets at their discretion. Interest rates paid to members are linked to those on bank deposits. There are limited opportunities for workers with high balances to invest in other approved assets⁵³ at discretion. In

⁴⁸ Milder fluctuations could be dealt with by sterilised intervention.

⁴⁹ Other Latin countries introducing pension reforms also have strict foreign asset restrictions (Mitchell and Barreto 1997).

⁵⁰ This tends to reduce the returns of large funds, which are unable to invest as much of their portfolios in equities with good prospects as smaller ones may.

⁵¹ In fact only 1% is held internationally (Mitchell 1996).

⁵² Ceilings are higher for firms willing to submit to limits on their managerial independence ("Chapter 12 companies").

⁵³ Individuals may either purchase CPF- approved mutual funds, or invest on their own in CPF-approved equities, endowment policies, gold, domestic government bonds, bank deposits and fund management accounts.

Malaysia, there is a requirement that at least 70% of the total and 50% of additional EPF assets should be invested in Malaysian government bonds, funds from which are used for development purposes. Recent amendments to the Act have allowed investment by the EPF in other securities, joint ventures, real estate and foreign securities.

Among the countries with mandatory occupational funds, Swiss limits are currently for a 30% limit on domestic shares (50% limit on all shares), 55% for real estate and 30% on foreign assets. Such limits are not, however, imposed in Australia where funds' investment has been unrestricted since exchange controls were abolished in 1983 and public sector funds were deregulated in 1985, except for a 10% limit on exposure to the sponsor (now being reduced to 5%).

The Swedish ATP, (as well as private funds in Sweden) 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). Historically, restrictions on equity investments were justified on the additional ground that for ATP they would involve backdoor nationalisation and worker control.

5.4 Minimum funding rules and regulation of returns

Regulation of the funding of benefits and associated accounting rules⁵⁴ is a key aspect of the regulatory framework for defined benefit pension funds, which may strongly influence portfolio distributions, notably by influencing the degree of volatility in asset prices that can be accepted. Note that by definition, a defined contribution plan is always fully funded, as assets equal liabilities, 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. Minimum funding requirements set by regulation seek to protect security of benefits against default risk by the company⁵⁵, given unfunded benefits are liabilities on the books of the firm, and therefore risk is concentrated and pensioners (or pension insurers) may have no better claim in case of bankruptcy than any other creditor.⁵⁶ The counterpart of minimum funding regulations for defined contribution funds is regulation of contributions or returns, which implicitly seek to ensure that a target replacement ratio is achieved.

⁵⁴ Regulation of funding is typically carried out by periodic submission of accounts and actuarial reports to the authorities.

⁵⁵ Bodie (1990) 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 financial difficulty, and because (in countries such as the US) pension benefit insurance may not cover the highest-paid employees.

⁵⁶ Adequate provision of unfunded pensions is likely to be particularly difficult for declining industries, as the worker/pensioner ratio falls.

As regards national experience, in Chile, there are returns regulations comparable to minimum funding rules, as funds must obtain a minimum return relative to the average for all pension funds, to protect uninformed workers. There are limits on returns relative to other managers; if over a 12-month rolling period funds earn more than 50% or 2 percentage points above the average, the excess must be placed in a profitability reserve, set aside from, but also belonging to, the pension fund. If they earn below half the average or 2 percentage points less, then the company must top up the returns from its profitability reserve, or if this is zero from its own 1% investment, or alternatively go bankrupt. If a firm goes bankrupt - 3 AFPs have done so - the government will pay this minimum return. Note that these rules may lead to damaging herd behaviour (see Davis 1995d), as funds are penalised for being different from others over short periods.

In Switzerland, employers are not forced to maintain actuarial balance for defined contribution funds, but must pay in for defined contribution or defined benefit if returns fall short of 4%. As noted by Davis (1998a), these may be particularly constraining, forcing firms to adopt a one-year horizon despite 30-year liabilities. Moreover, in Switzerland, accounting conventions also have an impact on funding decisions, as shortfalls of defined benefit pension funds assets relative to liabilities (with assets valued defined at the lower of cost and market value) are included in the company accounts (Hepp 1990). It is suggested that this helps to account for conservative investment strategies based on bond holdings, independently of portfolio regulations discussed above, despite the fact that funding of projected "real" obligations should make equities attractive. There are also minimum contributions. In Australia, companies are obliged to contribute on behalf of workers to a complying pension fund, otherwise the government levies a charge - the Superannuation Guarantee Charge - on the employer to enforce the contribution.

5.5 Information disclosure

Given the length of pension contracts, detailed reporting and information disclosure are essential. Accordingly, standards of information for members are clearly a crucial complement to regulation, if rarely a substitute. Personal and defined contribution pension plans may require even better information for members than defined benefit, given the direct dependence of pensions on the performance of the portfolio. Members need to be able to judge whether contributions are adequate and investments too risky - a difficulty for individuals in advanced societies, let alone developing countries. For defined benefit schemes, members need to be aware of vesting and portability regulations as well as the state of funding.

In Chile, information to members is essential to enable the competitive mechanism of transfers to operate. Funds are publicly valued daily at market prices. Funds are required to provide statements to members three times a year showing the last four contributions, financial performance of the fund, accumulated balances and returns on the account. In Malaysia and Singapore, there is disclosure of the value of individual accounts, but very little other information is provided. Notably in Singapore,

there is no information about ultimate investments, and policies and performance relating to them. Accounts of the CPF are not publicly audited. In Australia and Switzerland, audited annual accounts and an individual benefit statement must be made available to members.

5.6 Benefit insurance and other guarantees

Protection of pensions against fraud is of particular importance to mandatory funded schemes, as in effect individuals are obliged to take out a financial contract which puts a sizable proportion of their wealth at risk of misappropriation. In Australia, a superannuation industry levy has been introduced to aid members suffering from fraud or theft.

Further forms of guarantee may also at times be appropriate. Because of the very long time span and economic uncertainties affecting returns on funded pensions, government may offer forms of guarantee against the insolvency of the pension provider, or underwrite provision of minimum pensions. However, it is important to avoid undermining the financial discipline of market based funded systems by such insurance - and leading to vast and unanticipated government obligations. Any system of guarantees, including deposit insurance as well as pension insurance, faces the difficulty of moral hazard, i.e. 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. (Bodie and Merton 1992). What is needed are means to control risk, which could include an appropriate mixture of monitoring, asset restrictions and risk-based guarantee premia.

In Switzerland, a guarantee fund financed by premiums assessed on covered wages protects workers against insolvency of pension funds set up by employers (i.e. not merely fraud). In Chile, there is again a form of government guarantee; the government guarantees a minimum pension of about 22% of average earnings to those retiring after 20 years' contributions, so is obliged to make up the difference with the AFP return if it falls short. It also guarantees a minimum profitability of each AFP relative to the average⁵⁷. In Singapore, a limited public assistance scheme provides a pension of 12% of average earnings to destitute old people not covered by the provident scheme; for those that are covered by the provident scheme itself, the government guarantees a minimum replacement ratio of 22% of average earnings. In Malaysia there is a guarantee of a 2.5% real return.

5.7 Other types of regulation

In Chile, as noted there are considerable information asymmetries between individual and management company. These are aggravated by lack of familiarity of investors with capital market investment, and the compulsory nature of the scheme, as well as the thinness and lack of credibility of capital markets. As a consequence (albeit also to protect the government's guarantee), regulation focuses particularly on consumer protection. For example, regulation of the AFPs seeks to ensure

⁵⁷ It also guarantees annuity and life insurance payments

solvency of funds, both by separating funds from the management companies (funds belong to the members and are not affected by losses to the AFP), and imposing minimum capital requirements on them (of US\$0.1-0.4 mn at 1991 prices). An additional safeguard is that managers must invest a sum equal to 1% of funds under management on its own books, and in the same way as the client funds, bearing in mind that each AFP may only have one fund - so they will share the losses from bad investment.

For occupational funds, forms of separation of the fund from the employer are practised to protect members' rights. In Switzerland, the fund is a foundation with joint representation of employer and employee representatives on the board, where ownership of the assets lies with that body itself. In Australia, the fund is a form of trust entirely separate from the employer. In the case of such mandatory occupational funds, employee representation may be helpful in avoiding abuse and disseminating information, albeit also at times leading to an excessively cautious investment strategy.

In Chile there are also restrictions on commissions. They may only be on inflows and not on assets or returns. The level of fees and the amount paid to agents is not regulated.

6 Investment performance of mandatory funded systems

It is important to assess the overall performance of the various schemes outlined above, in that they illustrate the effects of the various factors outlined above, and indicate the overall effectiveness of the different approaches to mandatory funded pensions.

In Chile, the funds initially invested largely in government bonds, but later shifted to equities, both via purchases in the secondary market and support for privatisation issues. Corporate bonds became popular investments as more companies met the government's rating targets - offering an attractive alternative to short-term bank credit, which was the only form of corporate debt available until the late 1980s. In 1994, their portfolios were invested 39% in public bonds, 33% in equities, 6% in deposits, 6% in corporate bonds and 13% in mortgage bonds (see Table 3). Their influence on the capital market may be gauged by the fact that they hold 55% of Chilean corporate and mortgage bonds, 10% of all equities and no less than 95% of privatisation issues.

Performance of the funds in terms of investment returns has shown an average real return of 13% per year over 1980-95 (see Table 4), and 10.5% even allowing for the high level of administration costs noted in Section 4. However, as noted by Vittas (1993), low income workers returns have been much lower (7.5%) owing to a flat rate element in the administrative costs (this element was later reduced). The good returns - well in excess of average earnings growth and somewhat above potential returns in international markets - have been linked to the overall performance of the Chilean economy, and in particular a sharp fall in the real interest rate (as noted, international diversification was only recently

permitted). Widespread use of indexed instruments⁵⁸ ensures that members are protected against inflation. Poorer returns in the 1990s have led to questioning of investment policies and restrictions, especially on foreign investment, for increasing risk unnecessarily.

In Singapore, 90% of assets are invested in government bonds. The returns credited to accounts have been around 2% in real terms on average since the 1960s (Vittas 1993), although over the period 1987-96, the real return has been lower, at 0.33%, with negative real returns for half these years (Asher 1998). Our own calculations (Table 4) suggest that real returns were 1.3% over 1970-95 and 2.3% over 1980-95. Since 1986 the return has been set according to the deposit rates for short term funds (up to 12 months) with four domestic banks, subject to a nominal minimum of 2.5%. The return compares unfavourably with those realised in many of the OECD countries (Davis 1995a), as well as those in Chile noted above. With real wages growing at 4% or more, Vittas (1993) suggests that the real rate of return is insufficient to secure a high replacement ratio, despite the high contribution rate (especially as some of the assets are used for non-pension purposes). Asher (1998) noted an actuarial study suggesting sizeable additional contributions on top of the existing 40% would be needed to attain a replacement ratio of 66%. Low interest rates on housing loans from the fund are one underlying reason for the low returns on the fund. The availability of cheap housing loans has also reportedly driven the price of housing to extremely high levels. But the main reason for low returns to investors is that a sizeable proportion of (reportedly high) returns on foreign investments are accumulated as hidden reserves for the future needs of the economy. Asher (1998) notes a government declaration that portfolio returns have been around 5% (real) in recent years; our own calculations suggest a similar figure for global returns. This shortfall suggests an element of taxation amounting to over 2% of assets per annum. An alternative benchmark, namely returns on the Medishield fund, would imply a tax rate of 4.2% per annum (Asher 1997).

On the other hand, as pointed out by Asher (1998), the investments of those individuals allowed to allocate their own excess-balances with the CPF as they desired have been even more disappointing. Over 1994-7, only 20% of investors achieved returns in excess of those available from leaving the money in the CPF, and aggregate losses in nominal terms of those investing exceeded gains; and this before the financial crisis in South-East Asia began. This is a sobering illustration of the capabilities of individuals to manage long term investments.

Malaysian investments have till recently been wholly domestic. For many years funds were invested solely in domestic government bonds. The share was 89% in 1987 but fell sharply thereafter to 34% in 1996, reflecting an improvement in the fiscal position. Corporate bonds have increased from 11% in 1991 to 20% in 1996, and equities from 2% to 16% over the same period. In terms of investment returns, the Malaysian provident fund has done considerably better than the Singaporean, with real returns of 3% on average over 1970-95, and 4.3% over 1980-95. This performance despite the focus on domestic assets illustrates the success of the related economic growth policies, which have of

⁵⁸ 90% of assets are either indexed bonds or real assets (Valdes-Prieto 1998).

course been reinforced by availability of pension fund assets. It may nonetheless involve an element of taxation, possibly of around 2%⁵⁹ (Valdes-Prieto 1997); it also falls slightly short of estimated real average earnings growth, and is well below potential returns on international investment. As noted, other provident funds have done much worse than Singapore or Malaysia, with Zambia achieving -25% real returns in the 1980s (World Bank 1994).

In Australia and Switzerland, asset returns have been rather lower than that in the most remunerative OECD pension systems. In each case the real portfolio return was estimated to be just over 1.5% over 1970-95; this compares poorly with 5.9% in the United Kingdom and 4.6% in the Netherlands over the same period - sectors which have prudent man rules for asset allocation and where funds are largely defined benefit. As compared with average earnings, the Australian funds had a surplus of 0.8% while the Swiss funds had a surplus of only 0.2%; the corresponding figures in the UK and the Netherlands were 3.1% and 3.2%. The estimated standard deviation of real returns in Switzerland was 7.5% and in Australia 11.4%, despite the relatively low real return. The UK return's volatility was only just above the Australian at 12.8% and the Dutch return's volatility was only 6%. This differing pattern is explicable in terms partly of returns on domestic instruments (where balanced domestic portfolios offered a lower yields in each case), while for the Swiss, the returns on the global portfolio were also rather low owing to appreciation of the currency. But another factor is a greater relative focus on low yielding assets owing to restrictions on portfolios throughout the period for Switzerland and until 1983 in Australia. It is notable that returns in Australia in 1980-95 increased sharply, while Swiss returns were similar to the overall period. Moreover, the compulsory nature of these funds, and defined contribution basis, may reduce competitive pressures to maximise returns; when companies select asset managers for defined contribution funds, maximising return may be subordinate to relationship considerations.

In Sweden, the returns have been comparable to Switzerland and Australia, with a real return of only 2.0%, only just above wages growth and with a standard deviation of 13.1% in excess of that in the Netherlands. It may be noted that this low return occurred despite potential real returns on balanced domestic portfolios of 8% over the same period, and 6.1% on international assets. Again, as noted above Swedish portfolios have been subject to portfolio restrictions. Moreover, political influence and the difficulties of a large fund in a narrow market may also have played a role. Similar poor results have been found in developing countries with funded social security, such as Egypt where returns have been -12% in the 1980s (World Bank 1994).

7 Conclusions

The mandatory funded pension scheme is becoming a popular means of providing retirement income to individuals both in developing countries and advanced countries, notably in the light of the

⁵⁹ The comparison made is between real returns over 1971-96 of 2.74% per annum, equity yields of 5.61% and a yield on bank assets/liabilities of 4.26%.

financing difficulties of pay-as-you-go schemes. In this paper, we have shown that a number of different types of scheme are operative in the world today. Notably, one can distinguish schemes where asset management is decentralised and pensions are provided on an individual basis; schemes where asset management is wholly centralised; and schemes where asset management is decentralised on an occupational basis. Trust funds of social security schemes are another variant. Behavioural differences arising from such differences in the structure of schemes have been shown to impact notably on performance of funds, although an influence on performance of regulation and politicisation of investment can also be traced. Returns accruing to members are also influenced by widely-differing levels of administrative costs. Meanwhile, it is suggested that although developing countries need not wait till capital market development is complete for introducing funded mandatory pensions, some preconditions exist nonetheless, both in respect of capital market structure and regulatory capacity.

Investment performance - the subject of this article - is crucial to the success of mandatory funded schemes, given that as defined contribution schemes, they expose the worker to investment and inflation risks, and thus are less able than defined benefit funds⁶⁰ to guarantee a minimum replacement ratio. Returns depend not only on asset-selection but also administrative costs and risks. Real world experience tends to suggest that funds' main weakness is indeed in the returns to investment of assets; they often fall short of benchmarks of average earnings growth, returns on a domestic balanced portfolio and returns on a "global portfolio". Chile is an exception, but the system there has benefited from exceptional capital market conditions. This makes it worthwhile to conclude by assessing the nature of the risks impinging on the realised returns to individual members of such schemes, so as to gather clues as to how such risks may be minimised.

Risks arising from the operation of the pension system: One type of risk relates to the possibility that the pension or retirement scheme is poorly managed - for example being vulnerable to expropriation and fraud or invested in inappropriate assets in terms of return, risk or diversification. As discussed in Section 4.4 under the heading of politicisation of investment, this is a particular danger in the case of centralised management, where centralised funds are often invested solely in government bonds which offer a low or negative real return. Accumulated funds for investment were often misallocated. Equally, returns were often eroded further by high administrative costs. Risks to members in such funds are clearly extreme, and widespread evasion of contributions unsurprising. Even efficient provident funds such as those in Malaysia and Singapore are not immune to such risks. Notably, high implicit rates of taxation seem to apply to the returns realised, which sharply reduce benefits to members compared with those obtained by the investment managers.

⁶⁰ In principle, it is possible using dynamic asset allocation, switching appropriately over time from equities to bonds for example, to target a certain replacement ratio for a defined contribution fund with a high degree of probability - albeit not 100%.

Decentralised funds benefit from the relative absence of political pressure, but are vulnerable to other abuses arising notably from conflicts of interest. For example, asset managers may take excessive risks, or indulge in abuses such as "front running" portfolios with pension monies, while corporate sponsors may simply expropriate assets. The issue is addressed largely by means of the various forms of regulation discussed in Section 5. Rules for prudent allocation of investments, for disclosure and for funding per se are among the most important in this respect. These should ensure that assets held are both adequate and appropriately diversified. Insurance against fraud may also have a role to play, although more general forms of benefit insurance may give rise to moral hazard.

In this context, the level of administrative costs increases the risk that pensions will be inadequate, for a given level of returns on the portfolio. High costs afflict personal pensions in particular as well as small occupational funds. This may of course be offset by superior investment performance; it is notable that the incentives to maximise returns are greater for personal pensions where switches between asset managers are readily made, compared to defined contribution occupational funds where the corporate sponsor nominates the asset manager. The degree of competition among asset managers and representation of foreign firms in the domestic market will also have a role to play. Meanwhile, as noted above, centralised funds may offer a relatively low return, even if efficient provident funds have very low administrative costs.

Risks arising from inappropriate regulation: A particular form of risk for decentralised funds arises from inappropriate portfolio restrictions, locking the pension system into low yielding assets that in turn reduces the replacement rate which can be realised for a given contribution rate. Such restrictions tend to sharply reduce returns. It is noteworthy (Table 4) that in Switzerland returns in the 1980s were much worse than those in Australia, where in the latter restrictions were removed in the early 1980s. Nevertheless, a case can be made for restrictions applying temporarily in developing countries as markets and expertise develop. It was also noted that accounting practices, funding practices and returns restrictions may have adverse effects on pension system performance.

Risks arising from the performance of financial-asset markets: Risks in the domestic economy arising for pension assets that are appropriately invested are basically those of financial instability and monetary instability. Hence the suggestion in Section 3.2 that a funded pension system should not be introduced before there is a stable and well-regulated banking sector. Appropriate insurance and securities market regulation designed to prevent financial instability is also appropriate. On the side of monetary stability, the risk for pension funds is basically that of inflation, particularly when it is high and volatile, as this tends to reduce the return on all financial assets and lead to real losses on nominal fixed assets such as government bonds. The underlying need is for a sound framework of monetary policy which will counter inflation. In addition, issuance of index linked bonds - as in Chile and Australia - offers pension funds a means of avoiding such risks. Alternatively, international investment is an efficient means to avoid domestic inflation risks, as well as tending to reduce volatility in returns relative to those in domestic markets. It is notable that portfolio restrictions as

mentioned above often force pension funds to hold largely nominal-fixed government bonds as well as limiting international investment, both of which clearly increase domestic-economy risks to individual holders. Centralised funds also tend to focus on purely domestic assets (Singapore is an exception).

Meanwhile, risks to the global financial markets cannot be avoided by international investment, as will have to be accepted as part of the price of funding. In effect, they point to a need for maintaining elements of pay-as-you-go pensions, since the latter are subject to differing risks from funded schemes, namely political risks that benefits will be reduced when the system deteriorates and/or the ageing of the population proceeds.

Risks arising from the design of the pension system. Whereas the list of risks in this category is potentially very large, one may note several which arise in particular in an investment context. Longevity risk for the individual links to the nature of disbursements made. If pension systems offer lump sum distributions, rather than mandating annuity purchase, then those actually purchasing annuities may face prohibitive costs owing to adverse selection. Compulsory annuity purchase reduces this risk. More generally, relative to personal pensions, occupational funds, by offering a diversified pool of clients to the annuities market, is likely to reduce the cost of annuities, thus encouraging this form of provision and reducing longevity risk. Issuance of index linked bonds gives scope to provide indexed annuities. Volatility of returns to pension funds may increase vulnerability of the annuity purchaser to adverse market conditions when they retire - and there is a clear trade-off in Table 4 between higher returns to pension funds and risks. Finally, occupational, and public funds also offer the possibility of a defined benefit⁶¹ pension - guaranteeing replacement ratios and providing annuities from within the fund - which is not feasible in the absence of a guarantor.

Meanwhile for personal pensions, even in a well regulated system, individuals may be unable to evaluate the quality of investment managers, risking considerable losses of retirement income. Particularly if the individual is in control of the asset allocation, s/he may be excessively cautious and thus generate low returns, cutting the replacement ratio - or not contribute enough.

Concluding with a view of the issues of investment, in the light of the risks outlined and of actual performance, on balance, we see no strong arguments in favour of public investment of pension monies, and many against⁶². The lack of transparency in the disposal of funds by a public agency, as

⁶¹ Note however that occupational defined benefit funds have in practice tended to discriminate against those changing jobs, thus threatening retirement income as well as reducing the flexibility of the economy. Such labour mobility problems of defined benefit funds would need to be minimised by appropriate regulation, if they are to be genuinely superior in terms of retirement income security. Defined benefit funds also tend to incorporate arbitrary redistribution within the plan, and absent appropriate regulation may not protect adequately against inflation.

⁶² Abstracting from individual risks, in terms of the development of capital markets, centralised funds have many disadvantages. By mandating investment in government bonds, they may hinder growth of equity and corporate bond markets. The private sector may be crowded out from access to finance, reducing growth. Public managers may exert undue influence on the corporate sector ("backdoor nationalisation"). Decentralised

well as vulnerability of short-sighted political influence engenders many of the problems. It is nonetheless crucial that regulation of private asset managers should be adequate, and the market structure of asset managers is such as to favour efficient investment of portfolios. We also consider that occupational funds are superior to personal pensions, as long as regulation protect the pension fund's assets against bankruptcy of the sponsor. That said, in economies such as in developing or transition economies where most firms are small or start-ups on the one hand, or at risk of financial distress on the other, the case for personal pensions becomes stronger

investment is more likely to ensure development of capital markets, efficient allocation of financial assets to the investments which are most profitable, and international investment. As with public funds, private managers may exert influence on the corporate sector, but this may be a positive one ("shareholder value")

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Table 1: Characteristics of mandatory funded pension systems

	Assets (% of GDP)	Coverage	Contribution rate	Benefit type	Asset management
Chile	39% (1995)	99% members; 58% contribute	13%	Defined contribution	Decentralised (personal)
Singapore	56% (1996)	90% members, 67% contribute	40%	Defined contribution	Centralised
Malaysia	47% (1996)	86% members, 50% contribute	23%	Defined contribution	Centralised
Switzerland	73% (1994)	90%	7%-18%	Defined contribution as minimum	Decentralised (occupational)
Australia	56% (1996)	92%	9%	Defined contribution as minimum	Decentralised (occupational)
Sweden	32% (1996)	90%	18.5%	Defined benefit	Centralised

Table 2: Share index behaviour of selected emerging and OECD equity markets

Monthly percentage changes

1980-96	Korea	Mexico	Chile	India	Switzer-land	Austr-alia	US	UK
Mean	1.1	5.7	2.1	1.2	0.9	0.9	1.0	1.1
Standard deviation	5.5	15.8	8.8	7.0	4.2	5.1	3.3	3.9
Kurtosis	0.5	12.8	26.9	6.5	4.2	8.4	3.0	6.6
Skewness	0.6	1.6	-2.9	0.0	-1.0	-1.5	-0.6	-1.3

Source: IMF IFS CD-ROM

Table 3: Portfolio distributions of mandatory funded pension systems

	Bonds	o/w Public	o/w Private	Shares	Property	Loans and mortgages	Short term assets	Foreign assets
Chile (1994)	45	39	6	33	2	13	6	1
Singapore (1996)	70	70	0	0	0	0	28	0
Malaysia (1996)	55	34	21	16	1	0	30	0
Switzerland (1994)	28	-	-	14	16	41	2	0
Australia (1995)	15	13	2	41	9	0	20	14
Sweden (1995)	83	37	46	1	3	7	2	0

Sources: Chile: Mitchell and Barreto (1997), Singapore and Malaysia: Asher (1998), Switzerland: OECD (1997); Australia and Sweden: Central Bank Bulletins

Table 4: Estimated real total returns for mandatory funded pension systems

In percent per annum, standard deviations in brackets

1970-95	Real return	Average earnings	Global portfolio	Domestic balanced portfolio	Return less average earnings	Return less global portfolio	Return less domestic balanced
Chile	-	2.1 (6.3)	-	-	-	-	-
Singapore	1.3 (2.0)	6.9 (3.3)	5.1 (18.4)	-	-5.6	-3.8	-
Malaysia	3.0 (3.9)	4.4 (2.9)	6.7 (17.2)	-	-1.4	-3.7	-
Switzerland	1.7 (7.5)	1.5 (2.1)	3.7 (17.0)	2.4 (18.1)	+0.2	-2.0	-0.7
Australia	1.8 (11.4)	1.0 (3.4)	6.1 (18.2)	3.5 (17.5)	+0.8	-4.3	-1.7
Sweden	2.0 (13.1)	1.4 (3.5)	6.3 (14.8)	8.0 (20.1)	+0.6	-4.3	-6.0
<i>Memo: Netherlands</i>	4.6 (6.0)	1.4 (2.6)	4.8 (14.7)	5.5 (18.3)	+3.2	-0.2	-0.9
<i>Memo: UK</i>	5.9 (12.8)	2.8 (2.3)	5.9 (15.0)	4.7 (15.4)	+3.1	0.0	+1.2
1980-95							
Chile	13.0 (9.5)	3.2 (5.7)	9.1 (19.1)	-	+9.8	+4.1	-
Singapore	2.3 (2.0)	6.4 (3.5)	9.2 (15.3)	-	-4.1	-6.9	-
Malaysia	4.3 (2.6)	4.1 (3.0)	11.7 (14.0)	-	+0.2	-7.4	-
Switzerland	1.8 (7.7)	0.8 (1.3)	9.2 (15.8)	3.4 (18.6)	+1.0	-7.4	-1.6
Australia	6.1 (8.6)	-0.1 (2.2)	10.2 (17.8)	8.8 (15.8)	+6.2	-4.1	-2.7
Sweden	4.9 (15.9)	0.3 (2.4)	10.4 (15.3)	10.3 (21.7)	+4.6	-5.5	-5.4

For Chile, Singapore and Malaysia, average earnings growth is proxied by growth in GDP per head. Global portfolio returns are estimated by using total returns on G-7 bonds and equities (50% each), weighted by approximate GDP weights and translated into domestic currency using the effective exchange rate index. Domestic balanced portfolio column shows real returns on 50% domestic bonds and 50% domestic shares. Sources: For Singapore and Malaysia: Asher (1998) and Vittas (1993); for Chile: Holzmann (1997); for Switzerland, Australia and Sweden: own calculations.