

Ageing and Financial Stability

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Abstract: Although the precise details are subject to major uncertainty, it seems likely that the process of population ageing will involve major shifts in financing, which may give rise to financial turbulence and systemic risk. The locus and scale of these effects will also depend on the predominant approach to retirement income provision. It is argued that the financial-stability risks arising from continuing with unsustainable pay-as-you-go systems would be more threatening than those arising from funding. Fiscal crises can have incalculable consequences for private financial markets, while pension funding involves more an adaptation by regulatory authorities to a more securitised and institutionalised financial system, that is likely to develop in any case. Concerning policy, for social security, the key issue is reform, so that the fiscal difficulties and their consequences for financial stability foreshadowed above do not arise. For institutional investors involved in funding, policy issues arising include the need for prudent person asset regulation, absence of guarantees generating moral hazard and international diversification of institutional portfolios, so that they are less dependent on the performance of the domestic economy than would otherwise be the case. Banks would not be immune to the side-effects of the various patterns ageing will generate, and an awareness of such risks as well as firm prudential supervision is essential to both institutions and supervisors.

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Introduction

This article reviews some of the potential pitfalls for systemic financial stability that may arise from the process of population ageing in coming decades. Although the issues are of global relevance, they will most directly affect OECD countries such as those in the EU. We draw on the extant theoretical and empirical literature on ageing and financial instability, including projections of the macroeconomic effects of ageing and experience of recent financial crises. Our focus is largely on the forms of widespread financial instability that may affect the macroeconomy, in line with the following definition of systemic risk “a sequence of events entailing heightened risk of a financial crisis, where a financial crisis is seen in turn as ‘a major and contagious collapse of the financial system, entailing inability to provide payments services or to allocate funds for investment’”².

Beyond its systemic consequences, such financial turbulence could certainly also entail risks to retirement income security for individuals. However, such individual risks are not central to our discussion, not least because risks to retirement income security go much wider than situations characterised by financial instability in this sense. Notably, individual risks in pay-as-you-go schemes are broadly political (that the “contract between generations” will not be honoured) while retirement incomes from funded schemes depend strongly on average capital market returns and the efficiency of annuities markets (Miles 1999)³. The lack of understanding among members of the public of the best approach to financing retirement, including the appropriate level of saving, may in itself aggravate retirement risks in private systems (Mitchell and Bodie 2000), although some outstanding risks may be ameliorated by feasible financial innovations, such as a reverse mortgage system.

The article is structured as follows: In the first section we provide a framework for assessing financial instability. In the second, we outline the projected patterns of ageing, while in the third and fourth we briefly trace the likely macroeconomic and financial-market consequences of ageing. In section five we go on to consider some of the potential outworkings of the process that may give rise to systemic risks. These may be divided into a number of subcategories, including financial stability issues arising from the macroeconomic trends anticipated from ageing, the financing difficulties of pay-as-you-go pensions, precautionary saving by the population as it ages in the presence of unsustainable pay-as-you-go schemes, risks for financial stability arising from the growth of institutional investors and the difficulties that may arise from the pattern of asset accumulation during funding.

There is a considerable element of uncertainty in many of the risks of instability, although we seek wherever possible to base them in existing experience of financial turbulence – not least those of Japan which have some links to rapid ageing in that country⁴. More generally, it is important to note at the outset that the effects of ageing on national financial systems are themselves highly uncertain, not least because they will be influenced

² An issue arises as to whether the definition should include the mispricing of financial assets. We suggest that though this may accompany a financial crisis, the failure of payments and of allocation of funds are the defining features. Arguably, mispricing of financial assets is quite common (eg in asset bubbles, exchange rate misalignments and mispricing of credit risk) without entailing a financial crisis, or even systemic risk, whereas failure of payments and of credit allocation are only seen in a crisis. Mispricing may nonetheless be part of the overall pattern that builds towards a crisis.

³ Generally, the differing risks to which pay-as-you-go and funding are subject suggest a need for retaining elements of both systems as a means of diversification.

by as yet unknown future reforms (e.g. reducing the benefits from pay-as-you-go systems), and fiscal or regulatory changes (e.g. taxation of the assets of funded schemes). Due to this strong element of uncertainty to outcomes for individual countries, our main focus is on global issues and on generic aspects that will occur to differing degrees in different countries. In particular, we distinguish effects likely to arise in countries dependent on pay-as-you-go, which finance the burden of ageing by taxation; those arising in countries dependent on pay-as-you-go, which use bond issuance, and countries which pre-fund pensions in private markets⁵.

Meanwhile, in setting out the potential pitfalls for financial stability that could arise specifically from ageing, it is important to add that other causes of financial instability are unlikely to fade from view. Among the most important may be those arising from intense competition in liberalised and securitized financial markets, where agency problems are important and there are mispriced government guarantees (see Davis 1995a).

1 Indicators of financial instability

As a preliminary to analysis of possible systemic risks linked to ageing, it is useful to set out some elements of a framework for analysing and seeking to predict periods of financial instability. This is set out in detail in Davis (1999a). We suggest that many of the strands of the theory of financial instability have a contribution to make to our understanding of financial crises (see also Mayer (2000) and articles summarised therein), but that the explanations are in most cases partial. In our view, a selective synthesis drawing on the evidence of actual crises is the correct approach to adopt. The relevant theories include those of:

- "debt and financial fragility", which suggests that over indebtedness, asset price booms and banking crises are a normal feature of the cycle (Fisher (1933), Kindelberger (1978), Minsky (1977));
- "monetarist" that bank failures impact on the economy via a reduction in the supply of money (Friedman and Schwartz 1963);
- "uncertainty" as opposed to risk as a key feature of financial instability, linked closely to confidence, and helping to explain the at times disproportionate responses of financial markets in times of stress (Shafer 1986);
- "disaster myopia" that competitive, incentive-based and psychological mechanisms lead financial institutions and regulators to underestimate the risk of financial instability (Guttentag and Herring (1984), Herring (1999));
- "asymmetric information and agency costs" that these well-known market failure of the debt contract help to explain the nature of financial instability e.g. credit tightening as interest rates rise and asset prices fall (Mishkin 1991), or the tendency of lenders to make high risk loans owing to the shifting of risk linked to agency problems (Allen and Gale 1999. 2000);

and complementing these,

⁴ Brooks (2000) points to the exceptional ageing of the Japanese population since 1950, related to the decline in the birth rate after WW2. This has meant, for example, that the youth dependency rate has declined from 60% in 1950, the highest in the OECD, to 23% in 2000, which is the lowest.

⁵ Note that we do not assess separately the effects of publicly managed funding initiatives (see Davis 1998).

- "bank runs" that panic runs on banks (which may follow the various stimuli identified by the above theories) link to the maturity transformation they undertake, and the relatively lesser liquidity of their assets (Diamond and Dybvig 1983)⁶; such theory can also be applied to failures of securities market liquidity (Davis 1994, 1999b);
- "herding" among institutional investors as a potential cause for price volatility in asset markets, driven e.g. by peer-group performance comparisons, that may affect banks and other leveraged institutions (Scharfstein and Stein 1990, Davis and Steil 2001);
- "industrial" that effects of changes in entry conditions in financial markets can both encompass and provide a supplementary set of underlying factors and transmission mechanism to those noted above (Davis 1995a).

It is also recognised that *inadequacies in regulation* may heighten⁷ tendencies to take excessive risks. Mispriced "safety net" assistance generates moral hazard, which if not offset by enhanced prudential regulation may lead to heightened risk taking (McKinnon and Pill 1997). This pattern may be particularly threatening as developments such as deregulation and increased competition reduce franchise values (Keeley 1991). Moreover, lenders in the interbank market may not have the correct incentives to discriminate between banks (by price or quantity rationing) and discourage risk-takers (Bernard and Bisignano 2000).⁸

There is also a need for consideration of the *role of international capital flows*. Traditionally, the focus of the literature on exchange rate crises (Krugman 1991) has been on the possible gains from speculation against a depreciation of a fixed parity, given the size of the nation's foreign exchange reserves and various fundamental factors, notably the net external asset position and the balance of payments. Some models suggest that such a process is akin to bank runs described above. The contribution of international capital flows to recent crises and their international transmission introduce a number of additional elements:

- the issue of exchange rate pressure, resisted by the authorities via interest rate increases, which may trigger or aggravate financial instability;
- complications introduced by the financing of the public or private sector in foreign currency, which makes balance-sheet positions sensitive to exchange rates, and leads to a potential link from depreciation in the context of a currency crisis to more general financial instability;
- the increasing role of institutional investors as a conduit for capital flows. As they are under severe pressure to perform in line with peers, they are particularly likely to "herd" into rising markets and to seek rapid withdrawal from falling markets, destabilising domestic financial markets and exchange rates (Davis 1995c);
- a possible link of contagion where there are cross-country similarities in trade patterns (Glick and Rose 1998).

⁶ Note that such "runs" lead to a contraction in the money supply, in line with the monetarist view, if the depositors seek cash, but not if they "run" to "safer" banks.

⁷ Risks can arise from agency problems independently of the safety net (Allen and Gale 1999).

⁸ In the case of excessive regulatory protection, "excessive competition" can arise despite knowledge by lenders of the true probabilities of cyclical shocks and even the distribution of disastrous outcomes. Institutions may as a consequence hold inadequate capital on a risk-adjusted basis.

In Davis (1999a) we assess the indicators of financial instability that can be derived from these theories (so called “*macroprudential indicators*” or MPis) in the light of experience of financial crises both in the banking sector and in securities markets (see also IMF (2000)). In advance of crises, common generic patterns include:

- Unanticipated regime shifts towards laxity on the part of monetary, fiscal or regulatory authorities (including “financial liberalisation”)
- Easing of conditions for new entry of intermediaries to the relevant market
- Debt accumulation leading to heightened leverage (economy wide, by individual sectors or in individual markets)
- Asset price booms (be it property or security prices)
- Financial innovation (and rapid growth of the markets concerned)
- Concentration of risk on the part of financial institutions (implying excessive optimism in respect of potential “correlations”)
- Declining capital adequacy of financial institutions
- Monetary tightening or unanticipated regime shifts towards rigour on the part of monetary, fiscal and regulatory authorities.

Of course, many of these features have occurred separately without entailing a crisis, and indeed are part of the normal functioning of a market economy. It is their combination and acuteness that is crucial to the occurrence of financial instability.

A number of econometric studies have examined shorter-term quantitative macroeconomic and financial developments prior to banking crises, offering complementary MPis. For example, Kaminsky and Reinhart (1999) examined 20 small, open economies from 1970-95, to assess macroeconomic variables whose behaviour is systematically different in the period prior to banking and currency crises. Whereas in the 1970s, before widespread financial liberalisation, there was no close link between currency and banking crises, in the 1980s and 1990s there were clear interrelations, with banking sector problems often beginning before currency crises, while the latter often deepen the banking crisis. As regards indicators, both currency and banking crises were preceded by recession, declines in the terms of trade, stock market crashes, real exchange rate appreciation, prior lending booms, increases in the money multiplier, and increases in real interest rates.

Demirguc-Kunt and Detragiache (1998a), estimated a multivariate logit model of banking crises only, using data from a sample of 53 developing and developed countries over 1980-94. They again pinpointed low economic growth as well as high inflation as key macroeconomic indicators of the probability of financial crises. High real short-term interest rates – often implemented in the context of a need to bring inflation under control - were also associated with systemic banking problems, as well as vulnerability to balance of payments problems (proxied by an adverse terms-of-trade shock) and to sharp capital outflows (ratio of M2 to foreign exchange reserves). Explicit deposit insurance schemes made crises more likely, pointing to a link to moral hazard in the context of the safety net. Finally Hardy and Pazarbasioglu (1998) sought to identify only leading indicators by looking only at lagged variables in their logit estimates and also seeing the pre-crisis year as a separate event from the crisis, focusing on data from 38 countries from 1980-97. They found that banking distress is associated with a sharp fall in GDP growth; boom-bust cycles of inflation, credit expansion and capital inflows; rising real interest rates and

an increasing incremental capital output ratio; declining bank deposits; a sharp fall in the real exchange rate, declining imports and an adverse terms-of-trade-shock.

In the rest of the article, we shall seek evidence and hypotheses for a potential effect of ageing on instability in the light of these mechanisms and indicators, as well as considering whether systemic risk might take a different form from that observed in the past.

2 The ageing problem

OECD countries have all witnessed an increase in life expectancy and a decline in the birth rate in recent decades. These have already given rise to an aging population, with a high proportion of the population currently in the high saving age groups (around 45-65) and also an increasing burden of dependents relative to the population of working age. The higher life expectancy is, the longer individuals expect to live after retirement and the greater the need for retirement income. As Table 1 shows, the life expectancy at birth in the G7 countries has risen from around 72 to 78 between 1970 and 2000. Life expectancy in Japan is now 81. Underlying these patterns are better health care, medical advances, and improved overall living standards.⁹

Except in the US, there has also been a decline in birth rates since 1970, which has reduced the size of the younger generations who would otherwise borrow and offset the saving of their older counterparts (see Table 2). In 2000, there were exceptionally low fertility rates¹⁰ (of below 1.5) in Germany, Italy, and Japan, while the rate in France, Canada, and the UK was around 1.7 and that in the US was 2.1. Only in the US is the fertility rate sufficient alone (i.e., without immigration) to generate a stable population. Underlying the decline in fertility is a pattern of later marriage and greater activity of women in the labour market, which has increased the opportunity cost of having children, as well as more general social and attitudinal changes.¹¹ Reflecting the decline in fertility, the generation born in the EU in the 1970s is 17% smaller than that of the 1960s, and the 1980s generation is 25% smaller.

In all of the G7, as well as the rest of the EU, the retirement of this baby boom generation offers a general problem for the macroeconomy and a particular challenge to systems of retirement income provision. For all demographic projections for OECD countries show a continuation and intensification of the ongoing process of aging in the future. Table 3 shows that the demographic shift will be particularly marked in the years from 2010 onward. Whereas in 1990, the average G-7 elderly¹² dependency ratio was around 21%, it is expected to rise to over 25% in 2010 and 40% in 2030. In Germany and Italy, the elderly dependency ratio will be over 45% in 2030. The aging of the population is also anticipated in the US, but the level expected in 2030 remains somewhat lower than that in the rest of the G-7 and the EU. There is also expected to be an increasing proportion of very old individuals, who may need additional, and costly, health care as well as pensions. The share of young

⁹ Accompanying these is a pattern of early retirement, thereby also lengthening the potential retirement period (Davis 1997).

¹⁰ Fertility rates indicate the number of children born to an average woman over her lifetime.

¹¹ Davis (1997) notes that the highest fertility rates among EU countries today are in Scandinavian countries, which provide comprehensive and subsidized child-care facilities, thus spreading the burden of childcare from the family to the economy as a whole.

¹² The elderly dependency ratio is the ratio of those over 65 to those 15-64.

dependents is expected to be flat, but they tend to be less costly than the old.¹³ The total dependency ratio (including those under age 15 and over age 65 in the numerator) will be over 70% in 2030 in Germany and Italy, according to these projections.

3 Consequences of ageing for the macroeconomy and pension systems

3.1 The principal effects of ageing on the macroeconomy

A useful starting point in assessing the potential links from the above patterns of ageing to financial stability is to consider the potential impact of ageing on growth, saving and investment at a macroeconomic level. Our aim in this section is not to provide any novel results, but rather to offer a brief survey of the relevant literature so as to provide a benchmark for assessment of financial effects.

As regards *growth*, it is widely considered that it will decelerate as ageing proceeds, principally because of lower labour force growth (see, for example, Turner et al (1998)). There will also be lower growth in living standards (i.e. GDP per head) than has been the case in recent decades, reflecting the accompanying increase in the dependency ratio. Effects on growth of a fall in labour force growth are unlikely to be offset by higher *investment*. Indeed, investment is likely to decline given a lesser need for capital widening, while capital deepening is likely to be limited by diminishing returns. Moreover, slower growth will tend to reduce returns on capital directly, thus again putting downward pressure on investment – the example of slower Japanese output and investment growth since 1970 and accompanying lower returns to capital may be cited in this context. On the other hand, higher labour force participation could help to underpin growth. Another unknown factor in this context is the response of *productivity* to ageing. It is suggested by Disney (1996) that there is no link detectable from ageing to productivity, implying investment rates will be crucial to growth¹⁴, not least given possible “endogenous” links from investment to productivity.

An important element in assessing *private saving* is the view taken of the life cycle hypothesis, which postulates initial dissaving in young adulthood, followed by saving for retirement and finally dissaving in retirement. Most estimates of the determination of saving based on macro evidence imply that this pattern holds, implying that an older population will save less. For example Masson and Tryon (1990) find an elasticity of 1 from the dependency ratio to the savings rate using pooled cross-section and time series data for industrial countries, although later work by Masson et al (1995) reduced this estimate to 0.14. Pure cross section studies such as Horioka (1991) find estimates of around 0.76 for this elasticity. The implication is that ageing will sharply reduce saving. An example may be the decline of saving in Japan in the 1980s accompanying ageing (although this was reversed in the 1990s, as discussed below). On the other hand, the micro evidence based on household survey data is much more equivocal, suggesting that older people continue to save, albeit at a lower level. Such comparisons are made more difficult by the existence of behaviour that is peculiar to cohorts (Disney 1996).

¹³ Heller et al. (1986) accordingly estimate that social expenditures will rise in the major industrial countries even if savings in education and family benefits are taken into account.

¹⁴ Some authors suggest ageing slows technical progress as innovation becomes less profitable with a shrinking market for capital goods and owing to the lesser dynamism of an ageing population (Wattenberg 1987). In contrast, Cutler et al. (1990) suggest that innovation increases as labour gets scarce.

Accordingly, Börsch Supan (1996), for example, finds net effects of the dependency ratio on saving are close to zero.

Public saving is largely driven by the scale of the public pension system in the light of ageing and the means of financing adopted (e.g. taxation versus debt finance). As the population ages, the public sector will tend to lower its saving, *ceteris paribus*. Rapid increases in the proportion of the population over 65 (the dependency ratio) combined with generous social security pension schemes are particularly threatening. The issue is well summarised in Tables 46 from Roseveare et al (1996) and Chand et al (1996), which show projections of expenditures for pay-as-you-go pension schemes. Such pressures will be enhanced by increased public health expenditures, albeit partly offset by lower expenditure needs on education (Turner et al 1998). If unsustainable increases in contributions or in public debts are to be avoided, there is a need for reform of social security pension schemes in many countries, which may involve a combination of lower benefit rates and higher retirement ages in social security systems.

The *system of retirement income provision* may impact on growth and private saving as well as on public saving. Concerning growth, the argument is that pay-as-you-go, if contributions are perceived as a tax, tends to distort labour markets. On the other hand, funding, by removing such distortions as well as increasing the efficiency in allocation of capital funds, and long term saving, may enhance prospects for economic growth (see for example Börsch-Supan and Tinios 2001). It may also boost saving itself, although there are likely to be high levels of substitution from discretionary saving which mitigate the overall effect (see the survey in Kohl and O'Brien (1998)). An element of funding of pensions will also allow diversification of risk by investment outside the domestic economy.

Concerning private saving, there is some evidence for the US and in international cross-section (Feldstein (1974, 1977, 1995)) that unfunded social security pensions reduce private saving. This can be justified theoretically by a life-cycle framework, whereby a guarantee of income to maintain consumption after retirement gives rise to a form of implicit wealth accumulation, and the need to save during the working life is lessened.¹⁵ Underlying this approach is a view that workers see contributions as a form of saving and not as a tax, and that confidence is maintained in the promises of pay-as-you-go. As the population ages and the size of unfunded liabilities increases, the negative effect on private saving could increase sharply (unless the effect is offset by increasing uncertainty over whether pension promises will be kept). Feldstein's results have been disputed (for a review, see Munnell (1987)), and other evidence suggests that the effect, even if negative, may be small, for example because social security induces early retirement, which gives incentives to save more to cover the longer retirement period, or because changes in intra-family transfers (e.g. bequests) may have offset the increase in public-sector transfers, thus leaving the need for old-age saving identical (Barro (1974)).

What happens to private saving when there is a reform and funding replaces pay-as-you-go? Countries with generous pay-as-you-go social security tend to have low levels of private pension provision (see Table 7, which uses total institutional investment as a proxy for private pensions). This suggests potential substitution. Disney (2000) offers some evidence that reform of public pension systems may have the effect of boosting private

¹⁵ A further mechanism inducing lower saving under pay-as-you-go social security is that those who are myopic and would otherwise have continued working till they die are now able to retire.

saving, also highlighting a study of Italy (Attanasio and Brugiavini (1999)) which shows strong results in support of the hypothesis. This supports the case made by World Bank (1994), the conditions under which funding will have a positive effect on private saving - namely, myopia, limited access to credit, and lack of credibility of the pensions scheme - are precisely those whose absence will lead pay-as-you-go to reduce private saving. So a switch from pay-as-you-go to funding is unambiguously likely to raise private saving.

Even in the absence of reform, one positive effect on private saving that may accompany pay-as-you-go where confidence in future benefits is weak is a high level of precautionary household saving. Analysts suggest that this has already been typical of Japan (see Nakagawa 1999), where surveys suggest that the recovery in the savings propensity in the 1990s partly reflected an increase in uncertainty¹⁶ about pension systems among young households while the old households felt anxiety about nursing care and hence sought to save more than any other age groups even in the last stages of their life cycle¹⁷. There is also anecdotal evidence of such effects in EU countries. Moreover, if there is debt finance of pension liabilities, there may be interactions between private and public saving owing to “Ricardian” effects whereby private saving responds positively to public dissaving, as individuals look ahead to the taxes needed to repay government debt.

3.2 Projections of growth, saving and investment

A number of projections of growth, saving and investment patterns in response to ageing have been produced in recent years by international organisations and analysts. Viewed with caution, these help to give some benchmarks of likely financial flows, that experience has often shown to be closely linked to the likelihood of instability. A key detail usually omitted from such calculations, but crucial for the purposes of the current exercise, is the composition of the flows in terms of instruments. We will comment on this issue further in Section 4.

Turner et al (1998) provide a simulation of the global effects of population ageing (both focusing on changing population growth and age structure) using the OECDs international dynamic general equilibrium macromodel MINILINK. Reflecting the declining labour supply with ageing, economic growth is forecast to decline to 0.25% per annum in Japan, 1% in Europe and 1.4% in the United States by around 2030. Pressures on saving and investment arise, first, from the slowdown in growth which reduces investment needs directly. Second, a decline in the weight of the OECD in the world economy tends to improve OECD current accounts (and hence saving-investment balances) as non-OECD imports rise faster than OECD import demand. The US, Europe and Japan all generate balance of payments surpluses of 2-3% of GDP up to 2025, thus building up net external assets which help to buttress GNP. On the other hand, eventual downwards pressures on public and private saving are greater in the OECD than elsewhere, generating – in combination with exchange rate appreciation – deficits for the three OECD regions after 2025. As world investment in this simulation falls less than saving, world real interest rates are expected to rise slightly, reinforcing the decline in investment. Reflecting differing returns on

¹⁶ The issue of uncertainty is verified in the Nakagawa results by survey responses. Oyama and Yoshida (1999) find a similar result – albeit for different kinds of uncertainty - including the error on a first order GARCH model in income in the consumption function.

¹⁷ The rise in saving was not seen as solely age related. The middle aged and elderly low income households felt anxiety about employment conditions given the economic situation (Nakagawa op cit), and in

capital, interest rates are higher in EMEs than in the OECD. The authors note that higher saving in OECD countries could generate quite different results, with lower real interest rates and consequently higher investment and capital-labour ratios. There would also be greater net external assets, boosting OECD GNP via inflows of interest, profits and dividends¹⁸. As we noted above, some limited boost to saving could be anticipated from a switch from pay-as-you-go to funding.

Masson and Tryon (1990) use the IMF's global econometric model MULTIMOD in a similar manner to assess the combined effect of ageing (measured by changes in the population age structure) on private saving, public deficits and overall production. Production is again assumed to link to the labour supply, i.e. the size of population of working age times the participation ratio. The main cost to the economy from ageing arises from lower labour force growth and consequent declines in output relative to base, notably in Japan and Germany, while real interest rates in the OECD rise by 3-5% in 2020, as investment exceeds saving. Their model generates large falls in national saving in Germany and Japan from 2000 onwards, as both private and public sectors reduce their saving, while in the US, France, Italy and the UK the net effect is positive for some decades, with increased private saving more than compensating for a rise in the fiscal deficit. The difference in private saving links to the differences in demographic profiles, with more high-saving individuals remaining in the population of the latter countries. As is the case for Turner et al (1998), the model includes endogenous tax rises which rise with the social security burden rather than assuming fixed contribution rates to social security.

Börsch-Supan (1996) concludes that until around 2010, demographic effects will increase private sector saving, given positive saving of the elderly and the baby-boom generation being in the high-saving period. He envisages flat investment/GDP, implying changes in the net balance of supply and demand for funds will be driven largely by the government sector. In a "worst case scenario", where government run sizeable deficits to cover pension expenditures, substantial shortfalls are envisaged in the overall balance after 2005.

Unlike the above, most other studies have tended to be partial and focus on individual countries or private or public saving only. For example, Roseveare et al. (1996) assess two scenarios for saving patterns, which differ in the size of the assumed negative effect of the dependency ratio on saving, and on the degree of Ricardian equivalence when government deficits increase. They see private saving as a proportion of GDP across all OECD countries falling 3-6 percentage points between 2000 and 2030, depending on the scenario, and national saving declining by 8 to 16 percentage points, given debt financing of pension expenditures (i.e. fixed contribution rates) and assuming a partial Ricardian response of private saving to government dissaving. In France, Austria, Denmark and Finland, net national saving is forecast to be negative in 2030 in both scenarios. As noted by Turner et al (1998), negative national saving seems unlikely in the light of positive national investment, given the large balance of payments deficits that would be implied. Changes in interest rates and exchange rates – omitted from the simulation – would be likely to occur, helping to equilibrate saving and investment.

particular the downward revision to growth after the collapse of the financial bubble of the 1980s. Of course, the view that the pension system is unsustainable may also have strengthened as economic growth fell in the 1990s.

¹⁸ The return on such investments will depend on factors such as labour and product market reforms in the EMEs as well as the overall size of such flows from the OECD (if the flows are sufficiently sizeable, they will depress the return on capital in the EMEs).

Looking at private saving in the EU, Miles and Patel (1996) suggests that as long as the ‘baby boom generation’ remains in the labour force an increase in private saving should be expected, building to a maximum of 2.5 percentage points in 2020, after which saving declines as individuals retire. The rise in private saving would over this period be more than enough to offset changes in government saving. Their projection is based on estimates suggesting a life cycle view of saving is warranted, whereby assets are accumulated at different rates over the working life rather than a simple coefficient on the proportion of elderly people, as for Masson’s work quoted above.

Bikker (1996) focuses on balance-of-payments effects of ageing and concurs with the general equilibrium studies that the effects in OECD countries may be towards a surplus as long as national saving is boosted by ageing, which seems possible as long as the ‘baby boom’ generation remains at work. But once people in this generation retire and begin to dissave, there could be balance-of-payments problems.

Besides saving, the amplitude of shifts in the balance of payments will also depend on the path of investment; in line with simulations noted above, most studies suggest that investment rates will fall, which would temper the increase in external deficits. For example, Cutler et al (1990) suggest that total investment may fall with ageing, given the reduced need for capital widening with a smaller workforce; they also envisage a fall in the rate of return on capital from 6.7% in 1990 to 3.5% in 2025. Disney (1996) shows a significant negative relationship between the dependency ratio and fixed capital growth over 1977-92 in 24 OECD countries. Blommestein (1998) again sees falling investment as likely to occur as the labour force shrinks and the capital labour ratio rises, depressing returns to new investment.

4 Financial market effects of savings patterns

In the context of these growth and saving/investment patterns, the ageing of the population will have an important impact on financial markets, which we seek in this section to trace in terms of supply and demand for individual instruments. We defer discussion of shifts in prices and yields to Section 5.

In the case of pay-as-you-go, we have seen that confidence in the system may reduce private saving. More likely in the medium term, and consistent with the simulations cited above, is that private saving may rather be boosted by deteriorating confidence in social security. In countries where private pension funds are not extensive, these savings may be invested in either life insurance contracts and mutual funds (as in Europe) or mainly in bank deposits (as in Japan). They may also be sunk into real estate. As in Japan at present, such savings may well be reinforced by Ricardian effects as and when governments run large deficits (at which point saving may also flow into government bonds). We shall argue below that such precautionary saving could trigger financial instability independently of the flows occurring either directly via pay-as-you-go or pension funding.

The simulations suggest that there will indeed in due course be a sharp increase in the supply of government bonds, as governments start to run deficits to cushion the effects of ageing on contribution rates. Initially, private saving may be sufficient to finance such deficits. But even if precautionary and Ricardian effects continue to operate, the retirement of the “baby boom” generation implies that public deficits will eventually be accompanied by balance of payments deficits. Hence, part or all of the demand for government debt has to be

found offshore. Given the pattern of ageing and hence lowering of government saving is anticipated to be common across OECD countries, a significant part of such demand would have to emanate from emerging market economies (EMEs). Alternatively, if pay-as-you-go is financed in a strict balanced-budget manner, the implications for financial instruments will be less direct. In effect, it will depend on (possibly negative) effects on personal saving arising from a high level of taxation, as well as from the decline in private saving likely to accompany ageing more generally.

There will also be effects on financial markets when pensions are largely funded. During the transition phase as the working population ages while accumulating for retirement, there will be considerable demand for securities, notably in the form of equities (where regulations permit) and bonds. Given the contrasting portfolios of institutional investors and households, and the evidence of a lack of offsetting shifts in portfolios when institutional investment increases (King and Dicks-Mireaux 1988), relative demand for deposits is likely to decline. Over time, there will be a shift within demand for securities from equity to bond-related instruments because the growing maturity of pension schemes, and the increased demand for annuities per se would necessitate holding of shorter duration assets.

Such flows arising from funding will again not be purely domestic, to the extent that ageing occurs at different rates in different countries. Reflecting desire for diversification, it seems likely that there will be considerable gross capital flows between OECD countries and from OECD to EME countries during this phase, in the form of bond and equity finance. These are likely to exceed considerably the amplitude of net flows (i.e. arising from saving-investment imbalances and consequent balance of payments disequilibria), see Reisen (1998)¹⁹.

When an increasing proportion of the population retires and begins to live on the accumulated assets, domestic demand for securities in OECD countries could fall sharply. There would also be withdrawal of financing from EMEs. Schieber and Shoven (1994) point out that decumulation is an ineluctable process for defined benefit pension funds, and suggest that they will cease to contribute to US net saving around 2024. They note however that this effect is unlikely to occur for defined contribution funds in the foreseeable future. Given the need to finance annuities, demand for equities would fall more than demand for bonds (Brooks 2000). Poterba (1998) focuses on extant information on age-specific asset holdings (excluding defined benefit pension funds), corrected for cohort effects in order to evaluate this issue. He concludes that asset demands may indeed rise as households age, and notes that surveys suggest that there is a decline in risk tolerance at ages over 65, but suggests that there is less evidence of a downturn in asset holdings at the end of the life cycle. He thus considers that a sharp fall in demand for securities is unlikely to arise in coming decades²⁰.

Even if there were to be net decumulation of securities by OECD investors, global demand will also depend on the degree to which other countries, e.g. in the Far East or Latin America, experience slower demographic ageing and thus provide a countervailing factor in the context of globalised financial markets. Note however that

¹⁹ Reisen (1998) points to both the offsetting patterns of saving and the diversification benefits arising from EMEs as helpful in ensuring adequate returns on OECD pension funds that invest in EMEs, not least in the light of the tendency for returns in OECD countries to fall in coming decades. Blommestein (1998) on the other hand, points to the low returns and high risks of EMEs, in combination with increasing correlations with the OECD markets, which suggest that EME investment is not a panacea.

²⁰ He admits however that his analysis fails to cover defined benefit pension funds.

maintaining global demand for securities would require them not only to substitute for capital inflows from OECD countries, but also to generate substantial surpluses to cover declines in demand for securities in OECD countries themselves.

5 Effects on systemic risks

There are a number of potential financing issues that may be envisaged in the wake of the above-mentioned trends, which may give rise to financial turbulence. These may be divided into, respectively, risks arising from the overall macroeconomic development, the difficulties of pay-as-you-go, the risks arising from the manner of funding via institutional investors, and the risks arising from the above-mentioned pattern of asset accumulation during funding. We consider that the dangers arising from “no reform” are much more severe than those likely to arise from funding, where the latter largely require a readjustment on the part of regulators to a change in the locus of risk rather than a dramatic increase in its level. Note however that given the need to finance the transition, a country reforming a generous social security system and shifting to funding will not entirely escape some of the difficulties outlined for pay-as-you-go.

5.1 Risks arising from the overall macroeconomic development

If the predictions of an initial rise in private and national saving relative to investment are correct, then from the perspective of a country that faces relatively rapid²¹ ageing, risks may initially arise from a balance of payments surplus which leads to an appreciating currency and loss of competitiveness by domestic industry, generating credit losses by lending institutions (Japan in the 1980s being a possible example). Such losses could be especially marked if ageing is at the same time putting downwards pressure on economic growth rates and returns on physical capital.

Exchange rate appreciation in this period may be aggravated by the degree of home bias among investors. Uncertainty over the future course of the investment-saving balance can lead to heightened perceptions of currency risk which enhances such home bias, and puts further upward pressure on the exchange rate. This case is particularly made for Japan during the past two decades, in which the linkage between currency risk and home bias was strong due to the following perceptions by domestic savers and institutional investors; (a) the heterogeneity of its society from other countries -- this is partly reflected in limited labour movements into and out of Japan (b) the size of savings inflows are considered too big to be absorbed in a diversified way in foreign markets.

Later there could be balance of payments deficits as national saving diminishes, with the possibility of currency crises occurring if exchange rate fixity is sought to be maintained. The scope of such problems will also depend on the asset-liability position of the country – arguably a deficit is less likely to cause a currency crisis when there remain net foreign assets, and correspondingly the private sector is not exposed to currency movements via

²¹ Balance of payments effects would be attenuated if all OECD countries were to “age” simultaneously, but projections suggest this will not be the case.

foreign currency borrowing²². While currency crises are not themselves of systemic concern, they tend to be closely linked to banking crises, as noted by Kaminsky and Reinhart (1999).

In this context note that the macroprudential indicators cited in Section 1 do not include balance of payments deficits per se, suggesting that the period with an appreciating exchange rate may be just as threatening to financial stability, especially if savings flows generate abundant liquidity for bank lending, as was the case for Japan in the 1980s. Indeed, credit expansion was one of the MPIs cited in Section 1. Furthermore, a combination of an investment-saving imbalance and imperfect international capital market - i.e. ample liquidity in the home market – may in turn encourage the loose conduct of fiscal and monetary policies, if the imbalance is mistakenly seen as a cyclical rather than a structural one. Again the Japanese experience during the 1980s may be cited when the fiscal surplus including the surplus of public pension funds was viewed externally as a source of the long-lasting Japan's current account surplus. This situation - i.e. where fiscal and monetary measures are taken in an attempt to correct the structural imbalance due to the demographic factor - is also likely to lead to the creation of financial bubble though this case has not yet been observed in many other countries than Japan.

The experience of the Asian, Latin American and Mexican crises suggests, however, that balance of payments deficits did often accompany both currency crises and systemic risks, with the withdrawal of external credit flows being the triggering event. Furthermore, a number of the MPIs mentioned in Section 1 may move adversely during the advanced portion of the process of ageing sketched in Sections 3 and 4, notably lower economic growth, stock market volatility and/or increases in real interest rates ensuing when “high-savers” retire. These again point to potential risks for the financial system.

Macroeconomic consequences of ageing in the OECD may spill over to countries outside the OECD, because an acceleration and reversal of capital flows to EMEs may well be a marked feature of the process of ageing (corresponding to surpluses and deficits in OECD countries). It was seen in the Asian crisis that a rapid inflow of saving can generate wasteful investment, while the outflow can cause marked macroeconomic difficulties, asset price volatility, foreign exchange market turbulence and banking crises (Stiglitz 2000).

5.2 Risks arising from the difficulties of pay-as-you-go

If current social security pension systems remain unchanged, there will need to either be sharp increases in contributions or fiscal deficits. Owing to the foreseeable nature of the changes ahead, it seems likely that reform reducing benefits of pay-as-you-go will diminish²³ if not necessarily eliminate²⁴ the amplitude of the problems that would otherwise arise. In this light, and also to emphasise the need for reform and provide a polar case, it remains useful to trace out the extreme cases where such reform is not forthcoming (Cremer and Pestieau (2000) cite some of the political difficulties that reforms face).

²² Note that both the Asian and Latin American crises as well as the Swedish banking crisis were closely linked to foreign currency exposure of the private or public sectors (on Sweden see Englund 2000).

²³ Moreover, there are likely to be significant non-linearities, implying that reform will entail a more than proportional reduction in risks.

Before considering effects on public finances, one can trace the potential effects of increased precautionary saving by the household sector as and when confidence in social security promises ebbs. We have noted this is already a feature of Japan. Since countries with generous pay-as-you-go have underdeveloped private pension systems, it is possible that such flows of precautionary saving may go directly or indirectly²⁵ to banks, as in Japan in the last two decades. In certain conditions, again as observed in Japan, this may give rise to banking sector risk. The conditions include, first, inadequate credit risk assessment, second, moral hazard from the safety net, and third, domestic or international institutional investors offering attractive securities financing to the more highly rated companies, facing banks with adverse selection (on disintermediation in Japan, see Hoshi et al 1993). Funds may then be lent on to high risk borrowers at inadequate spreads, including commercial property and property related claims. The consequence could be a greater incidence of property linked bubbles. Particularly where there is a balance of payments surplus, the banking flows could also be diverted to the international interbank market, as was the case prior to the Asian crisis (Bernard and Bisignano 2000). Given the weakness of credit assessment in the international interbank market, the consequence may be to ease unduly the credit constraints on the banking systems where the funds become available, leading to misallocation of resources. Systemic crises in the past three decades have frequently been directly linked to the ebb and flows of international interbank funding (see also Davis 1995a).

Even if funds are invested in life insurance companies, avoidance of systemic risk is not guaranteed. Owing to the nature of their liabilities, as well as regulations (Davis 2001), life insurers tend to invest more in domestic bonds than pension funds do (pension funds diversify internationally and invest heavily in equities). A shortage of government bonds that may continue for some time ahead, as well as competition in asset management driving life insurers to increase returns may prompt more investment in higher risk assets such as high-yield bonds and low-rated securitised loans. Besides their general effect on credit expansion, which could generate fragility in the non-financial sectors, such funds may again feed a property boom, leaving the insurers as well as banks vulnerable to a downturn in the property cycle.

Turning to the public finance issues as the population ages, tax financing of public pensions is likely to give rise to economic problems, beginning with a decline in inward investment, slower economic growth and growing evasion of contributions as tax rates rise (World bank 1994). The process may culminate in translocation of domestic industry and productive labour. Driven to an extreme such “factor flight” effects could denude a country of a significant proportion of its productive resources. Property being non-tradable could be hardest hit among asset markets. Even a modicum of such shifts could have severe recessionary effects, impacting on the solvency of non-financial companies as well as on employment, thus in each case sharply increasing loan defaults. Banks could consequently suffer major credit losses on their domestic business if, as seems likely, the scale of economic problems arising from tax finance are poorly anticipated. Credit losses would threaten banks’ access to the international interbank market. There is the possibility of debt crises for the private sector, and deficits for the public sector, as the country faces a vicious cycle of diminishing tax revenues and rising tax rates

²⁴ It can be argued that even if reform implies a wholesale switch to funding some fiscal problems may remain given the need to issue bonds or raise taxes in order to finance accrued benefits. The crucial element of certainty about future borrowing needs would reduce adverse effects, however.

²⁵ Hargraves et al (1993) show that in the 1980s Japanese households sought to draw down their bank deposits and invest in life and pension claims, but life insurers and pension funds bought corporate bonds and companies deposited the proceeds with banks.

to seek to finance pension payments. A likely further outcome is default of the pension payments themselves, as in Eastern Europe in the 1990s and some Latin American countries in the 1980s (World Bank op cit).

Bond financing of unreformed pay-as-you-go may give rise to sharply increasing interest rates as credit ratings deteriorate and governments sell to increasingly unwilling holders of their debt offshore. Economic growth would decline sharply given effects on investment of higher real interest rates, while private sector borrowers may be “crowded out” of domestic bond markets by the government. Experience of countries such as Italy, Sweden, Ireland and Denmark that have faced fiscal crises suggest that besides direct effects of higher interest rates and crowding out, uncertainty generated by a fiscal crisis, as well as Ricardian effects act to dampen expenditure at a macro level, leading to recessionary tendencies, as well as inflation (Giavazzi and Pagano 1995). Credit ratings would be likely to fall lower for private firms than the government (since private credit ratings are usually lower than those of the government).

Together these consequences of bond financing may lead to financing difficulties for the corporate and household sectors, and would increase default risk faced by banks and life insurers. Again, credit losses and lower ratings would threaten banks’ access to the international interbank market. Higher real rates and a recession would also hit equity prices. Falling and volatile bond and equity prices accompanying debt finance could impinge on leveraged investors taking positions, as well as on the viability of any funded pension arrangements (showing the risks to pay-as-you-go and funding are not entirely independent in this case). Again, real estate, being less international tradable than securities, would be particularly exposed to rising long term interest rates, and prices could fall sharply, threatening banks’ collateral. Note that most OECD fiscal crises in the past (e.g. in Italy, Ireland and Denmark) have occurred in the context of financial systems with significant structural regulation and excess profitability of banks. Thus, the effects of these past events on banks may underestimate the likely consequences in a liberalised financial system. Equally, fiscal difficulties for the government will sharply limit its ability to finance recapitalisation of the banking sector in the wake of a banking crisis, which would also impinge on banks’ “support” credit ratings in the absence of such a crisis, raising their cost of funds.

Ultimately, the public sector itself could face a solvency crisis, owing to a “snowball” increase in debt and interest payments, which would have major consequences for private financial markets. Governments might be tempted as a last resort to monetise the debt and thereby cause hyperinflation, wiping out the value of money fixed assets held e.g. by banks and life insurers. The EMU context would make such deficits and monetisation particularly problematic, given spillovers within the Single Currency area, although global spillovers would also be present if a significant number of countries were affected. In this context, it may be added that contagion effects on other government bond markets might be anticipated, whereby the occurrence of a fiscal problem due to ageing in a single significant OECD country could generate sharply higher financing costs in other countries with similar potential problems. This could threaten to generate self-fulfilling fiscal crises in a number of countries, parallel to the contagious currency crises in Asia following trade patterns as cited in Glick and Rose (1998).

5.3 Risks arising from funding via institutional investors

We now turn to issues arising from funding of pensions. In this section, we discuss the consequences of the differences in financial structure that accompany private funding, separately from the saving flows examined in the next section.

In general, a financial system characterised by institutional investors and extensive capital market financing may be more stable than a bank-based one, especially if there is mispriced safety net protection in the latter and low values of banking charters. For in normal times, institutional investors, having good information²⁶ and low transactions costs, are likely to speed the adjustment of asset prices to fundamentals; this should entail price volatility only to the extent that fundamentals are themselves volatile. Moreover, the diversity in types and sizes of institutional investors - in their liabilities, incentives, and consequent attitudes to risk - should be stabilizing to financial markets. The liquidity that institutional activity generates may dampen volatility, as is suggested by lower share price volatility in countries with large institutional sectors (Davis and Steil 2001). In a global context, enhanced cross-border portfolio investment undertaken by institutional investors should enhance the efficiency of global capital markets by equalizing total real returns (and hence the cost of capital) between markets.

It can, moreover, be argued that securitized financial systems have important stabilizing features, such as ease of marking to market, matched assets and liabilities – notably for mutual funds and defined contribution pension funds - distance from the safety net. There are wider opportunities to diversify and spread risk. And the “multiple channels of intermediation” available to the corporate sector in securitized financial systems will reduce the impact of any crises which affect either banks or securities markets (see Greenspan (1999), Davis (2000)).

Institutional investors may, however, also sporadically give rise to unfamiliar types of financial instability from the point of view of regulators and market players, which would be accentuated as they grew during the expansion of precautionary saving and/or funding. Already in existing experience of financial instability one can distinguish two particular types of financial turbulence they give rise to:

A first type involves extreme market price volatility after a shift in expectations and consequent changes in institutional investors’ asset allocations. Such crises are focused mainly on the consequences for financial institutions of sharp price changes which result from institutional “herding” as groups of such institutions imitate one another’s’ strategies for reasons related to the information and agency problems between the investors and the asset managers (see the summary in Davis and Steil (2001)). Whereas misaligned asset prices and sharp price movements during corrections may not in themselves have systemic implications²⁷, these may emerge when such movements threaten e.g. institutions that have taken leveraged positions on the current levels of asset prices. Examples are the stock market crash of 1987, the ERM crisis, the 1994 bond market reversal and the Mexican crisis (Davis 1995c). There were also elements of this in the Asian crisis. Indeed, as discussed in Section 5.4, EME securities markets, as well as those for forex, derivatives, bonds and equities in OECD countries, could be vulnerable to these shifts.

²⁶ The concept of superior information of institutions is underpinned by studies showing that initial public offerings that are largely subscribed by institutions tend to do well, while those that are largely purchased by the general public tend to do badly (Trzcinka 1998).

A second type involves protracted²⁸ collapse of market liquidity and issuance (Davis 1994). Again often involving one-way-selling by institutional investors as they seek to shift asset allocations simultaneously, the distinction is often largely one of whether markets are sufficiently resilient, and whether market maker structures are suitably robust. Also such crises tend to characterise debt markets rather than equity or foreign exchange. The risks are acute not only for those holding positions in the market but also for those relying on the market for debt finance or liquidity – which increasingly include banks. Examples in the past have tended typically to be rather specific and idiosyncratic markets, which by nature relied on a narrow investor base, market maker structure and/or issuer base (junk bonds, floating rate notes, Swedish commercial paper, ECU bonds). However, the events following the Russian default and the rescue of the hedge fund LTCM were much more serious, as liquidity failure was threatened in markets such as the US securities repurchase (repo), swaps, commercial paper (CP), corporate and Treasury bond market (see IMF (1998), Davis (1999b)). In this context, note that real estate crises, which could also follow institutional herding, have elements of illiquidity as well as price declines.

Price-volatility and market-liquidity based crises may threaten EMEs, banks and the non-financial sector more than institutional investors themselves. The latter can “sit out” such crises given their long-term liabilities. But, as noted above, institutional investors may tend to focus increasingly on debt claims as members approach retirement, while competition in asset management may lead investment managers also to be willing to take heightened credit risks in order to maximise their return on assets (Bishop (1998), Allen and Gale (1999)). In countries such as the US, defined benefit pension funds have pension benefit insurance that may generate significant moral hazard (Bodie and Merton 1992). This suggests that institutional investors could increasingly invest in high yield bonds and EME sovereign and corporate debt, and thus be vulnerable to credit risk to a greater extent than was the case in the past. Credit cycles could, in other words, affect institutional investors as well as banks. Solvency could be threatened directly for life insurance companies and defined benefit pension funds if a significant proportion of their assets defaulted.

Besides market and credit risk, errors on the asset or liability side (e.g. in terms of guaranteed returns or mortality projections) could also threaten solvency of a range of institutional investors, as has been seen already in Japan and with certain UK companies such as Equitable Life.

Three points may mitigate related systemic concerns, first that insurance companies and defined benefit pension funds are not easily subject to runs on suspicion of insolvency given they have matched and long term assets and liabilities, while mutual funds and defined contribution pension funds are not themselves subject to solvency risks – credit risks are passed directly to the household sector. Second, most institutional-investor claims are not insured, or the insurance is mutual, thus generating incentives for interfirm monitoring. Third, given the ease of adopting market value accounting for securitised claims, it can be argued that debt crises are much less likely in corporate bond markets than for banks where the deterioration of credit quality is hidden from view in the balance sheet (Davis 2000). Markets can still make mistakes however, as witness the repeated bond-based debt crises of the late Victorian period; and US experience suggests bond markets generally find rescheduling after financial distress difficult (Gilson et al 1990).

²⁷ They may, however, lead to resource misallocation.

²⁸ It is not denied that all sharp price changes will tend to affect market liquidity to a greater or lesser degree

Beyond the consequences for asset price volatility and securities market liquidity, further risks may arise for the banking sector in an institutionalised financial system. A lesser proportion of saving being channelled via banks, given lower deposit inflows and greater competitiveness of capital market financing, may give rise to banking crises of the familiar type, where banks take increased risks so as to boost their profitability in a highly competitive market situation, while higher quality credits seek capital market financing. It can be argued that the banking crises in a number of countries in the late 1980s were linked to the heightened competition banks faced from the capital markets (Davis and Steil 2001). In this context, note that a number of authors such as Demirguc-Kunt and Detragiache (1998b) have looked at the effect of financial liberalisation on systemic risks, and found that banking crises were more likely to occur in liberalised financial systems. Crises tended to occur a few years after liberalisation, and were linked to a decline in bank franchise value, because monopoly power is eroded (see Hellman et al 2000). Securities market competition can arguably have a similar effect on franchise values and risk taking.

5.4 Risks arising from the pattern of asset accumulation during funding

The asset flows from pension saving are popularly considered to be already having an effect on asset prices, in driving the bull market in equities in countries such as the US. Certainly, work on savings flows such as Poterba (1998) does imply that current high levels of retirement saving in the form of securities may have driven up market prices (although their effect on returns has been much smaller). It may be the case that the institutionalisation of saving has boosted equity prices via a fall in the risk premium (Blanchard 1993), reflecting better diversification and lower risk aversion of collective investment vehicles. Such tendencies can overshoot, leading to bubbles. On the other hand, most work on the relation of equity prices to mutual fund flows suggests that direct effects of inflows on prices are hard to detect (Fortune (1998), Engen et al (2000)).

While the above discussion is largely focused on equity, asset bubbles could also accompany the pension asset build-up to the extent that retirement investment focuses on debt or real estate claims. The property market might be particularly susceptible. Finance of property development by bond issue or direct institutional investment are two possible channels. Following Allen and Gale (1999, 2000), if institutions become significantly involved in property investment and related credit finance, the massive inflows to pension funds and insurance companies could generate expectations of ongoing boosts to credit flows into property. There may also be increasing uncertainty about future such flows as ageing progresses. These in the past have tended to foreshadow asset bubbles generated by such credit flows. Since banks would remain exposed to property prices via collateral, and would probably also lend to higher-risk projects, they could be badly hit when decumulation occurs, or earlier if institutional investors seek to adjust their asset allocation away from property for any reason.

A large share of OECD pension saving in EMEs can also lead to bubbles and financial stability risks in the latter owing to institutional behaviour even before an eventual repatriation of funds as foreseen in Section 5.1. Owing, for example, to autonomous shocks affecting profitability and creditworthiness, there may be flight of investable funds back to the OECD or to other EMEs. In this context, note that securities are in principle much easier to repatriate than bank loans. Indeed, behaviour of OECD institutional investors is already widely considered to destabilise EMEs, not least owing to their tendency to invest in EMEs as a bloc rather than focusing closely on individual countries' fundamentals (Buckberg 1996).

These patterns of volatility are underpinned by the sharp difference in relative size of EMEs and OECD institutional investors, whereby according to 1995 data, 1% of domestic equity holdings by institutional investors in the G7 countries is equivalent to slightly over 1% of global stock market capitalization but would be equivalent to 27% of market capitalization of the emerging Asian economies and 66% of Latin American ones. Hence if portfolio shifts on the scale of only 1% of domestic equities were to be focused solely on the emerging markets, the effects would be very disruptive. The relative growth of EME market capitalisation and OECD institutional investors suggests that this size differential is likely to be maintained for some decades ahead.

Beyond the issue of changing asset allocation decisions, which can drive price falls even if pension saving is still rising, there are also arguments suggesting that asset prices will fall during the process of ageing itself, as it interacts with pension funding. A fundamental aspect is that the return on capital may fall as a consequence of a lower labour supply and lower growth during ageing. As noted, Cutler et al (1990) see the real return on capital halving. An issue for funding is whether it can generate offsetting increases in efficiency and resource allocation, e.g. via growth of capital markets, that may help to offset this by boosting productivity and investment.

Besides the return on physical capital, a key issue is whether asset prices will also be put under downward pressure in coming decades by declining saving in OECD countries implicitly affecting the real interest rate or the risk premium. Schieber and Shoven (1994) note that given the correlation of ageing in OECD countries, and the likely decumulation of defined benefit pension fund assets, there could be widespread falls in asset prices, linked to high real interest rates. Supporting this, Erb et al (1997) find a positive correlation in the US between the fraction of the population 25-45 and 65+ to stock returns²⁹, while those 45-65 have a negative effect. Looking at a range of OECD and EME countries, they find a positive relation of stock returns to the average age of the population. Brooks (2000) focuses on the relation between ageing and the demand for equities and bonds, and suggests that there will be excess demand for bonds and excess supply of equities in coming decades, with a marked decline in the returns on the retirement savings of baby boomers. In this context, solvency could be threatened for life insurance companies and defined benefit pension funds that had made undertakings based on expected returns on assets formed during the bull period (as has been the case recently for the Japanese life insurers and pension funds and for UK insurers such as Equitable Life).

Poterba (1998) on the other hand looks at past data and finds virtually no link of demographic patterns to asset returns, and particularly no positive results were found for equities. His conclusion is that there is no strong likelihood of a “baby bust” effect depressing asset returns markedly around 2020-2030³⁰, even if the recent rise in baby boom savings may have had a positive effect. Neuberger (1999) argues that the increase and subsequent decrease in flows will be balanced by rises and falls in equity issues, with little effect on prices and returns. Also the increase in the ratio of pensioners to workers is already underway, and will continue steadily rather than abruptly, again casting doubt on the idea of a cycle. Or at least, the market will take on board such gradual future shifts without major and abrupt adjustments in prices. Furthermore, OECD countries are ageing at different rates and there may be offsetting demands for securities from EMEs.

²⁹ And thus a negative effect on prices.

In general, we are sympathetic to the view that even if there are price changes with the decumulation of pension funds, they will not necessarily be precipitate, and hence the issue is one affecting the level of retirement income and the welfare of pensioners rather than systemic financial market stability. On the other hand, the tendency of markets to overreact in both directions is apparent from the recent boom in IT stock prices, and hence vigilance is needed. If there are indeed such sharp changes in market prices during ageing, they may give rise to losses threatening solvency on the part of financial institutions or investors taking leveraged positions along the lines set out in Section 5.3. It would also impact on the adequacy of funding and replacement rates offered by pension funds and life insurance companies. Such a sharp shift away from securities could extend to other asset markets, notably those for commercial property and possibly to residential property. These effects would be compounded if, for example, the older population had a lower demand for housing services. Mankiw and Weil (1989), for example, made controversial³¹ projections of lower house prices in the US as a consequence of ageing. The banks, which hold such property as security, would find credit quality declining as a consequence.

6 A re-evaluation of the theories and indicators

Tracing the relevance of the theories outlined in Section 1 in the light of the risks assessed in Sections 2 -5, it is suggested that financial instability peculiar to the ageing of the population would resemble only partly that most typical of the past, namely banking crises following stimuli to credit expansion such as financial liberalisation as outlined in the *financial fragility* paradigm. On the other hand, reflecting a shift from equity to debt and from government bonds to private bonds, credit cycles could affect institutional investors, also impacting upon banks. The effects of financial instability arising via a corporate debt crisis on bonds held by institutional investors has not yet been widely seen – although the threatened bankruptcy of Japanese life insurers may give some clues. The *monetarist* impact of bank failures on the economy via the money supply may also be attenuated if banks are a less important component of the financial system (as well as the safety net now being well-developed).

On the other hand, there will clearly be heightened *uncertainty* about the likely financing flows that will occur as the population ages especially when pay-as-you-go is dominant, and possible *disaster myopia* by institutions – and regulators - that have not made appropriate provision for the effects of ageing on the economy and the financial system. *Agency costs* will be most crucial in the context of the relation between the asset manager and the ultimate investor, and managers may indeed seek high-risk placements, especially in the debt market, to gain business. The more traditional forms of agency cost in banking will still be present, however (whereby banks with low franchise values and/or mispriced safety net protection will have incentives to take risks).

Runs from institutional investors are not feasible in respect of the bulk of their liabilities, namely long-term contracts, but life insurers – and money market funds - have proved vulnerable to liquidity crises in respect of their short-term debt. With lower credit quality, banks may become even more vulnerable, despite the lesser role they are likely to play in the financial system. *Herding* by institutional investors will meanwhile become a much more important cause of financial instability than hitherto, as outlined in Sections 5.3 and 5.4. The *industrial*

³⁰ Commenting on Poterba's work, Abel (2001) points out that an elastic supply of capital as the population ages could generate a fall in asset prices, even if the demand for assets falls little as baby boomers retire.

competition between asset managers will equally become as important in generating financial instability (e.g. by generating herding) as that between banks.

As regards *macroprudential indicators*, the size and composition of saving flows of the private and public sectors would seem to be the most crucial. Both gross and net flows would need to be taken into account given their relevance for credit, liquidity and market risk, while the evolving portfolios of institutional investors will come to the fore, particularly where funding plays a key role. Debt accumulation would still be of particular interest, with the focus being on public rather than private debt given the likely increase in government debt in pay-as-you-go, as well as the increased appetite of institutional investors for debt given growing maturity of pension schemes and the provision of annuities. On the other hand, one would need caution in using fiscal data because the meaning of a given level of debt changes with shifts in population structure because of the ratio of explicit to implicit debt. High frequency movements will still be dominated by explicit debt, but financial markets will be increasingly aware of – and react to – the implicit debt also. Moreover, changes in debt levels might provide little information in the context of a pension reform.

Asset price booms may well be driven by the accumulation of either precautionary savings (diverted via banks) or funding per se – and reversed sharply as the saving for retirement unwinds, or when asset allocations of institutional investors shift. Banks may find they have to concentrate on high-risk assets (including property loans) if institutional investors are providing extensive bond finance for higher rated firms. The flood of retirement funds likely to be generated in the coming decades will be fruitful areas for financial innovations, that experience shows are often mispriced in the first instance.

As regards regime shifts when funded sectors become very large, small changes in the details of regulation may have unanticipated effects at a macroeconomic level, comparable for example to the “capital crunch” that is widely considered to have followed the Basel capital adequacy accord of 1988. Policies which act to encourage or discourage institutional investment in real estate could be examples. And shifts in fiscal policy, whether or not related to pay-as-you-go pensions, could have regime shift effects on asset markets, even if the main regime shift is likely to be that of ageing itself and its impact on growth and returns.

Looking at the shorter-term indicators of instability, we can highlight that fiscal policies accompanying pay-as-you-go are likely to raise real interest rates and/or lead to a slump. Meanwhile, real exchange rate appreciation, credit expansion may accompany the accumulation phase in OECD countries, while recession, stock market crashes and currency crises may accompany decumulation. EMEs may experience sizeable capital inflows that are later unwound.

Conclusions

Although the precise details are subject to considerable uncertainty, it seems likely that the process of population ageing will involve major shifts in financing, which may give rise to financial turbulence and systemic risk. The locus and scale of these effects will also depend on the predominant approach to retirement income provision. It is argued that the financial-stability risks arising from continuing with unsustainable pay-as-you-go systems

³¹ Engelhardt and Poterba (1991) and Hendershott (1991) provide counter evidence to this suggestion.

would be more substantial than those arising from funding. Fiscal crises can have incalculable consequences for private financial markets, also generating transnational spillovers, while pension funding involves more an adaptation by regulatory authorities to a more securitised and institutionalised financial system. Concerning policy, for social security, the key issue is reform, so that the fiscal difficulties and their consequences for financial stability foreshadowed above do not arise. Central bankers have a strong interest in ensuring such reform occurs, given the difficulties for the policy mix and inflation that could otherwise occur. For institutional investors involved in funding, policy issues arising include the need for prudent person asset regulation, absence of guarantees generating moral hazard and international diversification of institutional portfolios, so that they are less dependent on the performance of the domestic economy than would otherwise be the case. Bank regulators need to be aware of the side effects the patterns of ageing can have for banks' assets and liabilities, and ensure capital adequacy and sound risk assessment is maintained

It is important not to see these effects on financial stability in isolation. The chosen approach to retirement income provision is likely to have major effects on economic performance as well as financial stability. In particular, retention of pay-as-you-go would be likely to accentuate the existing distortions that it engenders for labour and product markets, while switching to funding both reduces these distortions also gives rise to benefits in the field of investment and technical progress. The economy will accordingly be stronger and more resilient to any financial turbulence that may arise. Government finances would be in better shape for any bank recapitalisation that may be needed.

Furthermore, some of the risks outlined above may arise independently of ageing. Banking sector risks arising from financial liberalisation may be an ongoing rather than one-off phenomenon. Also, it can be argued that the process of institutionalisation is likely to occur independently of ageing owing to technical progress which boosts the comparative advantage of institutions relative to banks and the growing wealth of the household sector which leads them to seek professional management for high risk-high return assets (Davis and Steil 2001). Adaptation of regulatory authorities to this shift will thus be required in any case.

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TABLE 1
LIFE EXPECTANCY AT BIRTH

Years	1970–1975	1980–1985	1990–1995	2000
United Kingdom	72	74	76	78
United States	73	75	77	77
Germany	71	73	76	77
Japan	74	77	79	81
Canada	73	76	78	79
France	72	75	78	79
Italy	72	75	78	79

Source: World Bank (1996), U.S. Department of the Census.

TABLE 2
FERTILITY RATES

Number of Children per Female	1970–1975	1980–1985	1990–1995	2000
United Kingdom	1.8	1.8	1.8	1.7
United States	1.8	1.8	2.0	2.1
Germany	1.5	1.4	1.2	1.4
Japan	1.9	1.8	1.5	1.4
Canada	1.8	1.7	1.9	1.6
France	1.9	1.8	1.7	1.7
Italy	2.2	1.4	1.3	1.2

Source: World Bank (1996), U.S. Department of the Census website.

TABLE 3
PROJECTIONS OF ELDERLY DEPENDENCY RATIO TO 2030

Population 65 and over as a Percentage of Population Aged 15–65	1960	1990	2010	2030
United Kingdom	17.9	24.0	25.8	38.7
United States	15.4	19.1	20.4	36.8
Germany	16.0	21.7	30.3	49.2
Japan	9.5	17.1	33.0	44.5
Canada	13.0	16.7	20.4	39.1
France	18.8	20.8	24.6	39.1
Italy	13.3	21.6	31.2	48.3
Memo:				
E.U. average	16.5E	21.4	25.9	40.3

Source: Bos et al. (1994).

TABLE 4
PROJECTIONS OF PENSION COSTS (OECD ESTIMATES)

Pension expenditure/GDP	1995	2000	2010	2020	2030	2040
United Kingdom	4.5	4.5	5.2	5.1	5.5	5.0
United States	4.1	4.2	4.5	5.2	6.6	7.1
Germany	11.1	11.5	11.8	12.3	16.5	18.4
Japan	6.6	7.5	9.6	12.4	13.4	14.9
Canada	5.2	5.0	5.3	6.9	9.0	9.1
France	10.6	9.8	9.7	11.6	13.5	14.3
Italy	13.3	12.6	13.2	15.3	20.3	21.4

Source: Roseveare et al. (1996).

TABLE 5
PRESENT VALUE OF PUBLIC PENSION LIABILITIES AS A PERCENTAGE OF 1994 GDP (OECD ESTIMATES)

	Pension Payments	Contributions	Balance
United Kingdom	142	118	-24
Germany	348	286	-62
Japan	299	192	-70
Canada	204	97	-101
France	318	216	-102
Italy	401	341	-60
United States	163	134	-23

Source: Roseveare et al. (1996). French estimates exclude "fictive contributions"; German estimates exclude statutory transfers from the federal government.

Table 6
PRESENT VALUE OF NET PENSION LIABILITY, 1995–2050 (IMF ESTIMATES)

As % of 1994 GDP	Net Pension Liability	Memo: Contribution Gap
United Kingdom	5	0.1
Germany	111	3.4
France	114	3.3
Italy	76	2.5
United States	26	0.8

Source: Chand and Jaeger (1996). The contribution gap is the difference between the contribution rate that is needed to reduce the net asset position to zero and the current contribution rate.

TABLE 7
SOCIAL SECURITY BENEFITS AND INSTITUTIONAL INVESTMENT

	Social Security Replacement Ratios	Institutional Investment/GDP (%), 1998
United Kingdom	60–33	197
United States	71–45	176
Germany	45–43	32
Japan	na	63
Canada	57–26	105
France	67–51	90
Italy	78–75	54

Note: Replacement ratios—pensions as a percentage of final salary—are for final salaries of \$20,000 and \$50,000. The data are for 1997.

Source: Watson Wyatt (1997), Table 1.6.