

Recreating Sustainable Retirement

Resilience, Solvency, and Tail Risk

EDITED BY

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Contents

<i>List of Figures</i>	ix
<i>List of Tables</i>	xiii
<i>Notes on Contributors</i>	xv

1. Recreating Retirement Sustainability <i>Olivia S. Mitchell and Raimond Maurer</i>	1
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Part I. Capital Market and Model Risk

2. Managing Capital Market Risk for Retirement <i>Enrico Biffis and Robert Kosowski</i>	9
3. Implications for Long-term Investors of the Shifting Distribution of Capital Market Returns <i>James Moore and Niels Pedersen</i>	30
4. Stress Testing Monte Carlo Assumptions <i>Marlena I. Lee</i>	60

Part II. Longevity Risk

5. Modeling and Management of Longevity Risk <i>Andrew Cairns</i>	71
6. Longevity Risk Management, Corporate Finance, and Sustainable Pensions <i>Guy Coughlan</i>	89
7. Model Risk, Mortality Heterogeneity, and Implications for Solvency and Tail Risk <i>Michael Sherris and Qiming Zhou</i>	113
8. The Securitization of Longevity Risk and Its Implications for Retirement Security <i>Richard MacMinn, Patrick Brockett, Jennifer Wang, Yijia Lin, and Ruilin Tian</i>	134

viii Contents

Part III. Regulatory and Political Risk

9. Evolving Roles for Pension Regulations: Toward Better Risk Control? 163
E. Philip Davis
10. Developments in European Pension Regulation: Risks and Challenges 186
Stefan Lundbergh, Ruben Laros, and Laura Rebel
11. Extreme Risks and the Retirement Anomaly 215
Tim Hodgson

Part IV. Implications for Plan Sponsors

12. Risk Budgeting and Longevity Insurance: Strategies for Sustainable Defined Benefit Pension Funds 247
Amy Kessler
13. The Funding Debate: Optimizing Pension Risk within a Corporate Risk Budget 273
Geoff Bauer, Gordon Fletcher, Julien Halfon, and Stacy Scapino
- The Pension Research Council* 293
- Index* 297

Chapter 9

Evolving Roles for Pension Regulations: Toward Better Risk Control?

E. Philip Davis

Pension regulation has been transformed in recent years, with the central theme being an increasing focus on protection of beneficiaries against various forms of risk. These changes render less relevant much of what was written in the past (e.g. Davis 1995a). Underlying forces include the ongoing shift from defined benefit (DB) to defined contribution (DC) pensions, the shift to risk-based supervision for DB and DC plans, changes in accounting standards and transparency (contributing to market discipline), and the turbulence in financial markets in recent years. These forces have engendered a greater awareness of the risks to retirement income security that are inherent in the use of funding to provide for pensions, and given rise to attempts by regulation to seek to reduce these risks to the extent that is feasible and cost-effective.

This chapter offers an overview of the evolution of pension regulation, with a particular focus on regulatory attempts to control risk and using evidence from selected countries under each topic. As regards outcomes, in our view there has been an improvement in retirement income security as a consequence of the focus of regulation on risk. That said, a number of the regulatory developments have stimulated a shift of DB pension portfolios toward lower risk and hence lower return assets, which may yet cause difficulties for future pension income. These shifts also leave open a number of outstanding questions that are related to risk, notably whether education of consumers is sufficient to apprise them of the risk tradeoffs in their pension planning, the neglected role of longevity risk in retirement income provision, and whether regulation can be made more countercyclical to avoid macroprudential risks affecting both pension funds and the wider economy.

In what follows, we first consider the question of why pension plans are regulated, highlighting the role of risk, and then we move to general portfolio regulations, the traditional means of regulating risk. Next we examine the evolving regulation of DB plans focused on risk, including the role of market discipline and accounting standards. We go on to analyze the changing regulation of DC plans, touching on issues again linked directly or indirectly to risk, including costs, annuitization, and outcomes. A final section considers some weaknesses of current

164 Recreating Sustainable Retirement

pension regulation in respect of risk, and we conclude by considering whether pension funds need a global agreement focusing on risks akin to those addressed by Basel III for banking.

Why Regulate Pension Funds?

Abstracting from issues of redistribution, a case for public intervention in the operation of markets arises when there is a market failure, in other words, when a set of market prices fails to reach a Pareto-optimal outcome. Thus from an economic standpoint, when competitive markets achieve efficient outcomes, there is no case for regulation.

Three key types of market failure arise in finance, namely those relating to information asymmetry, externality, and monopoly. These apply in differing degrees depending on the type of financial institution; in particular, there are quite distinctive problems associated with banks as opposed to pension funds (Davis 2012). But a finance-based approach is not the only way to view pension fund regulation. It can also be argued that enhancing equity, adequacy, and security of pension arrangements can be seen as objectives of pension fund regulation independent of financial aspects, focusing on member rights and the financial security of plans (Laboul and Yermo 2006). Tax privileges to pension funds are emblematic of this alternative approach.

We begin, however, with a discussion of arguments based on pension funds' status as financial institutions (Davis 1995*b*; McCarthy and Neuberger 2009). Regarding information asymmetry, when it is difficult or costly for the purchaser of a financial service to obtain sufficient information on the quality of the service in question, he may be vulnerable to exploitation. This could entail fraudulent, negligent, incompetent, or unfair treatment, as well as failure of the relevant institution *per se*.

Such phenomena are of particular importance for retail users of financial services such as those provided by pension funds, because clients seek investment of a sizeable proportion of their wealth, contracts are one-off, and they involve a commitment over time. Moreover, such consumers are unlikely to find it economic to make a full assessment of the risks to which pension funds are exposed—including, for DB funds, the sponsor's solvency and the level of funding backing pension claims in case of sponsor bankruptcy. Participants may not even be aware of costs, returns, volatility, and the range of outcomes for prospective pensions. Hence the need for 'consumer protection'-style regulation for pension funds—and consumer education. We consider this form of risk focus to be the most important element in pension regulation and that on which most recent innovations have largely focused, for example in portfolio regulations for all funds, risk-based regulations and solvency rules for DB funds, and regulation of costs, risks, and outcomes for DC funds as well.

Such asymmetries are evidently less important for wholesale users of financial markets (such as pension funds themselves in their dealings with investment banks), as these typically have better information, hold considerable countervailing power, and carry out repeated transactions with each other. A partial protection against exploitation, even for retail consumers, is likely to arise from the desire of financial institutions such as life insurers offering personal pensions to maintain their reputation, or equally for nonfinancial companies to retain a good reputation in the labor market—a capital asset that would depreciate if customers or employees were to be exploited. Nevertheless, accounting standards can be seen as a protection for wholesale creditors and investors when dealing with funds and their sponsors.

Externalities arise when the actions of certain agents have non-priced consequences on others. The most obvious type of potential externality in financial markets relates to the liquidity risk underlying contagious bank runs, when failure of one bank leads to a heightened risk of failure by others, whether due to direct financial linkages (e.g. interbank claims) or shifts in perceptions on the part of depositors as to the creditworthiness of certain banks in the light of failure of others. ‘Runs’ may also occur for other types of institutions, such as investment banks. But given the matching of long-run liabilities and long-run assets in pension funds, such externalities are less likely here. There are other possible externalities from failure of pension funds—notably to the state, whether as direct guarantor or as provider of pensions to those lacking them (Impavido and Tower 2009)—and similar investments by pension funds may give rise to macroprudential risks to financial markets as well as to funds themselves. This explains the provision of, for example, guarantee schemes for DB funds and countercyclical regulations. Positive externalities may also lead governments to encourage pension funds, such as a desire to economize on the costs of social security or foster the development of capital markets.

Market failure may also arise when there is some degree of market power. This may be of particular relevance for pension funds, notably when membership is compulsory; here attention to the interests of members is of particular importance, whether there is asymmetric information or not. As argued by Altman (1992), employers in an unregulated environment offering a pension fund effectively on a monopoly basis may structure plans to take care of their own interests and concerns, so for example they can institute onerous vesting rules and better terms for management than for workers. They may also want freedom to fund (or not) as they wish, and maintain pension assets for their own use, regardless of the risk of bankruptcy. They may not take care of the retirement needs of some groups in society, such as frequent job changers, young workers, or women with broken careers due to childbearing. Union pressure may ameliorate some of these problems for employees, but not for the most peripheral groups. This form of regulation, while as important as the others, has undergone less change in recent years than the focus on risk.

166 Recreating Sustainable Retirement

Some would argue that pension funds should be regulated independently of these standard justifications, for example to ensure that tax benefits are not misused and that the goals of equity, adequacy, and security of retirement income are achieved—in effect correcting the market failures in annuities markets that necessitate pension funds and social security (Laboul and Yermo 2006). This can be seen as an alternative way of justifying a focus on risk in pension regulation, in that in its absence, equity, adequacy, and security are less likely to be achieved. Annuitization regulations could also be justified in this way. Regulation may also be based on the desire for economic efficiency—for example removing barriers to labor mobility—and indeed financial efficiency, so firms' costs in running pension funds are minimized and pensions are affordable for members.

Moreover, Altman (1992) suggests that the term 'private pension' is itself a misnomer, as the distinction between private and public programs is increasingly blurred. Terms and conditions are often prescribed by the government; they are publicly supported by tax subsidies; there is compulsory provision in several countries; and in some countries, private funds take over part of the earnings-related social security provision function.

Regulations are, of course, not costless, and it is emphasized below that excessive regulatory burdens may discourage provision of private pensions when it is voluntary. It can also reduce the competitiveness of companies when provision is compulsory (Laboul and Yermo 2006). There is a trade-off of cost and benefit security, which regulators must consider and handle. Some would argue that the focus on risk in regulation has been excessive for DB funds and stimulated their replacement by DC, for example.

To guide our overview of developments in pension regulation and their relation to risk, we offer a schematic table which indicates the different types of regulation, the risks they address, their principal level of application, and the main countries cited. Table 9.1 provides an overview and guide to what follows.

Changing Investment Regulations for Collective Pension Funds

Investment regulations are the traditional means whereby pension regulators have sought to control risks arising from funding of pensions, be they corporate or public DC or DB plans (Davis 2002). In a country adopting quantitative asset restrictions (QAR), the government enforces specific regulations, typically limiting holding of particular classes of assets deemed 'risky'. The logic of QAR or 'prudent investment' rules is that prudence is equal to safety, where security of assets is measured instrument-by-instrument according to a fixed standard. Focus is placed on the investment itself.

Typically QAR involves limits on holdings of assets with relatively volatile nominal returns, low liquidity, or high credit risk, such as equities, venture capital/

TABLE 9.1 Types of regulation and related risks

Regulation	Main risk addressed	Principal application	Main countries cited
Portfolio regulations	Risky asset portfolio	Fund-by-fund	U.K. and U.S. (PPR); E.U., Japan (transition); Germany (QAR)
<i>Defined benefit funds:</i>			
Risk-based regulation	Shortfall risk, especially due to asset/liability mismatch	Fund-by-fund	Netherlands, Germany, U.K., U.S.
Tighter solvency rules	Shortfall risk	Fund-by-fund	Netherlands, U.K., U.S.
Guarantees	Bankruptcy of sponsor	System-wide	U.K., U.S.
Accounting standards	Risk to investors and creditors	System-wide	U.K., Netherlands, International accounting standards
<i>Defined contribution funds:</i>			
Costs	Risk of inadequate returns and hence pension	System-wide	U.K., Poland, Argentina, Sweden, Chile, US, Australia
Outcomes and risks	Risk of volatility close to retirement	Individuals and funds	Australia, Denmark, Mexico, Sweden, Chile
Annuitization	Risk of outliving pension assets	Individual by individual	U.S., U.K., Australia, Chile, Switzerland
Transparency and education	Risk of inadequate saving and inappropriate investment	Individual by individual	Denmark, Mexico, Australia, Poland, Chile
<i>Current weaknesses:</i>			
(Mortality tables and mortality risk-sharing)	Longevity risk to both DB and DC funds	System-wide	US, Switzerland, Netherlands
(Counter cyclical funding and investment)	Risks of wider market volatility	System-wide	Canada, U.S., Netherlands, Japan, Switzerland

Source: Author's depiction.

168 Recreating Sustainable Retirement

unquoted shares, and real estate, as well as foreign assets, even if their mean returns are relatively high. By contrast, under the prudent person rule (PPR), an OECD definition is that ‘a fiduciary must discharge his or her duties with the care, skill, prudence and diligence that a prudent person acting in a like capacity would use in the conduct of an enterprise of like character and aims’ (Galer 2002: 45). Hence, there must be an investment strategy whereby pension assets are invested prudently, just as someone would do in the conduct of his own affairs.

The PPR has generally been seen as an economically superior approach, since it permits funds to attain the frontier of efficient portfolios as well as optimize the risk–return trade-off given the maturity of the fund and the risks to which it is exposed (Davis and Hu 2009). PPR allows a free market to operate throughout the investment process, while ensuring, along with solvency regulations (for DB funds) and appropriate decisions regarding contributions in the light of market conditions, that there is both adequacy of assets and an appropriate level of risk. By focusing unduly on the risk and liquidity of individual assets, QAR fails to take into account the fact that, at the portfolio level, both default risk and price volatility can be reduced by diversification. Liquidity risk depends on the overall liquidity position of the investor and not on the liquidity of individual instruments. QAR may prevent taking into account the duration of the liabilities, which can differ sharply between sponsors and funds, as well as over time.

Indeed, in PPR there is usually an implicit or explicit presumption that diversification of investments is a key indicator of prudence, in line with finance theory. Prudent person rules also tend to include limits on self-investment, but this is not the case for 401(k) plans in the U.S., despite the losses at Enron and WorldCom (Galer 2002).

Traditionally there has been a division between countries adopting PPR and QAR that corresponds broadly to that of the Anglo-Saxon countries versus Europe and Japan as well as emerging markets. Nevertheless, the past several years have seen a broad shift from QAR to PPR. The logic of the argument for PPR has been followed, for example, in the Institutions for Occupations Retirement Provision (IORP) Directive in Europe and recent shifts to PPR in countries such as Japan. Nevertheless, this shift is not universal: for example, Germany retains limits such as 35 percent equity for its ‘Pensionskassen’ and limits on asset classes that can be invested in, and in this it is followed by many emerging market economies (OECD 2013).

The shift to PPR has also involved a change in the roles of regulators, away from evaluating and checking portfolios and toward assessing the validity of a plan’s approach to investment. For example, under PPR, regulators must test the behavior of the asset manager, the institutional investor, and the process of decision-making. Regulators must evaluate whether a ‘due diligence’ investigation has been undertaken in formulating the plan’s strategic asset allocation. A pension institution would also be expected to have a coherent and explicit statement of investment principles. PPR thus necessitates a wider degree of transparency for

the institutions, including, in particular, identification of lines of responsibility for decisions and of detailed practices of asset management to be discussed in more detail below.

The means of applying PPR varies. For example, trustees in the U.K. are not required to have investment knowledge, but they must obtain proper advice on the topic. Accordingly, regulation has, in effect, been supplemented by the role of the investment consultant. Meanwhile, in the U.S., the pension fund manager's decisions have to be justified by reference to those of investment professionals (prudent expert rule), maximizing risk-adjusted returns on a well-diversified portfolio. These have both tended to involve high equity holdings (OECD 2012). Although Continental European countries have also switched to the prudent person rule, they have held more conservative portfolios. This relates partly to tighter solvency regulations for DB and risk-based regulation for both DB and DC, to be elaborated below.

The Evolving Regulation of DB Plans

Besides the portfolio regulations noted above, the traditional regulation of DB funds has related to the funding of benefits and ownership of surpluses. By definition, a DC plan is always fully funded as assets equal liabilities, whereas with DB plans there is a distinction between the pension plan obligations or contractual rights to the participants and the fund assets to providing collateral for the promised benefits. This in turn gives rise to shortfall risk, which implies a danger that pension promises are not fulfilled.

Key aspects underlying the evolution of DB regulation in different countries relate to differences in how the pension fund is conceptualized, divisions of responsibility, and risk-sharing between employers and employees (Laboul and Yermo 2006). In the Anglo-Saxon region, the basis of safety is the solvency of the sponsor who bears the underwriting risk, backed by an insurance fund. Accordingly, the funds are organized as trusts securing the assets, but the plan is kept close to the company, with considerable flexibility in regulation and amortization of shortfalls. In Continental Europe, by contrast, pension funds have significant operational autonomy and offer guarantees with sponsors providing a form of reinsurance (or even more limited responsibility). Insurance funds are absent and funding rules more strict. Here the pension fund is legally independent, and economically it is akin to a life insurance company and regulated accordingly.

DB plans have suffered successive financial market shocks in the past dozen years, with the dotcom crisis and the subprime crisis affecting their equity holdings severely, the extent of which depended on their prior holdings of such assets. The resultant shortfall risk implied dangers to retirement income security. These crises challenged the traditional flexible approach of Anglo-Saxon regulators, as well as challenging the less flexible approach in Continental Europe (Laboul and

170 Recreating Sustainable Retirement

Yermo 2006). As noted by Franzen (2010), the ‘perfect pension storm’ that has been experienced led the risk management revolution to extend to the pension industry, superimposed on traditional forms of regulation, whereas it had previously been confined to other sectors, notably banks (see also Lundbergh et al. 2014). This has in turn been reinforced by regulation requiring risk management, also justified by the development of guarantees and shaped by the changing accounting standards for pensions and the shift to PPR as noted above.

The Shift to Risk-based Regulation and the Link to Solvency Regulation

Kocken (2006) defines risk management for a financial institution as a process starting at a strategic level. It begins with analyzing risk factors for a pension fund and its stakeholders, which is followed by a decision regarding the acceptable level of risk, and ends at the operational level in measuring and controlling risk. Banks have been in a process of shifting from returns-driven management to risk management for some decades, with a particular milestone being the Basel Capital Adequacy Accord of 1988 and its extension in 1996 to cover use of approved models for market risk to calculate capital (Basel Committee on Banking Supervision 2006). The underlying shift of focus from return to risk was in turn a consequence of the wave of global financial crises that began in 1973 after a long period of quiescence since 1945 (Davis 1995*a*), and notably the Latin American debt crisis that began in 1982. There is a clear parallel between these seismic events affecting banks and triggering changes in the focus of regulation and the more recent market crises impacting on DB pension fund solvency.

Yet this transition in banking regulation did not initially affect pension funds and their regulators in Europe, although DB plans are clearly subject to underwriting or actuarial risk—risks that they might not fulfill contractual obligations to customers. These, in turn, are linked to longevity risk and inflation risk; they also bear market risk on their assets and the risk of asset/liability mismatch. But, as noted above, pension funds are not subject to liquidity risk, arguably the main concern of banks and their regulators in risk management. Traditionally pension fund risk managers have focused instead on choosing appropriate assets to derive a strategic asset allocation and manage the market risk, largely ignoring liabilities. But increasingly, larger funds have begun to use asset liability management (ALM), eventually deriving the optimal strategic asset allocation in a liability-consistent way, assessing the impact of decisions not only of investment but also of contributions and indexation of benefits. In this sense, risk-based regulation has grown up from best practice in individual pension plans.

Franzen (2010) argues that pension funds in the major industrial countries manage risk today according to differing concepts of the underlying pension promise as defined previously. This explains why Continental pension funds such as the Dutch were in the lead in risk-based regulation. Also, Anglo-Saxon country

regulators have been traditionally more lenient with respect to risk-taking than Continentals (Laboul and Yermo 2006).

Risk-based regulation of pension funds was first prompted by the dotcom bust of 2001–3, which led to widespread underfunding of DB pensions (Davis and de Haan 2012). The subprime crisis was a further spur. It can be argued that the introduction of risk-based regulation for DB funds enables pension funds to make proper use of complex markets and instruments, and to allocate scarce supervisory resources efficiently (Brunner et al. 2008). It has also been driven by the integration of financial supervision in the Netherlands, as well as in DC countries Denmark and Australia. Thus, the Dutch and Australians seek to apply a similar form of financial regulation to pension funds as to banks and insurance companies, adapted nonetheless to the economics of pension funds (Brunner et al. 2008).

Risk-based management requires sound risk management within the institution—including a risk management strategy, board involvement, fulfillment of risk management functions, and internal controls. Evaluation of corporate governance rules for risk management architecture becomes an important role of the regulator, although large and small funds are not expected to be equally sophisticated. In practice, regulators typically do not require a specific form of risk management architecture; there are links between the form of risk-based regulation and the varying structural form of pension funds and pension promises discussed above. Thus, for example, asset liability management (ALM) is mandatory in the Netherlands and Germany, whereas in the U.K. it is only encouraged, and in the U.S. regulators are neutral. Accordingly, the role of regulators in the former countries must include evaluation of models and strategies based on ALM, not essential in the Anglo-Saxon countries. In fact, mandatory use of ALM can be criticized, in the sense that it is subject to model risk and the breakdown of underlying assumptions. And if all pension funds were to adopt a similar model, they could be subject to herding, volatility, and liquidity crises in capital markets, worsening aggregate risk.

More fundamentally, it can be argued that when pension fund models include Value-at-Risk (VaR), they could be in danger of imposing an inappropriately short time horizon on pension funds and excessive concern about market risk (Shi and Werker 2012). Indeed, Campbell and Viceira (2002) note that when equities are subject to mean reversion, and taking human capital into account, equities can be secure assets for long-term investors such as pension funds. But this argument may break down when taking into account a plan's integration with the sponsor, which is assumed to provide a backup for shortfalls. Mergers and bankruptcies are examples in which the state of the sponsor limits the horizon of investment of the pension fund. And new accounting standards also impact the time horizon of investment, as will be discussed further on in the chapter.

Stress testing is another key aspect of risk-based regulation. For example, since 2005, the most important tool of the regulator in Germany is a stress test (within the ALM) to ensure that funds retain 100 percent funding under

172 Recreating Sustainable Retirement

various capital market scenarios (Franzen 2010). Sale of assets may be required to meet the test, so this is one explanation why funds there are typically well below their 35 percent limit on equities. Since 2007, Dutch funds have had to run scenario-based solvency tests showing that they have only a 2.5 percent probability of falling below 100 percent funding (excluding conditional indexation) within a year (Franzen 2010). There are methods based on simplified and standard methods prescribed by the regulator, but also internal models are permitted, as in most recent global accords on banking regulation, Basel II and III. But stress tests are only as useful as the likelihood of the scenarios they depict coming about, and if they are imposed mechanically they can lead to complacency about exposure to risk.

Risk scoring is a further aspect of risk-based supervision. Pension regulators in the Netherlands use a common model for assessing pension funds for banks and insurance companies (Financial Institutions Risk Analysis Method, or FIRM). This is a four-stage approach to assessing risk, requiring a detailed profile of the fund, identifying relevant management units, assessing gross risks and giving scores, and then seeking insight into the quality of risk controls in each category for a view of overall risk. This, in turn, drives the frequency of on-site inspections. As discussed below, risk scoring is also a feature of risk-based supervision of DC funds in countries such as Denmark, Australia, and Mexico.

In the wake of the dotcom crisis, pension authorities also began to impose higher funding ratios. Franzen (2010) argues that solvency ratios are not an ultimate goal of pension funds, but rather an instrument of risk management imposed by the regulatory authorities. The U.K. 2004 Pensions Act and the 2006 U.S. Pension Protection Act, for example, tightened funding rules in those countries, with the U.S. shortening periods of smoothing of asset values and liability discount rates from five to two years.

Meanwhile the Dutch introduced a full model-based approach to solvency regulation similar to that used for insurance and banking, with longevity, market, currency, and interest rate risks all covered and asset–liability mismatches penalized, though a 15-year period is allowed to amortize shortfalls (Franzen 2010). Whereas the minimum solvency buffer is 5 percent, in practice consideration of the risks and the stress tests require pension funds to be 30 percent overfunded. As noted by Brunner et al. (2008), the new Dutch system is seen as costly and could discourage provision of DB pensions; more onerous supervision may also have played a role in the shift to career-average-based DB and conditional indexation.

These conceptual differences highlighted above are reflected in the differences in the ways in which regulators approach funding. The U.K. approach to funding is principles-based and relies on regulation of governance. It is scheme-specific with no general rules for funding recovery periods. Meanwhile, the Dutch approach is a rule- and risk-based approach focused on fair value, in line with

banking concepts. The U.S. offers a hybrid combining governance principles with quantitative rules on funding—amortizing shortfalls in seven years, discounting liabilities with corporate bond yields and limiting smoothing to two years. (Public plans are allowed 30 years to amortize shortfalls; Impavido and Tower 2009.)

The Development of Guarantees

The passage of the Employee Retirement Income Security Act (ERISA) in 1974 led to the introduction of the Pension Benefit Guaranty Corporation (PBGC) for private sector DB funds in the United States. This enterprise has become a model for the extension of such guarantees in other countries seeking to protect beneficiaries against risk of sponsor insolvency. In particular, the U.K. introduced the Pension Protection Fund (PPF) in its 2004 Pension Act to pay compensation to members of eligible DB pension schemes in the event of employer insolvency, where there are insufficient assets in the fund to cover Pension Protection Fund levels of compensation. Existing schemes are charged an annual levy, which is a mixture of scheme-based and risk-based levies (Liu and Tonks 2008).

The scheme-based levy is based on the plan's pension liabilities and makes up 20 percent of the total pension protection levy. The risk-based levy is based on the plan's underfunding risk and the insolvency risk of the sponsoring firm. The PPF Board, a government entity, considers the level of underfunding and the likelihood of sponsoring employer insolvency (based on external rating agencies). It may also consider the plan's asset allocation and any other risk factors.

Although guarantees seek to protect beneficiaries against risk, they pose risks in themselves to the guarantors, particularly if incentives are not appropriate. McCarthy and Neuberger (2005) suggest that there is a large chance that the U.K. PPF will default on its liabilities if it sticks with its proposed levy structure. Also it faces severe moral hazard and agency problems, not least because the financing burdens are placed mainly on riskier funds. More generally, the development of pension insurance involves additional agencies regulating DB funds with the risk of overlap and contradiction. It also puts greater pressure on regulators to impose stricter funding rules and asset/liability management to avoid calls on insurance funds that may themselves discourage DB pension provision.

The Role of Accounting Standards

Whereas pension funds are economically subject to longevity risk and wage or inflation risk, under the influence of accounting standards they must take increasing account of interest rate risk (Franzen 2010). Accounting standards are seen as an aspect of regulation since they are a form of market discipline, but they may also impinge on the investment horizon of pension funds. They integrate the sponsor and the fund into one accounting unit valued at market prices, thus leaving the

174 Recreating Sustainable Retirement

sponsor's balance sheet vulnerable to short-term market risk arising from pension fund considerations. The sponsor may hence require the fund, independent of regulation, to invest on a shorter time horizon than would otherwise be the case. Accounting pressures and mark-to-market may also limit investment in illiquid assets such as private placements and private equity, which may increase shortfall risk since these assets are potentially high-yielding.

In practice, there is often an inconsistency between the accounting and actuarial approaches to pension fund valuation. Actuarial approaches tend to look at a fund on an ongoing basis, focusing on accrued and not projected liabilities. Traditional accounting approaches recognize the pension contributions as costs on the sponsor's financial statement, but they do not expose the sponsor to market risk from the pension fund, not least given smoothing and long periods between valuations. The mark-to-market approach to assets and liabilities currently growing in popularity means that the focus is increasingly on the current financial situation of the pension fund, allowing for projected values (Franzen 2010). As noted above, in the U.K. there is also a third form of valuation required by the PPF, related to the cost of buying out liabilities with an insurance company. This has created a dilemma for sponsors, since regulators often focus on the actuarial values while, due to capital market pressures, firms need to take the accounting values into account. The importance of interest rates in calculating accounting liabilities means interest rate risk, which is not an economic risk for ongoing pension funds, becomes dominant.

Indeed, the combination of risk-based regulation with market value accounting has led to a focus on liability-driven investment whose goal is to manage interest rate risk such as immunization and dedication (Franzen 2010). These practices are much costlier than traditional strategies that would have been adopted in risk/return optimization or even ALM. Given their high cost, they are also inducing firms in the U.K. to opt out of provision of DB pensions. But on the positive side, liability-driven approaches adopted by the U.K. Boots plc pension fund also appear to have enabled the plans to ride out the subprime crisis without a shortfall (Skypala 2011). The alternative approach of greater diversification using financial innovations such as collateralized debt obligations (CDOs) proved more than counterproductive, due not only to defaults but also to mark-to-market losses as illiquidity set in and false perceptions of credit quality were corrected.

Accounting pressures on pension funds have arguably contributed to a further trend involving market-based calculations of liabilities for regulatory purposes. In the light of the development of guarantee funds, the fragility of sponsors, and recent financial turmoil, some argue that regulators should be more concerned with measures of termination or wind-up liabilities, as opposed to those for an ongoing fund. Recently, the Dutch shifted to a market-value basis for liabilities and not a fixed rate, while in 2004–5 the U.S. shifted from a 30-year Treasury bond yield to a corporate bond yield where the timing of future benefits will

determine the yield (Laboul and Yermo 2006). Smoothing of the latter helps reduce the impact of short-run market turbulence.

Evolving Regulation of DC Plans

DC funds have not been immune to the asset market volatility caused by the global financial crisis, with losses of as much as 25 percent of portfolios (OECD 2009). This has naturally put a focus on investment risks, highlighting the ongoing importance of costs and annuitization which can also put retirement income security in jeopardy, as well as that of DC holders' level of financial knowledge.

The Regulation of Costs

Many charges are applied to DC funds, including flat rate fees (e.g. a monthly policy fee unrelated to the fund size), deductions from the fund (e.g. the annual management charge is usually expressed as a percentage of the fund value), initial charges (e.g. set-up costs such as the bid–offer spread: the difference between the prices at which investments are bought and sold), and exit charges (e.g. the transfer fee if a member transfers to a different scheme; U.K. Parliament 2012).

There is a growing awareness that DC plans can be very costly for beneficiaries, considerably reducing the pensions accumulated relative to the returns on the underlying portfolios. For this reason there is a risk that accumulations will fall short of what is desired for a comfortable retirement. This is particularly true if these are individually managed plans, suggesting a need for regulatory intervention to limit costs. In a low-inflation environment the impact of costs is even more noticeable.

One option is direct regulation of costs. Under the U.K. Stakeholder scheme, costs are limited to 1 percent of assets per annum, and the new 'NEST' plan aims to deliver to all employees and the self-employed the opportunity to save for a pension at the annual management charge of 0.3 percent per year or less 'today enjoyed only by employees of large firms, by public sector employees or by high income individuals' (U.K. Parliament 2012: 28).

In mandatory funded schemes, direct regulation of fees is common, with maximum fees imposed in countries such as Argentina, Bolivia, and Colombia as well as in Central and Eastern Europe (Tapia and Yermo 2008). In Poland, progressively lower limits are being imposed on fees to put pressure on providers to economize. There may also be restrictions on types of fees, as, for example, in Argentina, where pension funds may only charge fees on contributions.

Another way to limit costs is to create a market structure that generates competition via a central agency or clearing house for pensions, as in Sweden (Tapia and Yermo 2008). This separates costs of fund collection and management from those of asset management, limits marketing costs, and ensures a government

176 Recreating Sustainable Retirement

monopsony to put pressure on asset managers' fees. The central clearinghouse negotiates fees with providers, and a proportion of fees must be rebated to participants so they share in economies of scale in asset management. Similar low costs are ensured in Bolivia by limiting the market to two competitors selected by an international bidding process for the lowest fees, and restricting competition between them (Tapia and Yermo 2008). Nevertheless, low costs in Bolivia may also relate to low costs of asset management for government bonds. Competition per se, without such structures, has tended to increase costs owing to the expenditure necessary to encourage members to switch suppliers. Chile is an example of this, with there being no direct regulation limiting fees and the hope that competition would limit them, when in fact fees there have remained high despite the maturity of the system (Tapia and Yermo 2008).

Another regulatory response to the problem of high costs has been to enforce greater transparency, as in the U.S., where 401(k) plans are now required by the SEC to disclose charges. Similarly, in Australia, the Cooper Review led to tough disclosure rules. In the U.K., there have been industry initiatives such as the National Association of Pension Funds (NAPF) code on disclosure. However, given the lack of understanding by beneficiaries, as discussed later in the chapter, such initiatives may not lower charges.

The Regulation of Risks and Outcomes

Besides costs, the outcome of DC plans and consequent risk to beneficiaries depends on the efficiency of the investment process. Accordingly, the nature of portfolio regulations plays a significant role for such schemes. As noted above, there is a trend to move from quantitative restrictions to prudent person rules that apply both to DC and DB schemes. Nevertheless, countries with pure mandatory DC schemes tend to have QAR (Antolín et al. 2009).

Besides limiting holdings of volatile assets, QAR may apply a minimum investment return, as in mandatory funds in Switzerland, which the government has been forced to reduce owing to market conditions. Or there may be an extension of the forms of risk-based regulation discussed above for DB schemes, as in the case of stress tests in Denmark and a daily value-at-risk ceiling as in Mexico based on the volatility of individual member accounts (based, in turn, on asset prices over 500 days; see Brunner et al. 2008). The Danish system is a hybrid of DB and DC with return guarantees and hence risk-sharing, but is classified here as DC. The stress test based on asset composition provides a 'traffic light' indication of solvency, which drives regulatory intervention (Brunner et al. 2008).

In Australia, pension funds are subject to risk scoring as for other financial institutions, in line with the Netherlands. Although funds are DC, the system takes into account institutions' exposure to financial risks and ability to manage them (including investment strategies and asset allocation), by looking not only at portfolio allocations but also how risk management compares to industry best

practice. Risk scoring then leads to a degree of supervisory oversight and intervention (Brunner et al. 2008). Denmark and Australia, like the Netherlands, require a risk management plan or risk management guidelines during licensing, and the aim through risk scoring is to induce funds to take on best practice in risk management. Australia introduced licensing of trustees at the same time as risk-based supervision and has seen a number of trustees leave the industry; in other words, there has been industry consolidation.

For DC funds in these countries, risk-based regulation has at times been a *quid pro quo* for easing of investment restrictions (Brunner et al. 2008), and this has entailed a more diversified portfolio in Mexico. On the other hand, the Mexican VaR ceiling is criticized in Antolín et al. (2009), as it is centered on a zero mean return while a pension fund needs to consider non-zero means in the returns distribution. Such tools may force pension funds, which are not subject to liquidity risk, to invest in lower risk assets and thereby harm the outcome at retirement, as well as inducing them to sell equities when markets are falling. They may also be vulnerable to modeling error. Brunner et al. (2008) note that it is only manageable to require such a detailed specification of risk management (including precise details of board structure and risk models to use) for all funds when they are small in number, as in Mexico. Meanwhile, the Danish risk-based supervision system is seen as generating shifts from hybrid to pure DC across the funds, partly driven by workers seeking higher returns that come without guarantees.

Whereas risk-based supervision is readily applied to DB funds, as in the Netherlands, it is less clear whether it is appropriate for DC funds, which lack a concept of ‘solvency.’ Instead, some suggest that income replacement targets should be implemented, and scenarios based on contributions and returns (Brunner et al. 2008).

For individual contracts, there may be investment rules that apply in addition to—or instead of—QAR or PPR. The provision of a default option is becoming more common across DC schemes, when individuals may not have the information to invest freely with confidence. Particularly in mandatory schemes, this may entail a form of lifestyle or target date fund which may protect individuals from losses in volatile assets as they draw close to retirement. The age of the participant does affect the nature of the portfolio limits in Chile and Mexico, for example. But it does not in E.U. countries with similar schemes. For instance in Estonia, Hungary, and the Slovak Republic, there is a single default option with zero or few equities. Arguably, this may not be appropriate for younger workers who can afford to take more risk. A similar problem arises in a more acute form in Colombia, Israel, and Poland, which allow no fund choice at all.

By contrast, Australia and Sweden allow providers to establish their own choice menus and individuals to elect therein freely, which may lead to excessive equity exposure for older workers. Some types of voluntary DC fund also involve lifestyle default options as in stakeholder funds in the U.K., although default options

178 Recreating Sustainable Retirement

are less common in voluntary schemes. Impavido and Tower (2009) suggest that default options in the U.S. could reduce the impact of shocks such as the subprime crisis on pension wealth, and hence on household expenditures.

Antolín et al. (2009) show that mean-variance efficient portfolios with low or high equity exposure may not be efficient for pension provision given the trade-off between expected replacement ratio and risk. And a dynamic risk budgeting strategy may be superior to zero equities for the years approaching retirement, although calculating this would be challenging for individuals. They also emphasize that there is no 'single recipe' for DC plans, so factors such as desired participation rates, cultural attitudes to financial risks, and the nature of the pension promise will affect appropriate regulation of outcomes.

Regulation of Annuitization

Annuities can protect individuals from longevity risk, though these are traditionally very little used when voluntary. In the U.S. and Australia, this links to tax disincentives. In Australia, there are no restrictions on payout options from the second pillar, which reduces annuitization demand (Rocha et al. 2010). This is unusual for countries with mandatory funded schemes which typically are tightening regulations on lump sums, as in Chile in 2004 and 2008, where a growing proportion of average wages must be provided in the form of a real annuity for the minimum pension plus a variable annuity or a phased withdrawal.

Other forms of regulation of annuities include those related to prudential regulation of insurance companies, conduct of business regulation of insurance companies, and other aspects of the regulation of annuities within the overall pension system (Davis 2004). These topics are largely beyond the scope of this chapter; suffice to note that risk-based regulation and strict solvency rules are more appropriate for the provision of annuities, which are guaranteed products, than they are for DC and (to a lesser extent) DB pension plans discussed earlier in the chapter.

As regards further regulation of annuities per se, Swiss regulations fix the pricing of annuities—which causes difficulties when bond yields fall (including cross subsidies between individuals). Then the conversion factors have had to be repeatedly lowered, although they are generally higher than could be obtained on the open market, thus encouraging annuitization via the occupational pension fund (Rocha et al. 2010). In Sweden, under the centralized funded system, only two options are offered and annuitization is obligatory. One is a with-profits annuity with minimum guaranteed benefits, which in 2007 had its guarantee cut from 2.75 percent to zero with the hope of raising returns and bonuses. In fact most retirees select the unit-linked alternative from the asset managers where risks and returns are higher (Rocha et al. 2010).

Marketing of annuities is not widely regulated beyond conduct of business rules, except in Chile, which has a licensing regulation for pension advisors as well as caps on broker commissions and an electronic quotation system. This quotation

system is aimed to reduce brokers' influence on costs and hence returns by providing consumers with direct access to a full range of commission quotes.

Annuity regulations are changing also in countries with voluntary schemes. In the U.S., withdrawal from DC funds is becoming more restrictive, while in the U.K. it is becoming less so, with former levels of compulsion in annuitization no longer applying, partly under pressure from low bond yields. Turner and Hughes (2008) note that historically lax regulation of DC fund payouts may have accelerated the shift from DB to DC in the U.S., while in contrast, the requirement of annuitization in Canada may have decelerated the shift by ensuring a 'level playing field'. This does not explain the shift in the U.K., where such a level playing field also prevails—the mandatory inflation indexation requirement for DB pensions in payment may be more decisive (Ashcraft 2008; McCarthy and Neuberger 2009).

Transparency and Financial Education

As highlighted earlier in the chapter, pension benefits from DC plans are inherently uncertain and affected by returns on investment, discount rates, inflation, wages, and employment, as well as life expectancies. Participants must make decisions at a time when the outcomes in these factors are unknown.

For risk-based systems of regulation as in Denmark and Mexico, market discipline is established by ensuring individuals and sponsors are well informed, since there is scope to change providers. In Australia and Mexico, auditors also assess the quality of risk management and must report problems to the supervisor. Nevertheless, supervisory ratings are not typically disclosed to the market. Whereas this is understandable for banks, given the risk of a 'run,' this is not a consideration for pension funds and disclosure would seem to be appropriate. In Chile, efforts are made to help members further by communicating those choices and their implications on a regular basis, as well as giving projections showing likely future pensions by way of pension statements and pension risk simulators. These complement the electronic quotation system for annuities highlighted above.

Pension statements usually include a member's current balance asset allocation, and they can also provide projections about future benefits (although projected pension benefits are never certain). Meanwhile, questions regarding the returns on investments, whether the person will lose his job, or how long the person will live are among the factors that generate uncertainty. Pension risk simulators, used in Chile since 2005, can be used to help employees understand related uncertainty about projected future pension benefits.

To convey this uncertainty, members need projections they can readily comprehend. There are two main approaches to providing projected future pension benefits: deterministic or stochastic projections. The latter offer a range with associated probabilities. A particular advantage of stochastic modeling is that it allows for the uncertainty regarding projections of future benefits from DC pension plans to be quantified. The drawback is that results may be complex and difficult to understand.

180 Recreating Sustainable Retirement

Despite such advances, surveys cited in Tapia and Yermo (2008) show that knowledge of fees is poor in countries such as Poland and Chile. In Poland, there is limited understanding of types of fees paid and 40 percent did not know there is a transfer fee between accounts. In Chile 96 percent of people did not know pension companies receive management fees as a proportion of monthly payments. Since fees are a major determinant of returns and consequent pensions, transparency is again not sufficient.

This discussion highlights the need for education about pensions to complement these forms of transparency, without which beneficiaries will be unaware of risks to retirement income until it is too late. This remains absent, or at least mainly on paper rather than in practice in most countries. It is of course of particular relevance where there is a major element of choice in pension saving and hence in retirement income, such as in countries without mandatory funded schemes or substantial pay-as-you-go pensions.

The Evolution of Pension Portfolios

Fair valuation principles used for accounting purposes have been a key factor behind the decline in equity allocations in pension fund portfolios in the United Kingdom, according to Severinson and Yermo (2012). Risk-based funding regulations have also contributed to the declining equity allocation among pension funds and pension insurance companies in countries such as Denmark and the Netherlands. In complementary work, Shi and Werker (2012) show that the imposition of an annual expected shortfall constraint, or a VaR constraint on a long-term investor, can lead to an economic cost of 2.5–3.8 percent of initial wealth over a 15-year horizon.

These points should not be exaggerated, however, as there has also been a shift to private equity, hedge funds, real estate, and, most recently, unlisted infrastructure equity held in pension funds. Accordingly, risk in pension portfolios has not necessarily fallen. Although bond allocations have increased, particularly in Sweden and the United Kingdom, derisking is more evident in the growing use of interest risk-hedging instruments (such as swaps and options) than in the net change in investment risk in the main asset portfolio. There are also perceptions of changes in long-term asset returns which underlie shifts in portfolios (see also Moore and Pedersen 2014).

Emerging Concerns

Longevity Risk

Longevity is a key determinant of liabilities of DB plans as well as the retirement income provided by DC plans (Cairns 2014). U.S. DB plans from 1995 to 2007

appear to have retained use of outdated mortality tables (from 1983), and few plans used the latest available data (IMF 2012). Pension liabilities may be underestimated by at least 12 percent as a consequence, implying a major risk of inadequate funding. In Switzerland, despite the mandatory funded system, pension funds can also choose their own mortality tables and discount rates for estimating liabilities (Rocha et al. 2010). In the Netherlands, a change in the mortality table in 2010 led to an increase in measured liabilities of 7 percent. Because of the way in which liabilities are calculated, longevity risk is particularly sizeable in a low interest rate environment. Using the methodology proposed by Impavido (2011), at a 6 percent interest rate, a three-year rise in longevity raises liabilities by 8 percent, but at 2 percent interest liabilities rise 14 percent.

One response has been to increase risk-sharing. Dutch pension regulators have arrived at an accord that stabilizes contributions, ensures up-to-date mortality calculations, and requires the risk of longevity and market performance to be reflected in retirement ages and benefits (IMF 2012). Such a shift is likely to make DB funds in that country more sustainable. Market-based transfers of longevity risk could also occur via buy-ins, buyouts (both with insurers), and longevity bonds. Meanwhile it is essential that countries ensure mortality tables are updated, as was apparently not the case in some U.S. pension funds.

Procyclicality of Funding and Investment Rules

Risk-based regulation and fair value accounting could incentivize procyclical investment behavior such as the fire-sale of assets in market downturns (Severinson and Yermo 2012). Besides generating unnecessary losses for pension funds per se, this could lead to price distortions in less liquid markets, as witnessed during the 2008–9 crisis in some maturity segments of derivatives markets used by pension funds and life insurers to hedge interest rate risks. This effect is compounded by a supply problem in long-term government bonds, as pension and insurance liabilities are often substantially larger than the stock of long-term government debt. Besides fire sales, inappropriately designed regulations could force companies to contribute heavily after a crash while not incentivizing build-up of contributions in an upturn (Impavido and Tower 2009). These can have a macroeconomic impact on company investment, to add to other macroeconomic effects via pension funds, such as those on personal wealth, and via calling of government guarantees. Moreover, Antolín and Stewart (2009) and Yermo and Severinson (2010) show that after the crisis there were measures of regulatory forbearance such as longer periods to recover shortfalls (in Canada, Netherlands, U.K., U.S.), moratoria on contributions (in Japan) and lower minimum returns (in Switzerland). Besides allowing funds to remain viable, they prevented damaging fire sales of assets that could have further destabilized markets.

Yet regulations remain damagingly procyclical (Yermo and Severinson 2010), meaning that it will be important to reduce the reliance on current market

182 Recreating Sustainable Retirement

values when determining contributions. In particular, it has been suggested that smoothed discount ratios could be used for liabilities, as is already the case in the U.S. and Japan. Or, as in Canada, regulators could use average rather than current solvency ratios in calculating minimum funding requirements. There could be greater encouragement of surpluses in good times via more flexible tax ceilings, while also limiting contribution holidays and sponsor access to surpluses. And the calculation of minimum funding could pay more attention to security mechanisms such as insurance schemes that are in place. These suggestions, of course, are in contrast to the development of risk-based and market value-based regulation highlighted above.

Conclusion

In the wake of the market crises over the last decade, along with a growing awareness of the shortcomings of pension plan finances, there has been widespread innovation in the regulatory field. Increasingly, and appropriately, regulation has grown more focused on risk to beneficiaries both within the portfolio and arising from other aspects of pension systems such as costs and lack of consumer education. In this context, we highlight countries such as the Netherlands (for DB) and Sweden and Australia (for DC) as having regulatory innovations worthy of attention, although some shortcomings remain, as discussed above. We have argued that further progress in managing and controlling risk remains vital, for example in the fields of longevity risk, procyclical behavior of funds, and financial education. These remain threats to retirement income security that regulators need to bear in mind in future reforms.

It has also been shown that a number of regulatory developments have been counterproductive, inducing pension funds to be increasingly short-term in their investments and focusing on interest rate risk, which is not economically relevant for pension funds. In this light it is worth asking whether pension funds need a Basel III in the wake of the crisis—a new global regulation like that currently being introduced for banks (Basel Committee 2012). As noted, the successive Basel agreements have put an increasing focus on the need for sufficient capital to protect against solvency risk, but also measurement of risk and, in the case of Basel III, including consideration of macroprudential as well as individual institution risk.

Some would contend that global agreements are not needed, since pension funds do not compete across borders and pension policy remains national. Moreover, failure of a pension fund does not usually generate significant externalities either within countries or across borders. That said, some global similarity in the regulation of company funds would be beneficial to multinationals, which are forced at present to set up individual and idiosyncratic funds in each of their operating countries. As noted, Basel III tightens solvency regulations for banks,

and similar tightening might help pension funds, although it could at some point also become counterproductive by enforcing holding of low-return assets and/or inducing procyclical investment and portfolios. Liquidity regulations for banks are being introduced for the first time at a global level with Basel III. These do not apply to pension funds, given that their liabilities are long-term—although for mature funds and especially those that are winding down, liquidity is more important. Furthermore, one area of particular interest which does feed through from Basel III is the idea of offsetting procyclicality. As noted, the easing of pension regulations on an ad hoc basis has followed the subprime crisis. The next challenge will be to develop and implement risk-based regulation sufficient to ensure there are not undue and counterproductive countercyclical shifts in pension asset portfolios, forcing sponsors to sell shares at the very point when they are likely to be most profitable. This may in turn be generated by inappropriate forms of risk-based supervision. Furthermore, as in Basel III, macroprudential regulation of pension funds may need to be developed, given the often-neglected macroeconomic consequences of their collective behavior.

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