

5th October 2004

SAVING, FUNDING AND ECONOMIC GROWTH

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London

**Draft chapter for the “Oxford Handbook of Pensions and Retirement Income”,
forthcoming, Oxford University Press**

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Introduction

A key issue in pension reform is whether a shift from pay-as-you-go (PAYG) to funding is largely a matter of reallocation of the financial burden of ageing (with the risk of a generation paying twice), or whether funding improves economic performance sufficiently to generate the resources required to meet the needs of an ageing population. There are several aspects to this question. One is whether funding leads to an increase in saving which permits higher capital formation. A second is whether, independently of the impact on saving, there are effects of funding which lead to higher economic growth, for example via more efficient capital and labour markets. A third is whether a direct impact of funding on growth can be discerned. We address each of these issues in turn.

1 Saving and funding

In this section we analyse theory and empirical work on pension funding and saving, looking successively at personal saving and national saving. It should be noted at the outset that population ageing will of itself generate changes in saving which may have a major macroeconomic impact. See for example at a macroeconomic time series level, Disney (1996) who noted that, consistent with the life cycle, savings rates tend to decline in countries where there are a larger number of retired people. The changes in savings lead to changes in demand for financial assets. Econometrically, a strong effect of demographics on private saving is found by many studies, with for example Masson et al (1995) finding the total dependency ratio to have a significant negative effect on private saving in a panel of both advanced and developing countries³. These changes will undoubtedly be channelled via pension funds, but pension funds may not be the causal factor in such shifts.

1.1 Personal saving

A strong effect of funding on personal saving appears a priori unlikely to hold. Empirically, the countries where pension funds are most important—the United States and the United Kingdom—are also known for low personal saving. Indeed, in the UK there is thought to be a major Savings gap reflecting underestimation of saving needs for retirement (Davis 2004). There are also theoretical objections. The basic argument against any effect of funding on saving is that individuals choose a lifetime savings pattern separately from its distribution, so a rise in one component of wealth (such as pension funds) should be fully offset by falls elsewhere, either by reducing forms of discretionary saving or by borrowing. This offset will be particularly likely to occur when pension wealth and discretionary savings are close substitutes. Nevertheless, in principle, funding could generate increased saving via the following channels (for an overview, see Kohl and O'Brien (1998)):

³ See also Roseveare et al (1996).

- Illiquidity of pension assets may mean that other household wealth may not be reduced one-to-one when pension assets increase, because households do not see such claims as a perfect substitute for liquid saving such as deposits (Pesando 1992). This argument is supported by the fact that many pension laws prohibit pensioners from mortgaging their future pension benefits (Cifuentes and Valdes-Prieto 1997).
- There may be liquidity constraints whereby some households are not free to borrow. These may imply that any forced saving (such as pension contributions) cannot be offset either by borrowing or by reducing discretionary saving (Hubbard 1986).
- The interaction between the need for retirement income and retirement behaviour may increase saving in a growing economy, as workers increase saving to provide for an earlier planned retirement (Feldstein 1974).
- As unfunded social security is typically seen to reduce saving,⁴ because it implies an accumulation of implicit claims on future income, a switch toward funding of pensions should increase it (World Bank 1994, Feldstein 1977, 1995).
- There might be ‘recognition effect’ as people who witness the transition via pension reform from PAYG to funded systems realise the importance of saving for retirement regardless of whether they are directly affected. In other words, even for those who are given the option to stay in PAYG system and for whom the government honours previous benefits, such awareness regarding the pension crisis might encourage people to save more.
- Tax incentives that raise the rate of return on saving via life insurance or pension funds may encourage higher aggregate saving. (McCarthy and Neuberger 2004). This tax deferral arrangement is designed to encourage pension saving.

Note that there are counter arguments to a number of these points. For example, taxation provisions boosting rates of return will influence saving at the margin only for those whose desired saving is below that provided by social security and tax-favoured institutional saving. For those whose desired saving exceeds this level, the increased returns on saving⁵ will have an income effect but no offsetting substitution effect. Hence their saving will tend to decline.

As regards empirical work, on balance, research suggests that growth in funded pension schemes does appear to boost personal saving, but not one-to-one. A significant offset arises via declines in discretionary saving. Much of the literature is focused on the impact on household saving of the growth of U.S. defined benefit funds, and on balance it suggests an increase in personal saving of around 0.35–0.5 results from every unit increase in pension fund assets (Pesando 1992), though the cost to the public sector of the tax incentives to pension funds reduces the overall benefit to national

⁴However, analysts in countries such as Germany dispute this effect (Pfaff et al. 1979) and suggest that social security had no effect on saving.

⁵Note that increased returns may link not only to the tax concession but also to increased underlying returns on saving via institutions relative to the alternative.

savings to around 0.2. Hubbard (1986) suggests a larger effect on personal saving of 0.84, Gale (1997) rather less.

Effects would plausibly be less marked for defined contribution funds, in which the worker is more likely to be able to borrow against pension wealth and participation is generally optional. On the other hand, Poterba, Venti, and Wise (1995, 1996) suggest that 401(k) accounts in the United States have added to aggregate saving. Tax incentives are one important reason, but employer matching of contributions, payroll deduction schemes, and information seminars may also be relevant factors in encouraging net saving by this route. For example, for families accumulating both IRAs and 401(K) between 1987 and 1991, mean total financial assets increased from \$37,882 to \$44,432 while there was no decline in nonpension financial assets. But Hubbard and Skinner (1996) argue that findings by Poterba et al might be biased upward, and the actual contribution is positive but at a lesser extent. Similarly, Joines and Manegold (1995) finds that IRAs have raised saving in the United States (by around 0.25-0.3), while Attanasio and De Liere (1994) found that IRAs raise private saving by 0.2. Venti and Wise (1994) found that RRSPs (a kind of personal defined contribution pension) raises saving in Canada. In developing countries, estimates by Corsetti and Schmidt-Hebbel (1997) and Morandé (1998) find that the pension reform replacing pay-as-you-go with funding boosted saving in Chile; World Bank (1994) finds similar effects in Singapore. These effects may link to the prevalence of credit constraints for low-income households that would not otherwise have saved.

Unfunded social security appears to lower private saving in developing countries (Edwards 1995); Feldstein (1995) suggests that personal saving rises 0.5 for every unit decrease in U.S. social security wealth (and vice versa). Neumann (1986) gives similar estimates for Germany, and Rossi and Visco (1995) find a figure of 0.66 for Italy. Lower figures than Feldstein's, of 0.1-0.3, are found by other studies of the United States, such as Gale (1997), who found 0.11, and Hubbard (1986), who found 0.33; King and Dicks-Mireaux (1988) found 0.17 for Canada. Kohl and O'Brien (1998) argue that the displacement of private saving by pay-as-you-go is more likely, the more imperfect capital markets are.

A major empirical international study focusing on the link of pension fund assets to the saving rate has been conducted by Reisen and Bailliu (1997), who used data from 11 countries including both OECD and non-OECD nations. The empirical equation employed in that paper is a relatively simple single-equation panel regression model which allows for the influence of control variables, e.g. dependency ratio, real interest rate, etc as well as pension assets on saving. They give evidence that pension asset accumulation has positive and significant impact on private savings, but to a varying degree. For example, their estimations reveal that the impact is 8 times larger for non-OECD countries than OECD countries.

Given that financial liberalisation leads to a reduction in liquidity constraints, the effect of funding on saving may change after it takes place. It is plausible that there would be an effect of funding on saving before such liberalization owing to liquidity constraints as outlined above. This might disappear after liberalization. This may account for the Reisen-Bailliu differential between OECD and non-OECD countries, since the former are more likely to have liberalised financial markets. Furthermore, it is notable that the household sectors in countries with large pension fund sectors, such as Australia, the Netherlands, Ireland, the United States and the United Kingdom, have also been at the forefront of the rise in private sector debt in the 1980s and 1990s (see Debelle 2004). The familiar story underlying this is that rationing of household debt diminished following financial liberalization, which allowed households to adjust to their desired level of debt. But in the context of pre-existing accumulation of wealth via pension funds and high returns to pension assets, this adjustment could be partly seen to rebalance portfolios, thus entailing borrowing by households to offset earlier forced saving through pension funds.

On the other hand, even in a liberalized financial system, credit constraints will affect lower-income individuals particularly severely, as they have no assets to pledge and less secure employment. Therefore forced institutional saving will tend to boost their overall saving particularly markedly (for evidence, see Bernheim and Scholz (1992)). This point is of particular relevance in countries with compulsory private pensions, such as Australia, which could thus anticipate a rise in personal saving *ceteris paribus* (Edey and Simon 1996) and also in poorer countries such as Chile. There may also be a link to education; Gale (1995) indicates that the displacement of private saving by social security is twice as large for the educated as for the uneducated.

Bernheim and Shoven (1988) show that the development of defined benefit pension funds may change the volatility and relationship between saving and real interest rates, bearing in mind that both employers' and employees' pension contributions count as part of personal saving. Data from the United States show that a rise in real interest rates may reduce saving if it makes more defined benefit schemes fully funded by reducing liabilities more than assets, and hence reduces the need for contributions. There is also evidence for this in the United Kingdom in the 1980s. This pattern may itself give a further boost to market valuations, since it raises profits. Other sectors, of course, need to take up the shares for this boost in valuations to be realized. The decline of defined benefit funds in recent years means that this effect will be less marked in the future.

1.2 National saving

James (1996), the principal author of *Averting the Old Age Crisis* argues that one main advantage of World Bank multi-pillar model is that national saving as well as personal saving could be boosted. But the effect of pension fund growth on personal saving could be offset at the level of national saving by

the impact on public finances of the costs involved in the transition to a privately funded system (see Holzmann 1997b), as well as the costs of tax subsidies to personal saving.

A key aspect of this issue is how pension-reforming governments finance existing social security obligations. If the government tries to finance the implicit pension debts by public debts, then public savings would decrease, so the overall national saving rate might be unchanged or even fall (Cesaratto 2003). For example, a simulation study by Hviding and Merette (1998) gives evidence that debt-financed transitions may not have material effects on national saving and output; all that may happen is that the government has altered the form of the debt (Orszag and Stiglitz 1999). If such transition burdens are partly financed by tax, they are more likely to increase national saving as public saving would not decline significantly, other things being equal. But even tax-financed transitions may, according to some authors, have at most a small positive effect on national saving in the long term (Cifuentes and Valdes Prieto 1997).

Schmidt-Hebbel (1999a) estimated that pension reform in Chile raised the saving rate. Given the difficulty of pinning down how the pension reform was financed in Chile, Schmidt-Hebbel considers three cases, i.e. fiscal contraction financing of pension reform at the levels of 100%, 75% and 50%. Then with estimates of regression coefficients from two separate equations, one of which includes mandatory savings and the other without, as well as the hypothetical effects of 1984 tax reform on savings, Schmidt-Hebbel suggests that the rise in national saving could be explained by pension reform from 9.8% to 45%, with the remaining being explained by structural reform, e.g. tax reform etc. Holzmann (1997a) also gives evidence that aggregate savings in Chile grew with pension reform.

Samwick (1999), working with a panel of countries, finds that no countries except Chile experienced an increase in gross national saving rates after pension reform towards non-PAYG systems. The model used is based on the effects of contemporaneous and lagged reform dummies regressed on the residual of an equation for Gross national saving (GNS) as a percentage of Gross National Disposable Income (GNDI), where control variables are the log of per capita income, per capita income growth, the private credit to income ratio, population the old age dependency ratio, the young dependency ratio, the urbanisation rate and life expectancy. On the other hand, cross-section evidence, based on data of 1990 and averages of 1991-1994, suggest that countries with PAYG systems had lower saving rates than other countries. This finding is consistent with Orszag and Stiglitz's claim (1999) that it is entirely possible that the introduction of a PAYG scheme reduces national saving, but a shift to an individual account system does not necessarily increase national saving.

2 Wider impacts on financial markets

2.1 Pension Funds and Financial Development

Abstracting from the question whether pension reform indeed boosts saving, it is useful to also view pension reform more broadly as aiding financial development, which may also stimulate growth. As background we may cite extensive work that suggests financial development aids growth, and in particular that equity market development is a positive factor for growth (such as Demirgüç-Kunt and Levine (1996), Levine and Zervos (1998)). Underlying mechanisms include increasing liquidity and thus facilitating financing of long term, high return projects; increasing incentives to acquire information about firms; facilitating the tying of management compensation to share prices via stock options; and facilitating take-overs to resolve corporate governance difficulties. Demirgüç-Kunt and Maksimovic (1998) show that access to an active stock market also increases firms' ability to borrow at long maturities, especially in developing financial markets. Furthermore, access to a range of securities in domestic currency should limit the incentive for companies to borrow in foreign currency, which was a feature of the vulnerability exposed by the recent Asian crisis.

A quantitative impact of development of pension funds on capital markets, abstracting from potential increases in saving, must arise mainly from differences in behaviour from the personal sector. Pension funds in most cases hold a greater proportion of equities and bonds than households⁶. These differences can be explained partly by time horizons, which for households are relatively short, whereas given the long term nature of liabilities, pension funds may concentrate portfolios on long term assets yielding the highest returns. But given their size, pension funds also have a comparative advantage in compensating for the increased risk by pooling and diversifying across assets whose returns are imperfectly correlated, an advantage linked also to lower transactions costs for large deals and ability to invest in large indivisible assets such as property. Unlike banks, they tend to rely on more on public than private information in investment and hence seek relatively liquid assets. However, owing to economies of scale, specialisation, links to investment banks etc. their information may be typically superior to that of private individuals.

The implication is that even if saving and wealth did not increase, a switch to funding would increase the supply of long term funds to capital markets. There will be increases in the supply of equities, long term corporate bonds and securitised debt instruments and a reduction in bank deposits, so long as individuals do not adjust the liquidity of their portfolios to fully offset effects of growth of pension funds - and so long as the macroeconomic environment favours long term financing. A priori, one can argue that full offsetting is unlikely, especially if pension assets are defined benefit and/or implicitly substitute for highly-illiquid implicit social security wealth. Empirical work by King and Dicks-Mireaux (1988) found no such offset for Canada, while Davis (1988) obtained similar results for the G-5. Certainly there is a correlation in OECD countries between equity market capitalisation and the size of the pension fund sector. Simple estimation for the EU-15, the US, Japan and Canada gives a

⁶ Differences in portfolios link to a variety of factors, notably regulation and historical developments.

correlation of 0.97. In emerging markets, the activities of foreign investors may be relatively more important. Moreover, radical changes in financial structure - inconsistent with full offsetting - have been widely observed to accompany growth of funding, not least in Chile, as discussed below. More generally, the size and activity of equity markets and the number of listed companies differs little between the emerging markets with large institutional sectors and the OECD markets.

Concerning empirical work, Catalan et al (2000) seek to identify whether there is a Granger-causality relation between capital markets and contractual savings. They use two capital market indicators, stock market capitalisation and stock market value traded across 26 countries, among which 6 are developing countries. They give evidence that contractual saving institutions, e.g. pension funds, Granger cause capital market's development. The potential benefits of developing contractual saving sectors are, unsurprisingly, stronger for developing countries than for developed countries.

Such overall shifts to long term assets should tend to reduce the cost and increase the availability of equity and long term debt financing to companies, and hence may raise productive⁷ capital formation. Particularly for existing firms with small equity bases, there may be important competitive advantages to be reaped from equity issuance in terms of growth potential as well as reducing risks of financial distress in case of economic downturn; long term debt finance is correlated with higher growth for manufacturing firms (Caprio and Demirgüç-Kunt 1998). Economically, efficient capital formation could in turn raise output and "endogenously", growth itself, independently of a change in saving (Holzmann 1997a). Higher growth will feed back on saving. "Endogenous growth" effects of an increase in capital investment on labour productivity, 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 1997)⁸.

In this context, a panel study focused on 33 Emerging markets by Walker and Lefort (2002) finds that pension funds decrease dividend yield and increase price to book ratio, implying a drop in the cost of capital. This result is robust when pension funds are proxied by four sets of variables, i.e. a) dummy variable, b) share of stock in pension portfolio, c) pension investment in stocks and private bonds to total market capitalisation, d) pension fund assets to GDP. Other explanatory variables are inflation, per capita income, bank assets/GDP and dummy variable-region. But when they change their econometric specification by controlling for the degree of reform in different areas of the economy, the relation turns to insignificance.

⁷ This also requires allocation of funds to their most profitable uses and adequate shareholder-monitoring of the investment projects, which as detailed below should also tend to occur in capital markets dominated by pension funds.

⁸ One note of caution is that if governments force pension funds to absorb the significant issues of bonds that may be needed in a debt financed transition strategy, or if government issuance crowds out corporate issues, many of the benefits outlined will not be realised.

In terms of bond markets, IMF (1994) reports that in recent years, governments have tried to attract foreign pension funds by modernising the infrastructure of their public bond markets as well as facilitating private bond issuance. In a cross country study, Impavido et al (2003) find a positive relationship between contractual saving assets and bond market capitalisation/GDP, e.g. a 1 per cent increase in the former leads to 0.4 per cent rise in the latter. The generalised method of moments (GMM) dynamic panel model, developed by Arellano and Bond (1991) is used in their paper, which improves on earlier studies. On the other hand, they use the value of aggregate outstanding public and private bond issuance to proxy bond market development, when the former is driven by government needs. Second, separate regressions on developed and developing countries ought to be conducted, in order to discern whether such impacts of contractual savings are identical across countries. Third, differences of the long run and short run effects might be a concern of policy makers. Overcoming some of these issues, Hu (2004) shows that in a panel error correction model, growth of pension funds stimulates private bond finance, notably in developing countries both in the short and long run.

Besides inducing shifts to longer term assets, funding would also increase international portfolio investment. 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. On the other, it may be seen as beneficial to pensioners as volatility of returns could be reduced. In addition, it will forestall the point at which pension fund investment becomes so large as to face diminishing returns domestically. 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). This may in turn benefit growth since investment responds negatively to uncertainty (Carruth et al (2000), Byrne and Davis (2004)).

Besides the quantitative effects noted above, the development of pension funds is also likely to trigger *qualitative developments in financial markets*. That may benefit growth via better resource allocation. They are in general subject to positive externalities, as once instituted other investors may also benefit from them. One qualitative improvement is *financial innovation*, which early on in financial development may include equities per se, junior markets, corporate bonds, securitisation, CDs, derivative markets⁹ and indexed instruments. In OECD countries, pension funds' need for hedging against shortfalls of assets against liabilities has led to the development of a number of recent financial innovations such as zero coupon bonds and index futures (Bodie 1990). Similarly, immunisation strategies and the development of indexation strategies by and for pension funds has increased demand for futures and options.

⁹ On the development of derivatives exchanges in emerging markets see Tsetsekos and Varangis (1997).

Modernisation of the infrastructure of securities markets as required by pension funds should entail improved clearing and settlement on the one hand and provide more sensitive price information on the other, thus improving resource allocation. As a consequence it may help reduce the cost or increase the availability of capital market funds, and hence aid industrial development and growth *per se* as well as facilitating privatisations. In developing countries, pension funds' influence may be seen in terms of development of the overall market infrastructure (such as trading and settlement systems) and enhancement of liquidity. In OECD countries, given their focus on liquidity¹⁰ and lesser emphasis on investor protection, pension funds offer benefits to wholesale equity markets as opposed to heavily regulated retail markets (Steil 1996). They are footloose in their trading, and thus make the business of trading "contestable" rather than monopolistic, and facilitate its concentration. Increased pension-funding would raise the proportion of "wholesale" trading activity which would be willing to translocate. It would also put pressure on cartels in bond issuance and price fixing in equity trading.

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 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 are also stimulated to develop. Such improvements are crucial for financial development and growth more generally.

Development of equity markets and their dominance by pension funds would have implications not just for balance sheet structure - with potentially lower debt-equity ratios - but also for corporate governance, implying a greater degree of control by capital markets and pension funds (for a survey see Schleifer and Vishny (1997)). In this context, the "corporate governance movement" in OECD countries reflects dissatisfaction among pension funds with costs of the take-over mechanism, and preference for direct influence as equity holders on incumbent management (Davis 1995a, 2002). It also links to indexation by large funds, which seek to improve the performance of firms they have to hold, as well as more generally where pension funds are very large and cannot readily sell their participations without significant market movements against them. In practice, however, the scope of "direct influence" is limited in most emerging market countries; Brazil and South Africa are two exceptions.

There is a growing literature on the impact of corporate governance initiatives on performance, albeit mainly focusing on the effects on share prices *per se*. Positive results may be favourable to economic growth via efficiency gains. For example, on the positive side, Wahal (1996), in a sample of forty-three cases, found that efforts by institutions to promote organizational change via negotiation with

¹⁰ Liquidity may be less important where pension funds focus on buy-and-hold strategies, as in Chile.

management (as opposed to proxy proposals) are associated with gains in share prices. Strickland et al. (1996) report that firms that were targeted for pressure by the United Shareholders Association¹¹ experienced positive abnormal stock returns, although corporate governance proposals per se had no effect. On the negative side, Del Guercio and Hawkins found no evidence that activism had a significant effect on stock returns over the three years following the proposals. Gillan and Starks (1995) found some positive returns in the short term but no statistically significant positive returns over the long term, leading them to question the overall effectiveness of shareholder activism. Evidence from outside the United States on the effectiveness of corporate governance initiatives is sparse, but Faccio and Lasfer (2000) show that the monitoring role of UK pension funds is concentrated among mature and low-performing firms and that in the long run, the firms in which pension funds have large stakes markedly improve their stock returns.

All of these studies are based on micro evidence and hence only indirectly bear on the issue of whether pension funding affects growth. Davis (2002) undertook macro work based on the share of equities held by pension funds and life insurers. We would contend that the results are complementary to micro work if the view is taken that the effects of takeovers, institutional activism etc are not just apparent in the performance of targeted firms but also in the wider economy. This may plausibly be the case of managers of “unaffected” firms nonetheless change their behaviour in response to the threat of such action. We found results consistent with a disciplining role of institutions in the Anglo Saxon countries, particularly life insurers and pension funds. They exert restraint of investment, and lead to a boost to dividends and to Total Factor Productivity, while they are favourable to R and D. In the Anglo Saxon countries there is only a short term effect of domestic institutional holdings on volatility while in the bank dominated countries it may be more persistent. The trend for corporate use of equity to rise, for equity shares of institutions to increase, and for traditional corporate governance structures to break down in Continental Europe and Japan, suggests these results could hold there in the future as well as in emerging market economies.

2.2 Developments in Chile

Besides being typical of OECD financial markets with large pension fund sectors such as the UK and US (Davis and Steil 2001), a number of these phenomena highlighted in the section above are illustrated by the experience of Chile. It provides a testbed for the effects of pension reform on a relatively simple financial system.

Holzmann (1997a) points to the fact that Chilean pension funds grew from zero in 1980 to 39% of GDP in 1995. (The latest statistics from FIAP (2003) show that this figure was over 60 per cent as of 2002.) The same trend was found for financial assets, rising from 28 per cent of GDP to 68 per cent

¹¹ Note that this is actually a coalition of small investors rather than an pension fund per se.

from 1980 to 1993 (Fontaine 1997). Consequently, as of 2000, 65 per cent of government debts, 12 per cent of time deposits and bank bonds, 56 per cent of mortgage bonds, 40 per cent of corporate bonds and 7 per cent of equity were held by pension funds (Walker and Lefort 2002).

They may have played a major role in stimulating the rise in private saving observed over this period (Morandé 1998)¹². This accompanied an expansion of overall financial assets from 28% of GDP in 1980 to 68% in 1993 (Fontaine 1997), with pension assets accounting for a third of this total. Initially funds were 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 the early 1990s, closed companies were encouraged by high P/E ratios to go public and accept standard record keeping and auditing practices, thanks to better access to pension fund financing. In 1991 the pension funds held 1/3 of public bonds, 2/3 of private bonds and 10% of equities.

Holzmann (1997a) 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. Holzmann also estimates that long term growth in Chile is 1-3% higher owing to the effects of the pension reform operating via financial markets, although he also points out that the structuring of the transition may have played an important role¹³. EBRD (1996) show that pension fund growth was accompanied inter alia by rising stocks of corporate bonds, often placed direct by large companies into pension funds, the bond market having been improved by a new risk-classification industry. The life insurance sector grew to provide annuities as well as survivorship and invalidity reinsurance as required by the new system. And other investor groups such as mutual funds and foreign investor funds have emerged, increasing the diversity of market participants.

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 and the high domestic saving

¹² However, Holzmann (1997a) notes that the initial effect on private saving was low or even negative.

¹³ The tight fiscal stance may have contributed to economic performance by crowding in of private investment and offering a higher credibility to the reform programme within and outside the country.

that pension reform helped to stimulate, Chile is probably better insulated from the shifting behaviour of international investors, as witness the lower correction after the Mexican crisis than for other Latin American markets.

Hansell (1992) suggests development of pension 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. Corporate governance is improved by requirements that pension fund managers vote for independent directors. On the other hand, Chileans have been rather unsuccessful at ownership dispersion, one reason being unwillingness of closely held companies to accept dilution of control. Rating regulations have till recently prevented funds investing in start-up companies and venture capital.

Whereas the work noted above favours a causal role for Chilean pension funds in financial development, Uthoff (1993) argues that due to the existence of other accompanying factors, e.g. high and stable GDP growth, international capital inflows in Chile, it is difficult to draw a direct effect between pension funds and stock market development. Therefore, pension funds may have to some extent helped the financial development, but they are in general neither necessary nor sufficient (Singh 1996).

2.3 Potential costs of pension fund growth for financial markets

An aspect which could weaken the growth benefits of funding, is pension funds' direct effect on liquidity and price formation. In normal times pension funds, being willing to trade, having good information and facing low transactions costs, should tend to speed the adjustment of prices to fundamentals. It need hardly be added that such market sensitivity generates an efficient allocation of funds and acts as a useful discipline on lax macroeconomic policies. Again, the liquidity that institutional activity generates may dampen volatility, as is suggested by lower average share price volatility in countries with large institutional sectors¹⁴. And evidence on average day-to-day asset price fluctuations shows no tendency for such volatility to increase (Davis and Steil 2001).

Consistent with this, Walker and Lefort (2002) find that pension funds growth reduces security price volatility for 33 emerging market economies. They use 24 month annualised moving volatility as proxy of market volatility. Inflation is used to proxy macro-economic stability and bank assets to proxy financial development generally. Other independent variables include per-capital income, initial conditions and regions which are used to capture heterogeneity across countries. This negative link

¹⁴ This is not to deny that markets may be subject to forms of excess volatility relative to fundamentals, but that the scope of average volatility does not seem to be linked to institutionalisation

between pension funds and market volatility might be justified by the large investors' ability to access more information, thus restraining prices from deviating too far away from fundamentals.

In addition, Lakonishok et al (1991) give evidence that pension fund managers do not herd except in small stocks, and the hypothesis of positive relation between institutional holdings and share price movements does not hold, which might be due to the broad diversity of institutions' trading styles, which to a large extent, cancel out each other's effect. This result in fact is consistent with the words of BIS (1998): a financial system's stability depends on "the coexistence of participants with divergent objectives and mutually complementary behaviour."

But some evidence suggests funding may increase equity price volatility and thus may raise the cost of capital. At the level of idiosyncratic risk, Sias (1996) examined directly the relationship between the volatility of securities returns and the level of institutional ownership generally. He found a positive contemporaneous relation between institutional ownership and securities volatility after accounting for capitalization.¹⁵ Possible reasons for a linkage of higher volatility to institutional ownership may include larger average trade size of institutions, which may induce volatility by overwhelming market liquidity and the greater use of program trading by pension funds. It may also reflect a greater tendency for institutions to engage in noise trading or herding.

Another study at a market-wide level was conducted by Davis (2003) who used a data set covering both pension and life insurance assets across G-7 countries. His results suggest a positive link between equity price volatility and share of equity held by pension funds and life insurance across both Anglo-Saxon countries and Continental European countries and Japan (CEJ). He mentions, however, that such a link in the G-7 and Anglo-Saxon countries might be due to the shift in sectoral holdings of equities rather than institutional holdings per se.

Besides these average patterns, periodically some unfamiliar systemic risks may arise in institutionalised and securitised financial systems, about which regulators need to learn, and which will not be captured by econometric assessments depicting using long term average behaviour. One is extreme price volatility after a shift in expectations and asset allocations (such as the 1987 crash and ERM crisis), see Davis (1995b). Another is a protracted collapse of market liquidity and issuance after similar portfolio shifts (as for Russia/LTCM), see Davis (1994, 1999). Both may involve a threat to EMEs, banks and the non financial sector, and possibly to pension funds themselves given e.g. exposure to credit risk in real estate cycles. Both of these can give rise to costs to the wider economy from uncertainty and possible liquidity constraints on some borrowers. These "costs of financial

¹⁵ The adjustment is needed, since institutions focus on larger stocks; the result is that within each decile of size, the stocks most held by institutions are also the most volatile.

instability” can be detected both in terms of falls in investment (Davis and Stone 2004) and in consumption (Barrell, Davis and Pomerantz 2004).

Such periodic market-crisis events were characterised by features such as heavy involvement of pension funds in both buying and selling waves; international investment; signs of overreaction to the fundamentals and excessive optimism prior to the crisis; at times, inappropriate monetary policies; a shock to confidence which precipitated the crisis, albeit not necessarily sufficient in itself to explain the scale of the reaction; and rapid and wholesale shifts between markets, often facilitated by financial innovations. Such patterns have been part of the background for renewed discussion of capital controls in recent years. Underlying factors appear to be, crucially, influences on fund managers which induce herding behaviour (notably the prevalence of performance measurement¹⁶, due in turn to principal-agent incentive problems between the sponsor and the fund manager¹⁷). In countries such as Chile, 'herding' may also be stimulated by regulations which require pension funds to obtain similar returns.

Apart from equity market growth, the banking industry has been argued to be positively linked to economic growth and financial development, while pension reform may influence banks' role. A recent comparative study by Barth et al (2004) show that higher income countries are always accompanied by a larger banking industry as proxied by bank assets to GDP. For example, the average ratio of Bank assets/GDP for high income countries was 344 per cent, and this figure was 91 per cent, 80 per cent and 52 per cent for upper middle income, lower upper income and lower income countries respectively. Cross-country and panel studies on the issue of association between the banking industry and economic growth are extensively conducted by researchers, notably Beck and Levine (2004), and Beck et al (2000) etc. Among the commonly used banking indicators are bank assets to GDP, private credit provided by deposit money bank assets to GDP, commercial bank asset to central bank assets, etc. On balance, both standard cross-country and more recent panel analysis confirm a positive correlation between banking, finance and economy, allowing for not only the traditional determinants, GDP growth, initial school enrolment rate (Beck and Levine 2004), but also the legal origins (Beck et al 2003a), endowment indicators, religious composition, etc (Beck et al 2003b).

By leading to disintermediation, growth of pension funds is likely to entail increased competition for the banking sector. Besides increasing demand for capital market financing generally, disintermediation is facilitated in an institutionalised capital market because the scope of public as opposed to private information and the efficiency of its use by markets may be increased by the development of information technology and the related growth in influence of rating agencies,

¹⁶ It is important to add, however, that the "cure" (of seeking to reduce performance pressure) may be worse than the "disease" (potential for herding). An uncompetitive fund management sector without pressure from performance assessment may actually be "value deducting", investing in securities which do not minimise risk for given return and possibly investing client funds in a way which favours holdings of a parent institution (e.g. "front running").

¹⁷ See Scharfstein and Stein (1990), Froot et al (1990).

investment banks and credit assessors covering a wider range of firms. The traditional comparative advantages of banks in this area resulting from economies of scale in information gathering, screening and monitoring (Diamond 1984) may be eroded, even abstracting from price considerations.

Meanwhile on the liabilities side of banks' balance sheets, pension funds tend to be ready customers for repos, commercial paper and other money market instruments rather than bank deposits, thus undermining banks' comparative advantage in liquidity provision (Diamond and Dybvig 1983).

On the one hand such competition may lead to heightened efficiency of banks, thus aiding economic development. There are also complementarities in corporate finance between bank and market funding; and banks are essential components of capital market activity per se (as providers of collateral, clearing, settlement etc. services). By providing an alternative source of liquidity and long-term finance to banks, institutional and capital market growth helps the economy to diversify against the risks of banking problems ("multiple avenues"), see Greenspan (1999). Banks may respond to the associated pressure on their profits partly by increasing their focus on non-interest income – including asset management income per se, mutual funds and insurance – and reducing excess capacity by merger or branch closure.

Disintermediation, however, may also help to generate banking problems; the lessons of history from OECD countries suggest a need for vigilance, particularly if disintermediation coincides with deregulation and hence heightened competition within the banking sector (Davis 1995c). This is because, disintermediation historically led to increased risk-taking via aggressive balance sheet expansion (e.g. by lending to property developers) with risk premia which in retrospect proved to be inadequate¹⁸. Attention to shifts in the riskiness of banks portfolios, focus on capital adequacy and the issue of excess banking capacity are warranted by regulators in this context.

Some studies suggest indeed that low competition is best for financial stability. For example, Beck et al (2003c) with a dataset from 79 countries give evidence that countries with higher banking concentration are less likely to incur banking crisis. Allen and Gale (2004), however, argue that the nature of the trade-off between competition and financial stability is more complicated than was conventionally perceived. For example, they use 6 theoretical models to identify the relationship between competition and financial stability. Some models, e.g. a contagion model are consistent with the view of this trade-off relation, while others, e.g. a general equilibrium model, suggest the co-existence of perfect competition and financial instability to ensure optimal efficiency, thus denying the conventional view of trade-off.

¹⁸ It may be added that rapid economic growth and at times inappropriate monetary policy also played a role in this typical late 1980s pattern.

The above mentioned costs of financial instability are particularly marked for banking crises; estimates by Hoggarth and Saporta (2001) found that it takes 4.6 years in OECD countries but less in emerging market economies (3.3 years) before the economy returns to trend. They also found that cumulative output losses were much greater in OECD countries (23.8%) than in emerging market economies (13.9%). Banking crises alone cost 5.6% and twin crises¹⁹ 29.9%.

A related point, also implying decline of the banking sector is of concern, is that there is evidence that pension funds are reticent in *investing equity in small firms*, (i.e. there are limits to potential transfer of resources) despite the fact that their potential for innovation, growth and job creation is widely seen as crucial for economic growth²⁰. For example, Revell (1994) shows that in 1989, UK pension funds held 32% of large firms and only 26% of smaller ones. Sias (1996), shows that for the United States institutional holding of the largest firms on average over 1977-91 is over 47% and for the smallest, only 8%. The consequence of neglect of small firms by pension funds (assuming individual investors do not fill the gap) may be biases in the economy towards sectors with larger firms (for even if small firms can obtain bank loan finance, growth potential via debt is likely to be more restricted than with equity in addition). This may be contrary to the comparative advantage of the economy as a whole²¹. It suggests a need for venture capital funds, junior equity markets and appropriate pension fund regulation as well as an ongoing role for banks.

As is the case for excess volatility as outlined above, regular performance evaluation of pension fund managers by trustees is said to underpin *the short-termist hypothesis*, (entailing under-valuation of firms with good earnings prospects and willingness of funds to sell shares in take-over battles). This in turn is held to discourage long term investment or R&D as opposed to distribution of dividends, which would imply a suboptimal transfer and allocation of resources. Schleifer and Vishny (1990) provide an empirical model suggesting that short time horizons are an equilibrium property of capital markets, owing to the higher cost of long-term than short-term arbitrage²². Some recent empirical research seems to confirm the existence of short termist effects in the UK, with overvaluation of profits in the short term (Miles 1993). Evidence from a survey of US CEOs goes in the same direction (Poterba and Summers 1992) Against this, Marsh (1990) notes that in the absence of information relevant to valuations, excessive turnover will hurt performance of asset managers, and reaction to relevant information on firms' long term prospects, which itself generates turnover, is a key function of

¹⁹ Defined as cases where a currency crisis occurs within the period of the banking crisis.

²⁰ This tendency may link to illiquidity or lack of marketability of shares, levels of risk which may be difficult to diversify away, difficulty and costs of researching firms without track records and limits on the proportion of a firm's equity that may be held. The development and improvement of stock markets for small company shares is one initiative that may make such holdings more attractive to pension funds.

²¹ Of course, problems of equity provision to small firms are much more severe with book-reserve pension financing, which tends to preserve the existing industrial structure and not aid equity financing of new firms.

²² It is interesting to add that Von Thadden (1992) has noted that bank monitoring can in theory increase investment time horizons by enabling banks to detect at an early stage whether projects will be viable. This argument implies that a weakening of "relationship banking" may induce a further shortening of time horizons.

markets. High stock-market ratings of drug companies, with large research expenditures and long product lead times, would seem to tell against the short-termist hypothesis.

3 Pension funding and labour markets

Looking first at pension's effects on labour supply, due to the weak link between pension contributions and benefits under most PAYG systems, there is a tendency towards earlier retirement and job immobility. During 1950-1970, there was a very sharp fall in participation rate for those men over state pension age (65+) in EU countries (Disney 2002). For men aged 55-64, there was a sharp fall during 1970-1990, although this trend was less clear for women aged 55-64. One contributing factor regarding this low participation rate of the elderly in European countries is the disincentives imbedded in public pension systems (Blondal and Scarpetta 1998). In view of such problems, James (1998), the principal author of "Averting the Old Age Crisis", has written: "the close linkage between benefits and contributions, in a defined-contribution plan is designed to reduce labour market distortions." It also motivates the defined-contribution PAYG schemes recently introduced in some European countries.

An interesting case is the UK, where PAYG is not generous and defined benefit occupational schemes were historically dominant. Davis (2004) suggests that early retirement there to some extent reflects social preferences to retire early by those with occupational pension funds and the relative generosity of the public scheme of disability benefits. But it also reflects long term restructuring of manufacturing, where closure of firms has left many older workers with inappropriate skills, lack of demand in the local labour market, and/or unwillingness to accept lower pay than younger workers, even if they are less productive. These aspects interact with early retirement provisions of defined benefit occupational pension schemes. In some cases firms were seeking to avoid the large accrual of benefits in defined benefit funds close to retirement – but most commonly early retirement is used simply to deal with redundancy via voluntary severance, often on actuarially generous terms. Combined with the above discussion, it implies that it is the type of pension (defined benefit or defined contribution) and not the funding per se that has an impact on labour supply.

Beattie and McGillivray (1995), however, note that during the 1980s in Sweden where a very generous defined-benefit social security was provided, there was a higher participation rate for population aged 60-64 in Sweden than France and Germany²³. Although this example is not sufficient to invalidate the argument that PAYG induces less labour supply, as there might be other driving forces in this case (James 1996), it does indicate the complexity of the relationship between PAYG and labour markets. Moreover, this issue could become more complicated if we assume that the final

²³ A recent simulation study, however, does indicate that if the generosity of social security systems is reduced by abolishing early retirement program in Norway, participation rates for both males and females will increase by 5 per cent (Haugen et al 2002).

aim of pension systems is not to enhance labour supply but to increase social welfare (Orszag and Stiglitz 1999; Barr 2000). Therefore, if the utility gains from earlier retirement exceeds the corresponding costs resulting from less labour supply, defined benefit PAYG –related schemes are still welfare improving, thus desirable. The counter case is that this argument might be correct but early retirement is very costly to the economy; Herbertsson and Orszag (2003) estimate that even if the current participation rate of the elderly does not decrease any further, the cost of early retirement across OECD countries would be 9.1 per cent of GDP in 2010, up from 5.3 per cent in 1980.

Regarding the issue of job mobility, a recent empirical work by Disney et al (2003) shows that UK pension reform in the 1980s and 1990s was closely and positively linked to job mobility, i.e. people who opt out of occupational pension schemes (largely DC plans) and switch to personal pensions are more mobile than those who do not. But it might be the reason that those switching to personal pensions were mobile anyway.

The underlying theory of how PAYG systems affect the demand side of labour market is that employers view PAYG contributions as one form of payroll tax, so they tend to replace labour recruitment with capital investment, therefore reducing labour demand. Disney (2003) argues that public pension contributions can affect not only labour supply as we discussed in previous section, but also the demand for labour. The underlying rationale is that in the non-competitive product market the employee can pass through the burden of their pension contribution to consumers for example via product prices thus reducing the demand for labour given a lower demand for the product if the labour market is not fully competitive and unions play an important role in setting wages. Employers are typically also obliged to contribute on behalf of employees, and they normally view such contribution as extra taxes, impacting on labour demand, although they might be able to reduce wages and thus contributions if the labour market is competitive. This contribution's impact on labour demand will be marked in advanced countries with generous PAYG systems, but is likely to be less obvious when such taxes are not large, which is most likely when the population is young and only relatively small proportion of whole population are elderly dependents.

4 Funding and growth

Work that looks directly at the relationship of funding to growth (i.e. not indirectly via saving, financial development or labour market performance, is relatively sparse. Barr (2000) argues that there are three steps whereby funding could induce economic growth; First, pension reform leads to higher saving rate; this result is mixed as we showed in Section 1. Second, the higher saving is translated into more productive investment (which requires allocative efficiency, notably via financial development, see Section 2). Third, that investment results in increase in output. He argues that all of these three

links do not necessarily hold. On the other hand, we have argued that funding can also induce growth via improved market efficiency and incentives operating outside the saving-investment nexus.

A tentative empirical study by Holzmann (1997a) indicates a positive relationship between pension reform and economic growth in Chile. With the simple Solow residual specification of Total Factor Productivity (TFP), it is found that improving financial markets conditions following the pension funds reform significantly positively affect TFP. But this model suffers from low t values which might result from high multicollinearity between independent variables, e.g. unemployment rate and stock market index.

Meanwhile, Schmidt-Hebbel (1999b) reaches the conclusion that pension reform in Chile boosted private investment, the average productivity of capital and total factor productivity (TFP). One single regression is estimated to obtain the coefficients of parameters, then these coefficients are used to calculate the rise of each variable attributed to structural reform, (e.g. tax reform) and pension reform. In all, he concludes that pension reform in Chile had a positive impact on the private investment rate, average productivity of capital and TFP growth rate. For example, pension reform contributed to 0.1-0.4 per cent of the 1.5 per cent increase in TFP growth rate, while 0.4–1.5 per cent of the total 13 per cent rise in private investment rate was attributed to pension reform with the remainder being explained by structural reform.

A simulation study on 7 OECD advanced countries by Hviding and Merette (1998) shows that fundamental pension reform, (i.e. gradual removal of public old-age pensions) has more impact than parametric reform, (i.e. a 20 per cent reduction in the replacement rate). For example, for the United States, per capita GDP could increase 3.6 per cent per year in the long run under the fundamental pension reform, while the figure is 0.6% if under the parametric reform.

A tentative study by Davis (2002) found an insignificant direct effect of institutional assets – including pension funds, life insurer and mutual funds - on economic growth for 16 OECD countries, although the size of the banking industry was found to be positively linked to economic growth, consistent with Beck and Levine (2004). The equation Davis employed is the standard 5-year average economic growth model (King and Levine 1993 and Beck et al 2000), where explanatory variables include bank lending/GDP, stock market turnover, institutional assets/GDP, equity market capitalisation/GDP and as a variant the share of institutions in financial assets . One of the potential problems associated with Davis's specification, however, is that other variables, e.g. initial level of income which have potential explanatory power are omitted.

Hu (2004) looks at the impact of both pension reform and growth of pension fund assets on growth directly, as well as indirectly via saving and productivity growth. He empirically analysed two

relationships, first that between pension reform towards the World Bank model and economic growth, and second that between pension fund assets and economic growth. The logic of separating between reform and asset growth is that reform may have a signalling effect on expectations before assets are built up. Also some reforms do not generate assets (e.g. defined contribution PAYG).

Regarding the impact of reform, data from 59 countries showed pension reform is negatively linked to such growth indicators as total factor productivity (TFP) and investment (as well as saving) in the short run and positively in the long run. This nonlinearity relationship is in line with work by Packard (2003) and it might be argued that people need time to get used to the dramatic change to the public pension systems. For example, it often takes a few years to persuade people to convert to private systems, i.e. after they are confident about the new system. Then asset accumulation could be raised, therefore e.g. increasing domestic savings. This finding, however, is less robust for OECD countries than for emerging market economies.

Concerning a link from pension fund assets to economic growth indicators, covering 35 countries, a contemporaneous estimation (for 5 Year averages 1981-2000) favours a strong positive link between pension assets and TFP. A direct effect (additional to that via financial development) might link to lesser labour distortions following pension reform (Disney and Whitehouse 1999) and pension funds' increasing participation in corporate governance, thus improving corporate performance at the firm level and economic productivity on the macro level. Estimation results for investment and growth per se are ambiguous and not significant. A further regression for growth over 1996-2002 based on initial pension fund assets in 1996 is successful in terms of all three indicators. This positive link is further strengthened by panel Granger causality tests where the hypothesis of homogenous non-causality is rejected and that of homogenous causality could not be rejected, which implies that pension assets Granger-cause economic growth across both OECD countries and EMEs.

Davis and Hu (2004) used a dataset covering 38 countries to investigate the direct link between pension assets and growth, using the framework of a modified Cobb-Douglas production function with the inclusion of pension assets/GDP as a shift factor akin to urbanisation in McCoskey and Kao (1999). A co-integrating relationship was found between pension assets, the capital stock and output where pension funds and output are positively related. In addition, impulse response tests in the related Vector-Error-Correction-Mechanism show that a rise in pension assets boosts output per worker initially and then follow a gradual decline, but during the whole specified period, the effect remains positive. The positive effect on output per worker of a shock to pension assets is larger in EMEs and also remains significant for longer. Furthermore, a positive average long run relationship between pension assets and output across four countries is suggested by dynamic heterogeneous models (Pesaran and Smith 1995) estimated with the same dataset.

Conclusions

This chapter has focused on the issue of whether a shift from PAYG to funding is largely an accounting matter concerning the allocation of the burden of ageing, or whether funding improves economic performance. We have addressed several aspects to this question. One is whether funding leads to an increase in saving which permits higher capital formation. A second is whether, independently of the impact on saving, there are effects of funding which lead to higher economic growth, for example via more efficient capital and labour markets. A third is whether a direct impact of funding on growth can be discerned. We have shown that empirical work favours a positive but limited influence of pension funds on saving. There is stronger evidence of wider impacts on capital markets and corporate behaviour that could have an indirect impact on growth. Evidence of a direct impact on growth is mixed but effects detected on investment and TFP are suggestive that it is on balance positive.

REFERENCES

- Allen, F. and D. Gale; (2004); Competition and Financial Stability; Journal of Money, Credit and Banking; forthcoming.
- Arellano, M. and S. Bond; (1991); Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations; The Review of Economic Studies; Vol. 58; pp277-297.
- Attanasio O and De Leire T (1994), "IRAs and household savings revisited; some new evidence", Working Paper No 4900, National Bureau of Economic Research
- Barr, N.; (2000); Reforming Pensions: Myths, Truths, and Policy Choices; IMF Working Paper WP/00/130; international Monetary Fund.
- Barrell R, Davis E P and Pomerantz O (2004), "Costs of financial instability, household-sector balance sheets and consumption", NIESR Discussion paper
- Barth, J. R., G. Caprio and D. E. Nolle; (2004); Comparative International Characteristics of Banking; Working paper WP2004-1; Office of the Comptroller of the Currency; Washington, D. C.
- Beattie, R. and W. McGillivray; (1995); A Risky Strategy: Reflections on the World Bank Report Averting the Old Age Crisis; International Social Security Review; Vol. 48 No 3-4.
- Beck, T., A. Levine and N. Loayza; (2000); Finance and the Sources of Growth; Journal of Financial Economics; Vol. 58; pp 261-300.
- Beck, T. A. Demirguc-Kunt and R. Levine; (2003a); Law and Finance: Why Does Legal Origin Matter? Journal of Comparative Economics.
- Beck, T. A. Demirguc-Kunt and R. Levine; (2003b); Law, Endowments and Finance; Journal of Financial Economics, Vol 70.
- Beck, T. A. Demirguc-Kunt and R. Levine; (2003c); Bank Concentration and Crises; Working Papers; World Bank, Washington.
- Beck, T. and R. Levine; (2004); Stock markets, Banks and Growth; Panel Evidence; Journal of Banking and Finance; Vol 28; pp423-442.
- Beck, T., A. Levine and N. Loayza; (2000); Finance and the Sources of Growth; Journal of Financial Economics; Vol. 58; pp 261-300.
- Bernheim, B.D. and Scholz, J.K. (1992), "Private saving and public policy", National Bureau of Economic Research Working Paper No. 4213.
- Bernheim B D and Shoven J B (1988), "Pension funding and saving", in eds. Bodie Z, Shoven J B and Wise D A, "Pensions in the US economy", University of Chicago Press.

- BIS; (1998); Sixty eighth annual report; Chapter V: asset prices and the asset management industry; Bank for international settlement ,Basel.
- Blondal, S. and S. Scarpetta; (1998); The Retirement Decision in OECD Countries; Economics Department Working Papers No. 202; OECD, Paris.
- Bodie, Z. (1990), "Pension funds and financial innovation", *Financial Management Autumn 1990*, 11-21.
- Byrne, J.P. and Davis, E.P. (2004). Investment and uncertainty in the G7. forthcoming, *Weltwirtschaftliches Archiv*
- Caprio G and Demirgüç-Kunt A (1998), "The role of long term finance; theory and evidence", *World Bank Research Observer*, 13, 171-189
- Carruth A., Dickerson A. and Henley, A. (2000). 'What do we know about investment under uncertainty?' *Journal of Economic Surveys*, Vol. 14, pp. 119-153.
- Catalan, M., G. Impavido and A. R. Musalem; (2000); Contractual savings or stock market development: which leads? *Social Protection Discussion Paper Series No. 0020*; The World Bank.
- Cesaratto, S; (2003); Three Obstacles to the Transition from Unfunded to Funded Pension Schemes; Working Paper No.382; *Universita degli Studi di Siena, Chile*.
- Cifuentes R and Valdes Prieto S (1997), "Pension reforms in the presence of credit constraints", in ed. Valdes-Prieto S "The economics of pensions", Cambridge University Press.
- Corsetti G and Schmidt-Hebbel K (1997), "Pension reform and growth", in ed. Valdes-Prieto S "The economics of pensions", Cambridge University Press.
- Davis, E.P. (1988), "Financial market activity of life insurance companies and pension funds", *Economic Paper No. 21*. Bank for International Settlements.
- Davis E P (1994), "Market liquidity risk", in eds. Fair D. and Raymond R., "The Competitiveness of Financial Institutions and Centres in Europe", Kluwer Academic Publishers
- Davis, E.P. (1995a), "Pension Funds, Retirement-Income Security and Capital Markets, an International Perspective", Oxford University Press.
- Davis E P (1995b), "Institutional investors, unstable financial markets and monetary policy", in ed. F Bruni, D Fair and R O'Brien "Risk management in volatile financial markets", Kluwer, Dordrecht.
- Davis E P (1995c), "Debt, financial fragility and systemic risk, revised and expanded version", Oxford University Press.
- Davis E P (1999), "Russia/LTCM and market liquidity risk", *The Financial Regulator*, 4/2, Summer 1999, 23-28
- Davis E P (2002), "Institutional investors, corporate governance, and the performance of the corporate sector", *Economic Systems*, 26, 203-229
- Davis, E. P.; (2003); Financial development, institutional investors and economic performance; presented at the meeting of the British Association; Salford University, September.
- Davis E P (2004), "Is there a pensions crisis in the UK?", *Geneva Papers on Risk and Insurance*, 29, 343-370
- Davis E P and Hu Y (2004), "Is there any link between pension fund assets and economic growth? - A cross-country study", mimeo, Brunel University.
- Davis E P and Steil B (2001), "Institutional Investors", MIT Press
- Davis E P and Stone M (2004), "Corporate financial structure and financial stability", forthcoming IMF Working Paper and in *Journal of Financial Stability*
- Debelle G (2004), "Macroeconomic implications of rising household debt", *BIS Working Paper No 153*
- Del Guercio D and Hawkins J, (1999), "The motivation and impact of pension fund activism", *Journal of Financial Economics*, 52, 293-340
- Demirguc Kunt, A. and Maksimovic V. (1998), "Law, finance and firm growth", *Journal of Finance*, 53, 2107-37.
- Demirgüç-Kunt A and Levine R (1996), "Stock market development and financial intermediaries; stylised facts", *World Bank Economic Review*, 10, 291-321.
- Diamond, D (1984), "Financial Intermediation and Delegated Monitoring", *Review of Economic Studies*, 51, 393-414

- Diamond, D, and Dybvig P (1983), "Bank Runs, Deposit Insurance, and Liquidity", *Journal of Political Economy*, June, 401-19
- Disney, Richard (1996). "Can we afford to grow older?". MIT Press.
- Disney, R; (2002); Retirement, Pension Costs and Tax Policy in Europe; June; Presented at Retirement Policy, Reykjavik, Iceland.
- Disney, R; (2003); Are public pension contributions a tax on employment? Presented at the fourth annual conference of CeRP, Turin; September 16.
- Disney R. and E. Whitehouse; (1999); Pension Plans and Retirement Incentives; Axia Economics. <http://www.axiaecon.com/Newret5.PDF>
- Disney, R, C. Emmerson and S. Smith; (2003); Pension Reform and Economic Performance in the 1980s and 1990s; Working Paper; NBER.
- EBRD (1996), "Transition report 1996", European Bank for Reconstruction and Development, London.
- Edey M and Simon J (1996), "Australia's retirement income system; implications for saving and capital markets", Working Paper No. 5799, National Bureau of Economic Research
- Edwards S (1995), "Why are saving rates so different across countries?", NBER Working Paper No. 5097
- Faccio M and Lasfer M A (2000), "Do occupational pension funds monitor companies in which they hold large stakes?", *Journal of Corporate Finance*, 6, 71-85
- Feldstein, M. (1974), "Social security, induced retirement and aggregate capital accumulation", *Journal of Political Economy*, 82, 902-956.
- Feldstein M (1977), "Social security and private saving; international evidence in an extended life cycle model", in ed M Feldstein and R Inman "The economics of public services", International Economic Association.
- Feldstein, M. (1995), "Social security and saving, new time series evidence", NBER Working Paper No. 5054.
- FIAP, 2003; www.fiap.cl. International Federation of Pension Funds Administration.
- Fontaine J A (1997), "Are there good macroeconomic reasons for limiting external investments by pension funds? The Chilean experience", in ed. Valdes-Prieto S "The economics of pensions", Cambridge University Press.
- Froot K.A., Scharfstein D.S., and Stein J.C. (1992), "Herd on the Street: Informational Inefficiencies in a Market with Short-Term Speculation", *The Journal of Finance*, 47, 1461-84.
- Gale W (1997), "The effect of pension wealth; a re-evaluation of theory and evidence", Brookings Institution, Washington DC
- Gillan S L and Starks L T (1995), "Relationship investing and shareholder activism by institutional investors", University of Texas Working Paper
- Greenspan Alan , (1999) "Do efficient financial markets mitigate financial crises?", speech to the Financial Markets Conference of the Federal Reserve Bank of Atlanta, 19 October 1999.
- Greenwald B C and Stiglitz J E (1990), "Information, finance and markets, the architecture of allocative mechanisms", Working Paper No. 3652, National Bureau of Economic Research.
- Hansell S (1992), "The new wave in old age pensions", *Institutional Investor*, November 1992, 57-64
- Haugen, F., E. Hernas and S. Strom; (2002); Pension Systems and Labour Force Participation in the Nordic Countries; in *Social Security Reform in Advanced Countries: Evaluating Pension Finance*; ed. Ichori, T. and T. Tachibanaki; Routledge; London and New York.
- Herbertsson, T. T. and M. Orszag; (2003); The Early Retirement Burden: Assessing the Costs of the Continued Prevalence of Early Retirement in OECD Countries; June; Watson Wyatt Technical Reports 2003-LS04.
- Hoggarth, G. and V. Saporta; (2001); Costs of Banking System Instability: Some Empirical Evidence; *Financial Stability Review*; Bank of England, London.
- Holzmann, R.; (1997a); "Pension Reform, Financial Market and Economic Growth, Preliminary Evidence from Chile"; *International Monetary Fund Staff Papers*; June; International Monetary Fund, Washington.
- Holzmann, R. (1997b), "On economic benefits and fiscal requirements of moving from unfunded to funded pensions", *European Economy Reports and Studies*, 4/1997, 121-166

- Hu Y (2004), "Pension Reform, Economic Growth and Financial Development- An Empirical Study", mimeo, Brunel University
- Hubbard, R.G. (1986), "Pension wealth and individual saving, some new evidence", *Journal of Money Credit and Banking*, 18, 167-178.
- Hubbard, R. G. and J. S. Skinner; (1996); Assessing the Effectiveness of Saving Incentives; *The Journal of Economic Perspectives*; Vol. 10; No. 4 pp73-90.
- Hviding, K. and M. Merette; (1998); Macroeconomic Effects of Pension Reforms in the Context of Ageing Populations: OLG Model Simulations for Seven OECD Countries; *Economics Department Working Papers NO. 201*; OECD, Paris.
- Iglesias (1998); The Impact of Pension Reform on Capital Markets; the Chilean Experience; Presented at the Conference "Capital Market Development in Emerging and Transition Economics: Trends and Challenges", Washington.
- IMF (1994), "International Capital Markets Report", International Monetary Fund, Washington DC.
- Impavido, G., A. R. Musalem and T. Tressel; (2003); The Impact of Contractual Savings Institutions on Securities Markets; *World Bank Policy Research Working Paper 2948*; January. The World Bank.
- James, E.; (1996); Providing Better Protection and Promoting Growth: A Defence of Averting the Old Age Crisis; *International Social Security Review*; Vol. 49 No 3.
- James, E.; (1998); Pension Reform: An Efficiency-Equity Tradeoff? In *Beyond Tradeoff*; ed. Nancy Birdsall, Carol Graham, and Richard Sabot; *Brookings Institution Press*; Washington. Cited by Orszag and Stiglitz (1999).
- Joines D H and Manegold J G (1995), "IRA and saving; evidence from a panel of taxpayers", mimeo, University of Southern California.
- King, M.A. and Dicks-Mireaux, L. (1988), "Portfolio composition and pension wealth: an econometric study", in eds. Bodie, Z., Shoven, J.B., and Wise, D.A.. *Pensions in the US economy*. University of Chicago Press.
- King, R.G. and Levine, R. (1993), "Finance and growth, Schumpeter might be right", *Quarterly Journal of Economics*, 108, 713-737.
- Kohl, M. and P. O'Brien; (1998); The Macroeconomics of Ageing, Pensions and Savings: A Survey; *Economic Department Working Paper No. 200*; OECD, Paris.
- Lakonishok, J., A. Shleifer and R. Vishny; (1991); Do institutional investors destabilize stock prices? Evidence on herding and feedback trading; *Working Paper No. 3846*; NBER.
- Levine, R. and S. Zervos, (1998), "Stock markets, growth and economic development, *American Economic review*, 88, 537-58.
- Marsh, P. (1990), "Short-termism on trial", *Institutional Fund Managers Association*, London.
- Masson, P., Bayoumi, T. and Samiei, H. (1995), 'International evidence on the determinants of private saving', *IMF Working Paper No. W95/51*
- McCarthy, D. and A. Neuberger; (2004); *Pensions Policy: Evidence on Aspects of Savings Behaviour and Capital Markets*; Centre for Economic Policy Research; London.
- McCoskey, S. and C. Kao; (1999); Testing the Stability of a Production Function With Urbanization as a Shift Factor; *Oxford Bulletin of Economics and Statistics*; Vol. 64; pp671-691.
- Miles, D.K. (1993), "Testing for short termism in the UK stock market", *Bank of England Working Paper No.4*.
- Morandé F G (1998), "Savings in Chile; what went right?", *Journal of Development Economics*, 57, 201-228
- Neumann, M. (1986), "Moeglichkeiten zur Entlastung der gesetzlichen Rentenversicherung durch kapitalbildende Vorsorgemassnahmen", *Univ. Tuebingen*.
- Orszag, P. R. and J. E. Stiglitz; (1999); Rethinking Pension Reform: Ten Myths About Social Security Systems; Presented at the conference on "New Ideas About Old Age Security"; *The World Bank*; September 14-15.
- Packard, T. G.; (2001); Is There a Positive Incentive Effect From Privatising Social Security? A Panel Analysis of Pension Reform in Latin America; *The World Bank*.
- Pesando, J.E. (1992), "The economic effects of private pensions", in *Private pensions and public policy*. Organisation for Economic Co-operation and Development, Paris.
- Pesaran, M. H. and R. Smith; (1995); Estimating Long-run Relationships from Dynamic Heterogeneous Panels; *Journal of Econometrics*; Vol. 68; pp79-113.

- Pfaff M, Huler R and Dennerlein R (1979), "Old age security and saving in the Federal Republic of Germany", in ed. G M von Furstemberg, "Social security and private saving", Ballinger, Cambridge, Mass.
- Poterba, J., S. Venti and D. Wise; (1995); Do 401(K) Contributions Crowd Out Other Personal Savings; *Journal of Public Economics*; Vol. 58; pp 1-32.
- Poterba, J., S. Venti and D. Wise; (1996); How retirement savings programs increase savings; *Journal of Economic Perspectives*; Vol. 10; pp91-112.
- Poterba, J.M. and Summers, L.H. (1992), "Time horizons of American firms; new evidence from a survey of CEOs", Harvard Business School.
- Poterba, J.M., Venti, S.F., and Wise, D.A. (1996), "Personal retirement saving programmes and asset accumulation; reconciling the evidence", NBER Working Paper No. 5599.
- Reisen, H. and J. Bailliu; (1997); Do Funded Pensions Contribute to Higher Aggregate Savings; A Cross-Country Analysis; OECD Development Centre Technical Papers No. 130; OECD, Paris.
- Revell, J. (1994), "Institutional investors and fund managers", *Revue de la Banque*, 2, 55-68.
- Roseveare, D., Leibfritz, W., Fore, D. and Wurzel, E. (1996), 'Aging populations, pension systems and government budgets: simulation for 20 OECD countries', Economics Department Working Paper No. 168, OECD, Paris.
- Rossi N and Visco I (1995), "National savings and social security in Italy", *Temi di Discussione del Servizio Studi*, Banca d'Italia, Rome.
- Samwick, A. A.; (1999); Is Pension Reform Conducive to Higher Saving? November; The World Bank.
- Scharfstein D S and Stein J C (1990), "Herd behavior and investment", *American Economic Review*, 80 465-479.
- Schleifer A and Vishny R W (1990), "Equilibrium short term horizons of investors and firms", *American Economic Review*, 80, 148-53
- Schleifer A and Vishny R W (1997), "A survey of corporate governance", *Journal of Finance*, 52, 737-83.
- Schmidt-Hebbel, K.; (1999a); Does Pension Reform Really Spur Productivity, Saving and Growth; The World Bank.
- Schmidt-Hebbel, K.; (1999b); Chile's pension revolution coming of age; The World Bank.
- Sias R W (1996), "Volatility and the institutional investor", *Financial Analysts Journal*, March/April 1996, 13-20.
- Singh, A.; (1996); Pension Reform, the Stock Market, Capital Formation and Economic Growth: A Critical Commentary on the World Bank's Proposals; *International Social Security Review*; Vol. 49 No 3.
- Steil, B. (1996). (ed.). "The European Equity Markets, the State of the Union and an Agenda for the Millennium", The Royal Institute of International Affairs, London.
- Strickland D, Wiles K W and Zenner M (1996), "A requiem for the USA, is small shareholder monitoring effective?", *Journal of Financial Economics*, 40, 319-38
- Tsestekos G and Varangis P (1997), "The structure of derivatives exchanges, lessons for developing and emerging markets", World Bank Policy Research Paper No. 1867.
- Uthoff, A. W.; (1993); Pension System Reform in Latin America; in *Finance and The Real Economy*; ed. Y. Akyuz, G. Held, ECLAC, UNCTAD, UNU; Santiago, Chile. Cited by Singh (1996).
- Von Thadden E-L (1992), "The commitment of financing, duplicated monitoring and the investment horizon", WWZ Discussion Paper No. 9207, University of Basle.
- Venti S F and Wise D E (1994), "RRSPs and savings in Canada", paper presented at a conference "Public policies that affect private saving", OECD, Paris, 19 May 1994
- Wahal S (1996), "Public pension fund activism and firm performance", *Journal of Financial and Quantitative Analysis*, 31, 1-23.
- Walker, E. and F. Lefort; (2002); Pension reform and capital markets: are there any (hard) links? Social Protection discussion paper No. 0201; January; The World Bank.
- World Bank (1994), "Averting the old age crisis; policies to protect the old and promote growth", The World Bank, Washington DC.