

Defined-contribution pension schemes

Risks and advantages for occupational
retirement provision

Defined-Contribution Pension Schemes: Risks and Advantages for Occupational Retirement Provision

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Preface

Securing adequate retirement income has been a top priority for governments in Europe for many decades. This concern featured largely in the creation of pension and social security systems, which guaranteed a decent standard of living in old age. The situation is undergoing fundamental changes today, with ageing populations putting strains on public spending. Although the precise nature of the pension challenge differs across the European Union, today's solutions are in most cases sub-optimal. Better solutions are needed to address the retirement needs of individuals. The common purpose of all involved in the pension industry – legislators, regulators and financial institutions – should be to pursue that objective.

Although there is hardly a single universal solution to the pension challenge, achieving more and better household savings for retirement is one way of increasing retirement security. A recent report by the EU Financial Services Committee on ageing populations and financial markets, which was endorsed by EU Finance Ministers (ECOFIN), addressed this issue in a comprehensive manner, and called for a modernization of pension markets, products and schemes, with a special call to the industry to enhance the supply of pension savings products.

Opening pensions markets to new pension products may seem like a straightforward task. However, pension provision is a sensitive topic, and discussions and debates on solutions to the pension challenge are often fraught with misapprehension. The role of defined-contribution (DC) schemes in occupational pension is a telling example of a topic where the debate often is characterized by non-factual claims and misgivings. Given the need for a more balanced and informed discussion on this topic, EFAMA is proud to publish the report on *Defined-contribution pension schemes: Risks and advantages for occupational retirement provision*, prepared by independent economic consultancy, Oxera.

Based on a comprehensive analysis of the risks of DC schemes for individuals, as well as the advantages they offer, the report shows that criticisms of such schemes are often unfounded, as the risks associated with the schemes are overstated while their advantages are downplayed.

By drawing on the main findings contained in the report, a number of policy messages can be presented, including the following.

- DC schemes are in essence long-term savings vehicles. Hence, the level of retirement wealth accumulated depends primarily on the average return achieved, which results from the way in which assets are invested and in particular the extent to which they are diversified. The fact that regulation in a number of countries continues to impose minimum return guarantees or similar investment constraints stresses the need to foster policymakers' awareness about the high cost of these restrictions in terms of forgone returns. Oxera's findings shed some very helpful light on this aspect of pension saving regulation. In a nutshell, an investment framework that allows efficient portfolio diversification across all asset classes serves best. Moreover, efficient portfolio solutions are available for managing risk, taking into account factors such as the age and retirement date of the individual and the expected amount of public pension.
- A growing number of defined-benefit schemes are closed to new members and the generosity of public pension systems is decreasing. Combined with a lack of awareness about the level of savings required to offset these trends, these factors are likely to affect the quality of life of many people in the future, especially among low-income households. A most credible way of preventing the ticking social time bomb from ever

coming to pass would be for Member States to encourage greater participation and contribution levels of households in DC schemes. Solutions such as “opt out” choices and tax subsidies should be extended to achieve this objective.

- Oxera’s review of existing arrangements confirms that sound governance and risk management best practices can be implemented in the best interests of DC scheme members. This is an important confirmation, which hopefully will reassure policymakers – just like the solutions that are reviewed to address concerns about the ability of individuals to make the right choices when deciding how to invest their DC pensions, e.g. pre-selection of investment options, default option and targeted information and advice. We at EFAMA recognize that clear, reliable and comprehensive information is needed to address the individual information problem, and we encourage the European Commission and Member States to investigate whether the MiFID principles should not be extended to the distribution of pension products to ensure suitable advice and transparency of product and fees.
- Finally, instead of facing a fragmented and constrained European market for occupational pensions, individuals should enjoy portable occupational pension arrangements tailored to their specific needs. Not only would this increase individuals’ welfare – it would also increase job mobility, aggregate savings and economic efficiency. The evidence available in Oxera’s report highlights how cost efficiencies can be achieved through economies of scale in pension administration and investment management. Ensuring a level playing field across the European market whilst fostering competition would also offer advantages in terms of choice and cost-effectiveness. Therefore we urge the European Commission once again to develop an appropriate regulatory and supervisory framework that could support the creation of DC-type pension products, fully portable and mutually recognized within the European Union. As the European Parliament noted in its recent resolution on financial services policy (2005-2010), the adoption of such a framework would have the additional benefit of fostering favourable conditions for cross-border job mobility in an integrated single market.

It is clear from the report that outdated stereotyped views on DC schemes must be abandoned. EFAMA trusts that the present report will stimulate a healthy debate on the role of DC schemes in occupational pension provision, and urges national legislators and the EU Commission and Parliament to consider the report’s findings as part of their commitment in addressing the challenge of ageing populations.

Mathias Bauer
EFAMA President

Executive summary

Across EU Member States, a clear shift is being seen towards occupational pensions in defined-contribution (DC) form, although the nature, extent and pace of this shift differ between countries. Existing defined-benefit (DB) pension schemes are being restructured and/or new schemes introduced that are mainly of DC type. This shift is occurring alongside wider changes in the pension landscape—ie, the growth in the prevalence of private funded pension schemes in light of the increasing strain on public finances.

Perception and reality

The shift towards DC pensions has been subject to much commentary and criticism. However, there is often a mismatch between perception and economic reality. In addition, and perhaps partly as a consequence, there is also a potential mismatch between current market operation (shaped by diverse regulations and historical practice) and the actual requirements for product characteristics and pension scheme design. There are at least three key aspects to emphasise.

- Contribution levels matter. Where the shift towards DC is accompanied by an overall reduction in pension contributions, this will result in lower levels of retirement wealth, but for reasons that have little to do with the shift to DC pensions per se. Lower contributions to a pension scheme imply lower pension benefits, irrespective of whether the scheme is DC or DB—pension provision is not a ‘free lunch’.
- All forms of pension carry risks. The fundamental difference between the different types of pension scheme relates to the allocation of risks between the parties. In a DC scheme, the main source of risk to an individual is investment risk—a risk that is borne by the sponsoring employer in a DB scheme. However, DB schemes expose individual members to other types of risk, and these risks are often underestimated.

Investment risk in DC schemes can be mitigated, either by investing in ‘safe’ assets or by shifting the risk to another party (eg, a financial institution providing a guarantee). However, given the trade-off between risk and return, both approaches come at a cost.

- In DC schemes, contributions are paid into individual accounts and invested over the long term to deliver a pension upon retirement. For a given level of contributions, the level of retirement wealth accumulated depends on the net investment returns accrued in the account, and hence the performance of the investments in financial markets.

At their core, DC schemes are therefore vehicles for long-term savings and investment. They do not necessarily need to have an insurance component. An insurance vehicle may be the obvious choice where the occupational pension is provided with a certain type of guarantee by a third party (ie, the insurer), or where the pension payout is defined in the form of a predetermined annuity at retirement age. When there is no guarantee requirement, the reason that insurance may nonetheless be the chosen vehicle for the accumulation phase appears to be more related to tax, regulations or historical precedent than any fundamental differences in the product characteristics between insurance and investment products.

Given the long-term savings plan characteristics of DC schemes, the core functions in accumulation consist of carrying out investment and advice functions, and providing the investment expertise required to manage risks, maximise returns, diversify portfolios, etc. These functions are asset managers’ areas of expertise.

Investment framework: quantitative evidence

Using analysis of historical asset returns data and simulations to model pension asset accumulation under different investment strategies, the report contains a significant body of evidence to demonstrate that:

- ‘safer’ assets (eg, government bonds) may have lower risks, but also imply on average lower returns. Holding instead a significant proportion of the portfolio in equity during the pension accumulation phase (or until a few years before retirement) can result in significantly higher retirement wealth, at comparatively low risk, given the long investment horizon over which pensions accumulate;
- minimum return guarantees limit the shortfall risk for individuals that may result from financial market volatility, but they also limit individuals’ participation in the upside benefits. The cost in terms of forgone returns, and hence lower retirement wealth, can be particularly significant if the guarantee is used throughout most or all of the pension accumulation phase.

DC pension investment can be structured along a broad risk–return spectrum. Specific investment solutions for DC pensions are already being developed in the market, ranging from life-cycle investment approaches to tailored solutions that seek to achieve specific target retirement outcomes for individuals.

Irrespective of the individuals’ risk preferences and retirement wealth expectations, effective management of investment risk requires an investment framework that allows efficient portfolio diversification. Regulations that strictly limit investment in certain asset classes may result in pension assets not being invested in the best interests of pension scheme members, implying portfolio holdings that are not risk–return optimised. This makes the case for an investment framework based on prudent-person principles, provided for at the European level in the Directive on the Activities and Supervision of Institutions for Occupational Retirement Provision (IORP).

Individual responsibility and choice

DC pension schemes tend to place more of the responsibility for planning for retirement on individuals. This can have significant advantages, in terms of flexibility and choice for individuals to adjust their pensions in line with their needs and preferences. However, there are valid concerns about the ability of individuals to exert choice and make the right decisions when it comes to their pensions. Two main types of solution are available to address the individual choice problem. They are applied, usually in conjunction, by existing DC schemes.

- Change or limit the choice set for individuals—eg, pre-selection of the range of investment options from which individuals can choose, or specification of a default option for those individuals who are unable or unwilling to make an active choice.
- Improving the capability of individuals to make choices—eg, provision of targeted information, financial advice, automated pension-decision tools, and broader financial education programmes.

Improving individual decision-making is likely to remain a key policy objective.

Importance of scheme governance

DC pension schemes can be structured to deliver best-practice governance. DC scheme governance is all about providing the structures and processes to ensure the safeguarding and investment of pension assets in the best interests of scheme members—ie, clear allocation of decision-making responsibilities, oversight of administration and investment functions, asset protection, and transparency and disclosure.

Existing governance solutions vary significantly between countries and schemes. There is no single governance solution that works in all circumstances. Rather, arrangements emerge from, and need to be adapted to, the specific institutional framework and DC scheme structure and design.

Cost issues

Cost-efficient solutions for DC pension provision can be found by seeking to exploit economies of scale in the administration, asset management and distribution functions of a scheme. In particular, pensions organised at the occupational level deliver efficiencies over personal pensions, mainly through cost savings in distribution and administration. Despite their collective character, they can be structured to offer pension solutions that are to a significant degree individualised.

Informing the policy debate

Enhancing the efficiency and overall adequacy of pension provision will continue to be a major challenge. This report contributes to the policy debate by providing a systematic analysis of the role of DC schemes, highlighting the risks and advantages for individual scheme members. Using evidence on the growth and structure of DC schemes emerging in seven EU Member States, it examines four aspects of DC scheme design that are key to ensuring effective occupational pension provision: the framework for pension investment; the measures introduced to facilitate individual choice and decision-making; scheme governance; and the scope for cost efficiencies in pension provision.

1 Introduction to the study

1.1 Background and objectives

Since the mid-1990s, reforms have been launched across Europe with a view to addressing the growing problem of providing pensions for retirement. Countries are implementing measures to strengthen the sustainability and performance of their first pillar state pension systems by increasing the funded element of these systems to complement traditional pay-as-you-go (PAYG) funding, as well as by simply reducing the generosity of the state pension system. Reforms of the first pillar of national pension provision are often accompanied by measures to strengthen the provision of retirement income through occupational pensions in the second pillar and individual pensions in the third pillar.¹

These changes have led to a general shift towards individuals taking more responsibility for the provision of adequate pension income for their retirement. This shift manifests itself in two main ways. First, there is greater reliance on private sector pensions to substitute or supplement the historically higher state pension benefits. Second, pension schemes increasingly take the form of defined-contribution (DC) schemes, in which individuals' retirement wealth depends on the performance of their investments in capital markets, as opposed to defined-benefit (DB) schemes, which guarantee a certain replacement rate at retirement.

This report focuses on the risk–reward implications of the shift towards DC schemes and the microeconomic aspects of scheme design to deliver effective pension provision for individuals. The changes that are occurring in the pension landscape also have wider macroeconomic and social consequences, but these implications are not discussed in the report.

The focus here is on the shift towards DC schemes in occupational pension provision in the second pillar only. In many countries, individual pension savings schemes in the third pillar are also growing in importance, and these schemes are also largely DC in nature.

The main objective of the report is to examine the following.

- The extent and nature of the shift towards DC occupational pension provision in Europe, drawing on evidence on the growth and structure of schemes emerging in seven EU Member States (France, Italy, Germany, the Netherlands, Poland, Sweden and the UK).
- The risks of DC schemes for individuals as well as the advantages they offer.
- Key aspects of DC scheme design, with examples from the schemes observed in the sample of Member States, focusing on:
 - the investment framework, including in particular the investment options and strategies available for managing individuals' exposure to risk in DC schemes;
 - the measures introduced to facilitate individual choice and decision-making;
 - the structures available to ensure effective scheme governance; and

¹ In the three-pillar model of pension provision, individuals can obtain retirement income from the state pension system (first pillar), supplementary occupational pensions or more generally pensions that are linked to the employment status of the individual (second pillar), and private pension savings that are based on individual voluntary decisions and are independent of the occupational position (third pillar). This three-pillar classification broadly follows the terminology used in European Commission (2005 and 2006). However, there is at present no uniform definition and classification of the three pillars in the EU, and a different terminology is used, for example, in the new EU 12 Member States that have adopted the World Bank model of pension provision; see Oxera (2007).

- the cost of pension provision, including evidence on how scheme structure can influence costs.
- The role that asset managers can play in occupational pension provision, including, in particular, the asset management solutions available to manage the investment risk for individuals in DC schemes.

Although there is a growing body of academic and professional literature, relatively little discussion has been held on the cross-country and -scheme differences along the above dimensions. This research addresses this gap in the literature. It draws from the existing academic literature as well as professional studies. In addition, detailed information was gathered from primary and secondary sources to describe pension developments and DC structures emerging in each of the seven Member States. Extensive data was collected to conduct quantitative risk–return analysis, and a simulation model developed to examine retirement wealth accumulation under different DC plan specifications. Finally, in-depth interviews were conducted with asset managers in different countries and other stakeholders to obtain information about developments in the national occupational pension markets, and, in particular, the role of asset managers in those markets.

1.2 Structure

The report is structured as follows.

- Section 2 summarises the main research findings and draws conclusions.
- Section 3 describes the shift towards DC occupational pensions. It reviews how the shift manifests itself in different EU Member States and describes the various scheme structures that are emerging, with more detailed country descriptions contained in Appendix 1.
- Section 4 sets out the main economic characteristics of DC-type pension schemes, by comparing them with the key DB pension scheme characteristics and highlighting the risks and advantages of DC schemes for individuals.
- Section 5 considers the investment framework of DC schemes. Using quantitative risk–return analysis, it examines the risks of different investment strategies and the investment options available to manage those risks. It also discusses the role that financial institutions, particularly asset managers, can play in providing product solutions.
- Section 6 addresses concerns about the ability of individuals to make decisions and make the ‘right’ choices when it comes to pension savings. It examines the solutions available to facilitate and enhance individual decision-making in DC schemes.
- Section 7 discusses the governance of DC schemes, focusing on arrangements governing the safeguarding and investment of pension assets for individual scheme members.
- Section 8 examines the cost implications of using different scheme structures and products in pension provision.
- Appendix 1 contains country descriptions of the shift towards DC occupational pension provision. Appendix 2 reviews some of the literature examining the factors underlying the shift from DB to DC schemes and the risks and advantages of the two types of scheme. Appendix 3 describes the methodology of, and extended results from, the simulation model used in the quantitative risk–return analysis of different DC pension plans in section 5. Appendix 4 contains the bibliography.

1.3 Acknowledgements

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2 Summary of main findings

This report examines the shift towards DC occupational pension provision in EU Member States. It provides an evaluation of the risks and advantages of DC schemes, examining how the schemes can be designed, what solutions are available, and what role asset managers can play to ensure effective pension provision via DC schemes.

The main findings contained in the report are summarised below.

2.1 The shift towards DC occupational pensions (section 3)

- There is a clear shift towards providing occupational pensions in DC form. However, the extent and nature of the shift differs significantly between countries. This report examines the extent and nature of the shift towards DC using seven countries as an illustration (France, Germany, Italy, the Netherlands, Poland, Sweden and the UK).
- The pension structures that are emerging involve a diverse and often complex set of allocations of risks and responsibilities between employers, employees and financial institutions, which often cannot be unambiguously described as DC.
- ‘Pure’ DC pension schemes, where pension benefits vary depending on contribution levels and the returns of the plans’ investments, are at one end of the spectrum of possible scheme designs (Figure 2.1). At the other end of the spectrum are traditional ‘pure’ (final-salary) DB schemes, which guarantee a certain replacement rate and specify pension benefits according to the employee’s final pay, length of service and other factors. Many actual pension schemes combine characteristics of the two, and thus lie somewhere along this spectrum.
- The shift is defined as a movement along the spectrum of pension scheme design. This shift takes the form of existing DB schemes being restructured and/or new schemes introduced that are mainly of DC type, including in those countries where occupational pension provision has historically not been significant. Importantly, the shift occurs as part of wider changes in the pension landscape—ie, growth in the prevalence of private funded pension schemes in both absolute and relative terms, given the increasing strain on PAYG state pensions (which also tend to be of the DB type).

Figure 2.1 Spectrum of pension scheme structures

‘Pure’ DB (final salary)	Average- salary DB	Various hybrids	DC with guarantees	Outcome- oriented DC	‘Pure’ DC
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Source: Oxera.

- The Netherlands and the UK have by far the largest occupational pension markets in Europe, with pension assets amounting to 130% and 90% of GDP in 2005.
 - In the Dutch market, there has been a marked shift away from final-salary DB plans (10% of pension fund members in 2006 compared with 67% in 1998) towards average-salary DB plans. Pure DC plans remain insignificant in the Dutch market, but hybrid structures with DC elements are gaining in importance.
 - In the UK market, the shift towards DC has gone further, with many DB schemes being closed to new members and growth in structures that are of DC form or

hybrids. There has also been growth in the new contract-based stakeholder pensions, established in 2001 as a vehicle for both occupational and personal pension provision; these are exclusively DC.

- The shift towards DC has, to a large extent, been stimulated by changes in the legal and regulatory frameworks of countries as part of wider reforms to enhance private pension provision. For example, in Italy, a law was introduced that established open and closed pension funds, which are uniformly DC, to replace funds that were of DB, DC or some hybrid form. Other examples include the establishment of the PERCO scheme in France, stakeholder pensions in the UK and employee pension programmes in Poland. These are all of pure DC form, without explicit minimum guarantee. However, the plans can be structured to include a guarantee as an option, and can also be invested to target specific retirement outcomes.
- The extent of the shift towards DC may instead be restricted by laws and regulations. For example, in Germany, the sponsoring company remains obliged to guarantee at least the level of contributions made to the scheme. Hence, adoption of pure DC occupational pension schemes is not possible—schemes can, at most, shift towards DC-type pensions with a (minimal) guarantee.
- A ‘money-back’ guarantee by the plan sponsor may also be established through agreement, as is the case for the industry-wide occupational schemes in Sweden, which have been restructured from DB to provide DC-type pensions for all employees (a scheme for blue-collar workers) or for young employees only (a scheme for white-collar workers).
- Instead of, or in addition to, the employer sharing part of the investment risk through providing a minimum guarantee, arrangements can be such that part of the risk is shifted to a financial institution. Occupational pensions operated by insurance companies often come with a guarantee of a minimum rate of return; they are of DC type because, although they limit the downside risk (and participation in the upside benefits), the performance still depends on the underlying investment.
- In Sweden and Poland, the shift towards DC manifests itself through the introduction of a mandatory funded tier in the first pillar, requiring individuals to channel a fixed proportion of their salaries to individual accounts in which assets accumulate on a DC basis. While not occupational schemes as such, these schemes have full (or partial but gradually growing to full) coverage of the workforce, thus expanding the employment-related DC pensions sector in these countries significantly. There are also plans in the UK to introduce a system of mandatory individual pension accounts.
- The shift towards DC pensions changes the role of intermediaries, including asset managers. As with DB schemes, asset managers can play their traditional role and carry out core investment and advice functions under a mandate by a scheme sponsor or governing body. However, they can also play a key role as product provider. Thus, asset managers can act:
 - **as an external asset manager** by means of a mandate and delegation from the sponsor or governing body of the pension scheme; and/or
 - **in the provision of product solutions** for occupational pensions. This includes the creation of funds, including Undertakings for Collective Investment in Transferable Securities (UCITS) and non-UCITS to pool assets held by a scheme, as well as the packaging of different products. These funds can be wholesaled to a variety of pension products or wrappers and distributed indirectly via pension platforms operated by other pension providers (eg, platforms run by insurance companies). Alternatively, asset managers may distribute their pension products directly to

employers (and/or employees), bundled together with the relevant pension administration services.

Examples of asset management firms directly providing DC pensions include open pension funds in Italy as well as the PERCO scheme in France, where, in addition to fund provision, the management firm is often the holder and administrator of the individual accounts.

- Contract-based occupational pensions are often provided by insurance companies. An insurance vehicle may be the obvious choice where the occupational pension is to be provided with a certain type of guarantee by a third party, or where the pension payout is defined in the form of a pre-determined annuity at retirement age. When there is no guarantee, DC pension plans in the accumulation phase are effectively no more than a long-term savings and investment vehicle for individuals. Insurance may nonetheless be chosen as the distribution vehicle, although for reasons that appear to be more related to tax, regulations or historical precedent than any fundamental differences in the product characteristics between insurance and investment products.

2.2 Risks and advantages of DC schemes (section 4)

- Many critiques of DC schemes focus on specific disadvantages, without taking into account all aspects relevant for the evaluation of different pension scheme designs. DC schemes can have significant advantages, as is supported by a wide body of academic literature comparing the economic characteristics of DC and DB schemes.
- If the shift towards DC is accompanied by an overall reduction in pension contributions, lower levels of retirement wealth will result, although for reasons that have little to do with the shift to DC schemes per se—lower contributions to a pension scheme imply lower pension benefits, irrespective of whether the scheme is DC or DB.
- Pension provision is not a ‘free lunch’, and the more relevant comparison of different pension schemes is one that holds the cost of pension provision constant—ie, ensuring that in any comparison of the outcome for potential pensioners the total level of contributions is the same.
- The fundamental difference between the two types of pension relates instead to the allocation of risk between the parties. The main source of risk to an individual in a DC plan is investment performance—for a given level of contributions, asset accumulation in the individual account depends on financial market returns and the chosen investment approach. In a DB plan, this risk is borne by the sponsoring employers, who will have to change their level of contributions as the investment returns vary.
- While pure DC plans expose individuals to investment risk, they are not necessarily riskier for individuals than DB plans; nor are DB plans without risk. DB plans expose individuals to other types of risk, and the riskiness of DB plans is often underestimated.
- DB plans tied to the final years of earnings expose employees to risk associated with changing wages and jobs during their career. DC plans, where contributions depend on lifetime earnings and where pension rights tend to be more portable, can deliver better value (in terms of the relationship between contributions and pension benefits) as job mobility increases. The relative value of DC schemes increases further given the risk that employers may reduce benefits ex post (eg, in the event of bankruptcy).
- DC schemes can have further advantages in terms of the control they give individuals over their pensions assets, allowing them flexibility and choice to adjust their pensions in line with their needs and preferences. DB plans, on the other hand, require individuals to

accumulate the pension in the form of deferred life annuities and thus limit the risk–return choice.

2.3 Options to manage investment risk (section 5)

- The shift towards DC pensions results in a reallocation of investment risk to pension scheme members. Investment risk can be mitigated by investing in safer assets or by shifting the risk to another party (which, in a DB plan, is the employer, but in a DC scheme can be a financial institution providing a guarantee).
- Both approaches give individuals some certainty over their investment and corresponding retirement wealth accumulation. However, both come at a cost, as supported by a significant body of new quantitative evidence presented in this report.
- There is a general trade-off between risk and (average) return; hence, a reduction in risk usually means a reduction in average returns, which can have a significant impact on retirement wealth accumulation.
- The simulations contained in this report show that holding a significant proportion of the investment portfolio in equity during the pension asset accumulation phase (or until a few years before retirement) can substantially increase retirement wealth, at comparatively low risk over the longer investment horizon.
- On average, equity investment generates higher returns than investment in bonds, and over the longer run low rates of return during some periods are balanced by higher returns in others. Hence, ‘bad’ outcomes associated with equity investment become less likely as the holding period increases.
- Minimum return guarantees impose costs in terms of forgone retirement wealth accumulation in individual accounts. While limiting the shortfall risk for individuals that may result from financial market volatility, these guarantees also limit individuals’ participation in the upside benefits. This cost can be particularly high if the guarantee is used throughout the entire accumulation phase.
- DC pension investment can be structured along the broad risk–return spectrum (Figure 2.1). Asset managers have a role in developing investment solutions that suit different risk appetites and maximise the risk–return performance overall. Specific solutions are being developed in the market that are directly targeted at meeting the needs of individuals when it comes to DC pension investment, ranging from life-cycle investment approaches to tailored solutions that seek to achieve specific target retirement outcomes. Further research would be useful into how DC pension investment can be tailored to meet individuals’ retirement needs, and new product solutions are likely to develop accordingly.
- Effective management of investment risks requires a framework that allows efficient portfolio diversification. Regulations that strictly limit investment may result in pension assets not being invested in the best interest of pension scheme members, enforcing portfolio holdings that are not risk–return-optimised. They tend to focus unduly on the risk of individual assets and fail to take into account the fact that, at the level of the portfolio, risk can be reduced through diversification.
- A restrictive investment framework conflicts with prudent-person principles, which are endorsed at the European level through implementation of the Directive on the Activities and Supervision of Institutions for Occupational Retirement Provision (IORP). Within a prudent-person framework, it can be appropriate to limit certain categories of investment, including securities issued by the plan sponsor.

2.4 Solutions to facilitate individual choice and decision-making (section 6)

- DC pension schemes tend to place more of the responsibility for planning for retirement on individuals. However, the degree of individual choice and decision-making responsibility varies between countries and between schemes within a country. It depends on the design of the scheme, and may also be determined by law or regulation.
- Individual choice can have significant advantages. In particular, it offers flexibility to structure pension savings in line with individual needs and preferences. However, there are valid concerns about the ability of individuals to exert choice and make the right decisions when it comes to their pensions.
- Focusing on decisions regarding how to invest pension assets, the DC or DC-type schemes examined in this report have implemented measures to facilitate individual choice through the provision of packaged pension investment solutions, pre-selection of the range of investment options among which individuals can choose, and/or specification of a default option for those individuals who are unable or unwilling to make active investment decisions. Where default options are introduced, the challenge is to design them such that they generally meet the retirement needs of individuals using the default option.
- Occupational schemes put effort into providing information, including targeted communications, to scheme members. Financial advice and automated pension decision tools can further add to individuals' ability to make the right decisions.
- Initiatives to enhance the general financial capability of individuals through educational programmes are also being implemented and have been shown to deliver some positive effects, if only in the longer term.
- As individuals are given greater control and responsibility, their decision-making ability is likely to improve over time through learning and familiarity. In the meantime, addressing the concerns about individual choice in DC schemes is likely to remain a key policy objective. Examining how individuals make choices and what can be done to help them make better choices when it comes to their retirement provision is also likely to remain an important area of further research.

2.5 Structures to ensure effective scheme governance (section 7)

- Governance in pension schemes of the DC form is all about providing the structures and processes to ensure the safeguarding and investment of pension assets in the best interest of scheme members. There is no single governance solution that works in all circumstances. Rather, arrangements emerge from, and need to be adapted to, the specific institutional framework and scheme structure and design.
- Existing governance solutions vary significantly between countries and schemes, but they all seek to provide a framework for allocating decision-making and oversight responsibilities between the relevant parties, ensuring asset protection, and promoting transparency and disclosure.
- In occupational schemes, where the pension is provided through a contract with a financial institution, there is in principle no equivalent to a trustee or similar body that acts on behalf of scheme members and is responsible for the operation and oversight of the scheme. However, employer-led pensions committees (with member representation) or a body with similar responsibilities can be established in contract-based schemes—eg, to select the range of investment options to be made available and to monitor the performance of the pension provider in relation to both administration and investment.

- There are other checks and safeguards. In particular, pension providers are financial institutions that are subject to regulations. Focusing on asset managers, such checks include the authorisation process, prudential framework, training requirements and fit-and-proper tests to ensure competency of key personnel, asset segregation requirements, disclosure rules, and other conduct-of-business standards.
- Additional regulatory requirements apply to the operation and management of collective investment schemes (eg, UCITS)—for example, clear accounts for individual holdings, regular pricing, disclosure and, importantly, a depositary responsible for safeguarding assets, with additional fiduciary responsibilities regarding monitoring and control. These provisions have much in common with the governance requirements for a DC pension product—they are implemented to provide a savings vehicle which allows the safe accumulation of assets.
- The review of existing governance arrangements provides examples of clear structures and processes being implemented through laws and regulations as well as market solutions (eg, contractual arrangements, self-regulatory codes of conduct). Importantly, pension scheme governance remains high on the agenda, and initiatives are being proposed and implemented to develop and improve existing frameworks and ensure effective pension provision.

2.6 Cost-effectiveness (section 8)

- The costs of pension provision can have significant effects on the level of pension wealth accumulated (or the level of contributions required to deliver a given stock of wealth at retirement). In DC pension schemes, this manifests itself largely through lower net returns.
- Cost-efficient solutions for DC pension provision can be found by seeking to exploit economies of scale in the administration, asset management and distribution functions of a scheme, subject to constraints imposed by the desired degree of individual choice and flexibility, as well as the chosen objectives for the investment of pension assets in the individual account.
- Pension arrangements at the occupational level deliver efficiencies over personal pensions, mainly through cost savings in distribution and administration. Despite their collective character, they can be structured to offer pension solutions that are to a significant degree individualised.
- Pension structures are developing (and are already being observed in some markets) that serve both occupational and personal pension provision in DC form, allowing efficiencies to be realised by joining up product offerings in the second and third pillars of the pension system.

3 The shift towards DC in occupational pension provision

This section describes the shift towards providing occupational pension benefits in DC form. While there is no doubt that this shift is occurring, its extent and nature vary from country to country. Moreover, the pension structures that are emerging often involve a complex system of allocation of risks and responsibilities between employers, employees and financial institutions. The diversity and complexity of emerging pension plans, as well as lack of comprehensive data, make consistent quantification of the shift difficult.

In addition, in most countries the shift within occupational pension schemes is occurring alongside wider changes in the pension landscape. Demographic changes and the resulting ageing population have raised concerns that existing PAYG state pensions in the first pillar of pension provision are politically (or even economically) not viable because of the size of the implied direct transfer through taxation between the working population and the retired population. This has led to a more general shift towards funded private pensions, organised either through occupational plans in the third pillar or individual plans in the third pillar. Again, there is a considerable variation between countries with respect to the nature and extent of this wider shift.

This section, and the report overall, is primarily concerned with the shift in emphasis within occupational pensions towards DC pensions, but it should be read in the context of this wider rebalancing of pension provision.

Using illustrations from seven EU Member States, this section examines how the shift towards DC or DC-type occupational pensions manifests itself in different countries, and describes the various scheme structures that are emerging (more detailed country descriptions are provided in Appendix 1). It also summarises the functions in DC pension provision and the role asset managers can play along the whole value chain—ie, core asset management, product manufacturing, and pension administration and distribution.

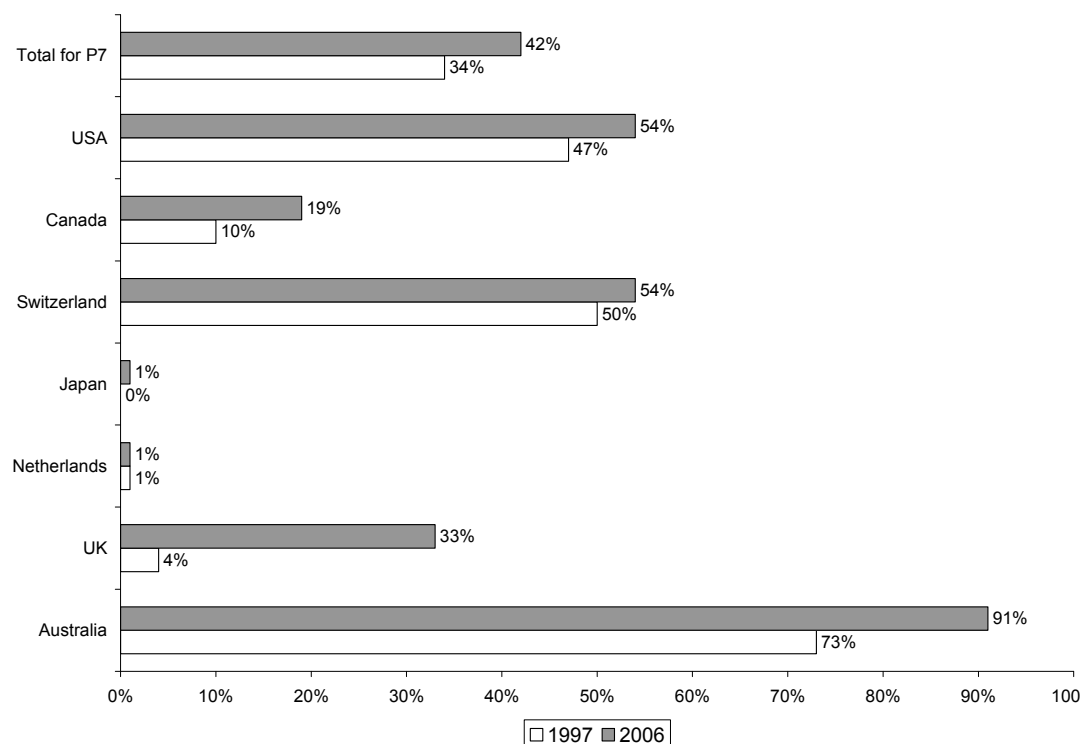
3.1 Aggregate statistics

The shift towards DC pensions has been widely documented. Where new occupational schemes are being introduced, these tend to be of DC type, and even in countries where DB arrangements have traditionally dominated, DC plans are growing in number and importance. The reasons for this shift have been examined in both the academic and professional literature, and are summarised in Appendix 2.

Attempts to quantify the extent of the shift has been examined at the national level, as well as in studies that seek to provide a cross-country overview and comparison of the trend. As an example of the latter, Watson Wyatt Worldwide (2007) provides estimates of the shift from DB to DC pension fund assets for seven countries with the largest workplace pension systems in the world.

For the seven countries as a whole, DC pension plan assets are estimated to have grown to 42% of total pension funds assets by the end of 2006. As shown in Figure 3.1, there was an increase in DC assets in all countries during the 1997–2006 estimation period, but there are significant cross-country differences. While the shift towards DC schemes has been limited in some countries (eg, the Netherlands), it has been significant in others (eg, the UK).

Figure 3.1 Percentage of total pension fund assets held in DC schemes, 1997 and 2006



Note: 'Total for P7' refers to all seven countries combined.

Source: Watson Wyatt Worldwide (2007).

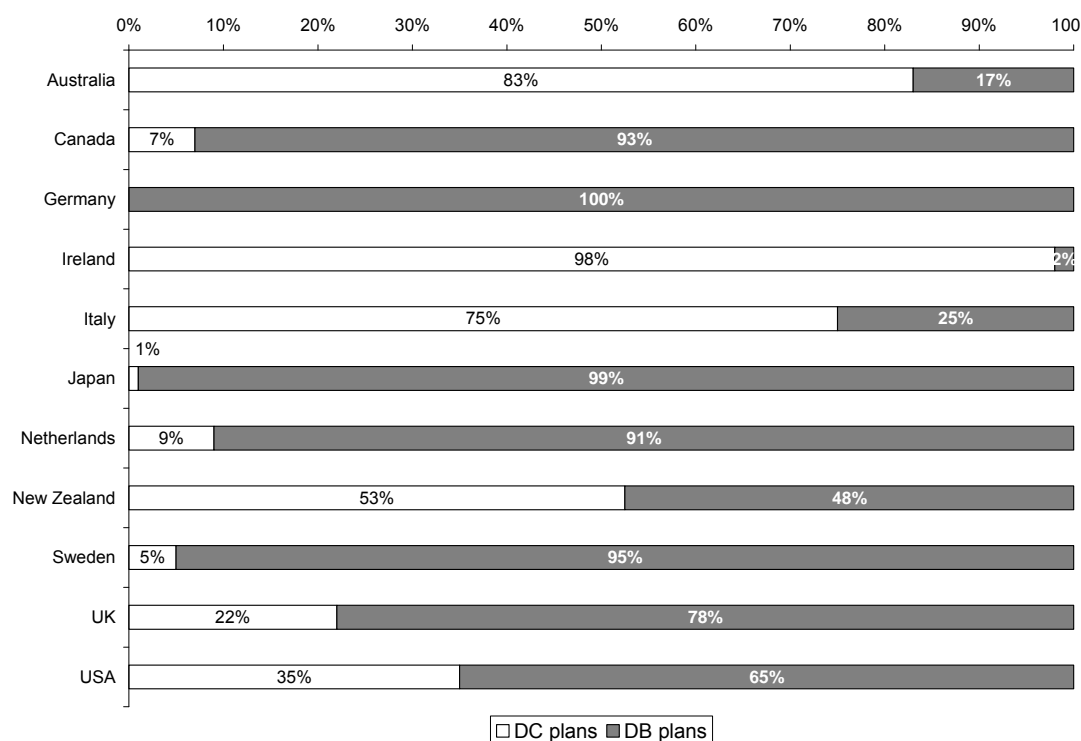
Other studies confirm this trend. For example, the OECD (2006) reports that the number of occupational DB plans in the OECD area is decreasing, while the decline in DB plans has been largely matched by a rise in DC plans. OECD (2007) confirms that an increasing number of employers have closed DB plans and increased the offering of DC plans.

The OECD has also started to gather comprehensive data on the volume of pension assets held in DB and DC schemes. Figure 3.2 provides a snapshot of DB and DC plan assets as a percentage of total occupational pension fund assets in 2004 for selected OECD countries. The data again suggests significant cross-country differences in the prevalence of DC schemes. OECD (2007) statistics available for some of the countries considered in this report show that DC has become more important than DB. For example, in Italy, DC occupational plan assets as a proportion of the total increased from 75% in 2004 to 84% in 2006.

A comparison of Figures 3.1 and 3.2 highlights some inconsistencies in the estimates of the prevalence of DB and DC schemes in different countries. These inconsistencies are indicative of the problems associated with quantifying the global shift from DB to DC, and the size of the DC pensions sector more generally, largely because of a lack of consistent and harmonised cross-country data. Inconsistencies arise between the studies from the variation in the use of different pension schemes in the analysis, and the use of different definitions of DB and DC. The OECD data classifies schemes based on the criteria summarised in Box 3.1 below.

As further discussed below, the line between DB and DC is blurring, with pension structures developing that fall somewhere between the two. The classification of the structures as either DB or DC depends to a large extent on the definition adopted by the researcher.

Figure 3.2 DB and DC occupational pension plan assets, 2004



Source: OECD (2006).

Box 3.1 OECD classification of pension plans

Defined contribution

The DC pension plan sponsor pays fixed contributions and has no legal or constructive obligation to pay further contributions in the event of unfavourable plan experience. Pension plan benefits are determined mainly by contribution rates and returns on the plan's investments.

- **Unprotected DC**—the pension plan or fund itself, or the pension provider, does not offer any investment return or benefit guarantees or promises.
- **Protected DC**—a DC plan other than an unprotected DC plan; guarantees or promises may be offered by the pension plan or fund itself or the plan provider (eg, deferred annuity, guaranteed rate of return).

Defined benefit

The DB plan sponsor company faces legal or constructive obligation to pay further contributions in the event of unfavourable plan experience.

- **Traditional DB**—benefits are linked through a formula to the members' wages or salaries, length of employment or other factors.
- **Hybrid DB**—benefits depend on a rate of return credited to contributions, where this rate of return is either specified in the plan rules, independently of the actual return on any supporting assets, or is calculated with reference to the actual return on any supporting asset and a minimum return guarantee specified in the plan rules.
- **Mixed DB**—a DB plan that has two separate DB and DC components that are treated as part of the same plan.

Source: OECD (2006), OECD (2005a).

3.2 Assessing the shift in a sample of EU Member States

Since consistent and comprehensive cross-country data on the shift to DC is difficult to identify, as evidenced by the selection of statistics presented above, the following summarises trends in individual Member States, drawing from national sources of data. While confirming the shift described in other studies, the description seeks to emphasise the differences between countries in the nature and extent of the shift, and the variety of DC structures that are emerging. This level of detail tends to remain hidden when using standardised cross-country data alone.

The following contains a summary description. Further details and statistics on the shift in each of the seven Member States are contained in Appendix 1.

3.2.1 Scope and classification

Occupational pensions

The description focuses on the occupational pension market in seven EU Member States: France, Germany, Italy, the Netherlands, Poland, Sweden and the UK. Occupational pensions form the second pillar of national pension systems. However, in practice, some schemes, which can be described as 'occupational' or at least 'employment-related', are not formally classified as second pillar schemes. For example, the Government Actuary's Department (GAD) (2006) states that UK stakeholder schemes are classified as personal schemes in the third pillar, even though they are clearly linked to employment and considered by employers and employees as a contract-based alternative to the trust-based occupational schemes. Similarly, when considering pensions financed via open pension funds in Italy, the line between the second and third pillars cannot be clearly drawn because the open pension funds to which employers can channel contributions on behalf of their employees also provide a vehicle for personal pension saving.

Sweden and Poland have switched part of their social security pension provision to a statutory funded private system with mandatory individual accounts saving. Although typically classified using EU terminology as the second tier of the first pillar (or Pillar 1 bis) and not as occupational schemes, the systems involve mandatory contributions that are a fixed percentage of salary. As such, they can broadly be categorised as employment-related. Given their importance, especially in the Polish market, this study also considers these schemes.

For the purpose of this study, occupational pensions are therefore defined in a broader sense to capture schemes that are linked to employment or professional activity, and that are funded through employer and/or employee contributions and operated by private vehicles.²

DB versus DC

At the general level, there is a common understanding of what constitutes DB and DC pensions. In a DB pension plan, the benefits to be delivered at retirement are predefined in the accumulation phase, and they are usually based on an employee's final or average pay and the length of service. In a DC pension plan, contributions paid by employers (and/or employees), rather than the benefits to be delivered at retirement, are defined in any particular year of employment; the accumulated pension assets (and, therefore, the actual

² This definition corresponds to the classification adopted by the European Federation of Retirement Provision (EFRP), which proposes a broader definition of the second pillar than that commonly adopted in EU terminology. Within the second pillar, the EFRP distinguishes between mandatory and voluntary supplementary pension arrangements linked to employment. For mandatory schemes, the pension characteristics are set out in national social and labour law; for voluntary schemes, the characteristics are negotiated by social partners or at company level within a legally defined framework. See, for example, EFRP (2006).

benefits that can be delivered at retirement) depend on the level of contributions and the financial performance of the investment of those contributions.

However, the classification of actual pension plans into DB and DC is complex, as discussed above. The OECD provides one possible form of classification (see Box 3.1), but this is not uniformly adopted by other stakeholders—eg, what the OECD classifies as a hybrid DB plan is classified by others as a DC scheme with minimum guarantee by the employer, and what is described as a mixed plan may be considered hybrid by others.

Section 4 provides a more detailed discussion of the economic characteristics of different types of pension arrangements and their fundamental differences. For the purpose of this descriptive section, the starting point is to regard DB and DC plans as two ends of a spectrum, with many actual pension plans combining characteristics of the two, and thus lying somewhere along this spectrum (Figure 3.3).

The ‘shift towards DC’ is defined as the move somewhere along the spectrum from final-salary DB plans to ‘pure’ DC pension plans where scheme members bear all the investment risk. The risk can be managed to deliver tailored outcomes (outcome-oriented DC). The risk can also be shifted away from the individual and shared by other parties. Unlike pure DB, such schemes guarantee only a minimum level of return and may allow for individual participation in the upside investment risk (DC with guarantee). The guarantee can take different forms and may be provided by the plan sponsor or instead by a financial institution (typically an insurance company). There are a number of other hybrid arrangements that involve some sharing of investment risk and rewards between the different parties.

In some of the countries examined, the occupational pension sector has been comparatively small, with many employees not having access to, or not participating in, a scheme sponsored by their employer. The shift towards DC can then be understood to take the form of growth in the number and importance of occupational pension schemes (eg, in light of reductions in the generosity of PAYG state pensions); the occupational schemes introduced tend to be along the right-hand side of the spectrum—ie, they are structured as DC schemes or have a significant DC element.

Figure 3.3 Spectrum of pension scheme structures

‘Pure’ DB (final salary)	Average- salary DB	Various hybrids	DC with guarantees	Outcome- oriented DC	‘Pure’ DC
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Source: Oxera.

For the seven countries examined, the following provides an overview of the shift towards DC along the spectrum. It describes the extent to which occupational pension schemes take the form of ‘pure’ DC schemes, or are instead of DC type, where scheme members bear some of the investment risk, but that risk is limited on the downside or shared by the employer or a financial institution.

3.2.2 Size of occupational pension market and funding vehicles

The size of the occupational pension market differs significantly between the countries, as does the structure and organisation of pension schemes. The description of the shift towards DC therefore needs to be put in context. While it is beyond the scope of this study to provide a comprehensive review of the institutional differences between countries (including the role occupational pensions play in the overall national pension system), the discussion below gives an overview of the countries examined.

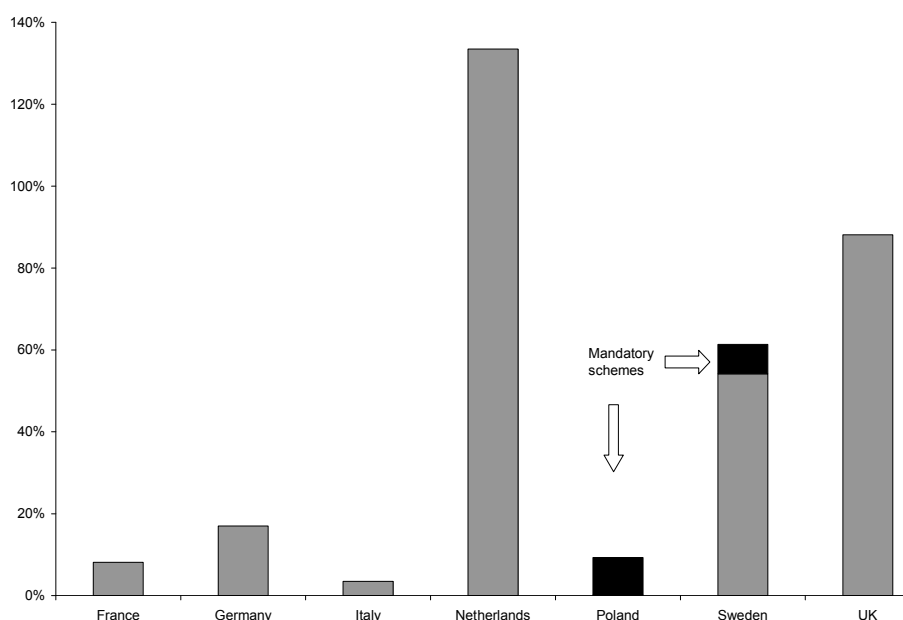
The first difference relates to workforce coverage of occupational pension schemes. For example, the Social Protection Committee (2005) reports that only around 10% of the workforce is covered by supplementary occupational pensions in France, with around 8%

covered in Italy,³ compared with the significantly higher coverage of nearly 90% in the Netherlands and Sweden. For Germany, it is reported that around 57% of the people covered by first pillar state pensions are also covered by occupational schemes, and around 43% of the employed population contribute to occupational pension schemes in the UK. Comparing the two mandatory individual account systems, the Swedish Premium Pension System (PPM) has near-universal coverage, whereas the statutory system of the Open Pension Funds in Poland covers around half of the workforce.

In terms of pension scheme assets, the European Federation of Retirement Provision (EFRP) provides data on workplace pension schemes, including voluntary and mandatory schemes, and covering the assets managed by pension funds, assets held in book reserve systems and assets managed by life-insurance companies. Expressed as a percentage of GDP (Figure 3.4), the Dutch pension market is the largest as of 2005, with assets amounting to over 130% of GDP. The UK market is the largest in absolute terms, with assets of well over €1,500 billion or close to 90% of GDP. Of the countries considered, the markets in France, Germany and Italy were the smallest. With relatively generous pension benefits from the first pillar social security system, supplementary pensions through occupational (and personal) schemes are still small in comparative terms but are growing.

The second pillar pensions in Sweden cover the majority of the workforce through collective industry-wide agreements, with assets reported by the EFRP to amount to more than €155 billion (54% of GDP). In addition, employees make mandatory contributions to individual accounts in the PPM, which by the end of 2005 had accumulated assets of close to €21 billion. Mandatory pension funds represent the majority of assets in the Polish market (over €22 billion of assets or 9% of GDP), while the market for voluntary supplementary occupational pensions is still insignificant.

Figure 3.4 Assets of supplementary occupational and mandatory pension schemes, 2005 (% of GDP)

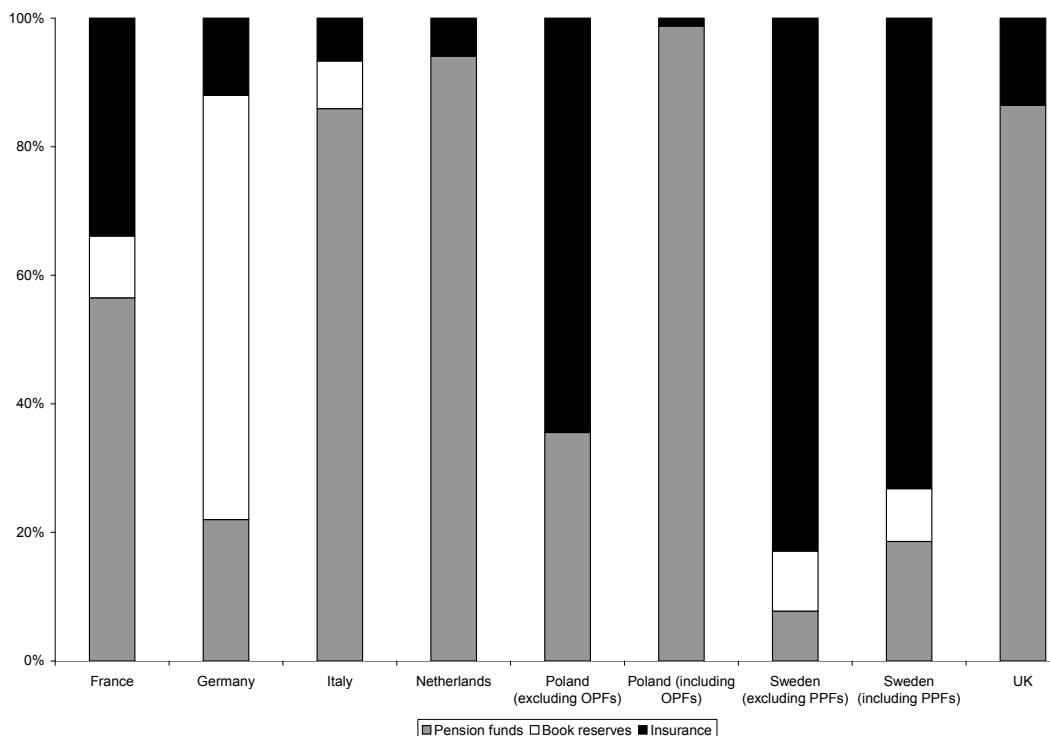


Source: EFRP, Eurostat and Oxera calculations.

³ The statistics are based on the responses by the different countries to the Social Protection Committee questionnaire, and are therefore not harmonised.

There is significant cross-country variation in the vehicles used to fund occupational pensions. Figure 3.5 provides a breakdown between pension funds, insurance companies and book reserve schemes.

Figure 3.5 Funding vehicles for occupational pension provision, 2005 (% of total)



Source: EFRP and Oxera calculations.

Pension funds are prevalent in France, Italy, the Netherlands and the UK, and hold around 57%, 86%, 94%, and 86% of the total pension assets, respectively. The bulk of the voluntary occupational pension assets in Sweden (excluding the assets of the mandatory Premium Pension Funds, PPFs) and Poland (excluding the assets of the mandatory OPFs) are held by insurance companies—83% and 64%, respectively. In Germany, book reserves are the most important financing vehicle for occupational pension schemes, representing nearly two-thirds of the total in 2005.

If the pension assets accumulated in the mandatory account system in Poland (the OPFs) are included, pension funds emerge as the single most important financing vehicle in Poland, with more than €22 billion of assets under management, or 99% of the total of voluntary and mandatory employment-linked pension plan assets. Insurance companies remain the most important financing vehicle for Swedish pension plans even when the mandatory pensions (in the PPFs) are included—only around €32.8 billion or 13% of the total voluntary and mandatory occupational pension plan assets are managed by pension funds. Book reserves are also observed, but are relatively small.

3.3 Overview of the dimensions of the shift

The existing structural differences between occupational pension systems mean that the shift towards DC pensions is far from uniform across countries. This section provides an overview of the different dimensions of the shift. Section 3.4 summarises the DC or DC-type structures that are emerging. A more detailed description and statistics on a country-by-country basis are provided in Appendix 1.

The different dimensions of the shift towards DC can be broadly split into two main categories: changes within existing occupational pension schemes, and growth in the occupational pensions market in both absolute and relative terms.

3.3.1 Changes within existing occupational pension schemes

The shift away from pure DB pension schemes in favour of more DC-type pension schemes is a result of supply- and demand-side factors and changes in laws or regulations,⁴ without necessarily having a direct impact on the overall size and growth of the occupational pensions market. That is, the shift takes the form of a restructuring of existing schemes to include arrangements that have DC characteristics.

- Employers are closing DB schemes to new members, with these members being offered DC or DC-type pensions instead (eg, UK and Germany).
- DB schemes, including those for existing employees, are being restructured as DC-type (eg, the occupational pensions established by collective agreement in Sweden), or at least partially converted from final salary DB to average-pay DB or hybrid schemes (eg, the Netherlands).

The restructuring of occupational pensions may be fostered by changes in the legal or regulatory framework—in Italy, for example, a law was introduced establishing open and closed pension funds, which are uniformly DC, to replace the pre-existing funds (which were of DB, DC or some hybrid form).

Equally, however, the extent of the shift from DB towards DC may be restricted by laws and regulations. For example, in Germany, the sponsoring company is obliged to guarantee at least the level of contributions made to the scheme, thereby limiting some of the downside risk. Therefore, adoption of pure DC occupational pension schemes, where employees take all the downside and upside risk, is impossible (this is why the OECD classifies all occupational schemes in Germany as DB rather than DC, as shown in Figure 3.2 above).

3.3.2 Growth in occupational pensions

The shift towards DC may also result from the expansion of the occupational or employment-related pensions sector. This expansion is often stimulated by implementation of, or changes to, laws and regulations designed to enhance private pension savings as part of an overall pension system restructuring. In such cases, the growing importance of DC schemes comes from the growth (in absolute and relative terms) of occupational pensions, and can be accompanied by the gradual reduction in the importance of state pension benefits.

- New types of occupational pension scheme have been established by law, and these new plans are of pure DC form. Examples include the PERCO scheme in France, the group stakeholder pension schemes in the UK, and the Employee Pension Programmes in Poland.
- In Germany, reforms introduced the Pensionsfonds as a new type of funding vehicle which, although not pure DC (employers always guarantee contributions), allows more flexible investment than the insured schemes observed in the market.
- In Italy, statutory provisions to transfer employees' indemnity payments (Trattamento di fine rapporto, TFRs) to pension funds means that contributions which were previously made to cover non-pension-specific pay when an employment relationship is terminated (often financed by book reserves) will be directed towards dedicated pension funds.

⁴ See Appendix 1 for a summary of the reasons for the shift.

- Sweden and Poland have introduced a mandatory funded tier in the first pillar, requiring individuals to channel a fixed proportion of their salaries to individual accounts in which assets accumulate on a pure DC basis. While not occupational schemes as such, they have full (or partial but gradually growing to full) coverage of the workforce, thus significantly expanding the employment-related DC pensions sector in these countries. There are also plans for a mandatory system of individual accounts in the UK, where employees will be automatically enrolled in the system from 2012.

3.3.3 Summary—the different dimensions

Table 3.1 summarises the main dimensions of the observed shift towards DC or DC-type schemes, and maps countries and occupational schemes onto these dimensions.

Table 3.1 Different dimensions of the shift to DC

Dimensions of the shift	Countries and schemes
Closing down of existing DB schemes to new members	UK: many traditional DB occupational schemes closed to new members; trust- or contract-based DC pensions offered instead Germany: many traditional book reserve schemes closed to new members (see below) Italy: Pre-existing pension funds (DB, DC and hybrid schemes) closed to new members, new pension funds (DC only) put in place instead
Restructuring of schemes from DB to DC	Sweden: SAF-LO (a country-wide scheme for blue-collar workers) fully restructured to be of DC type; parts of ITP (a country-wide scheme for white-collar workers) also already restructured and of DC type for those born after 1979
Shift away from traditional book reserve schemes	Germany: closing of DB book reserve schemes to new members. For small/medium-sized firms, deferred compensation scheme with insurance backing. For larger firms, off-balance-sheet financing through Contractual Trust Arrangements, which, for new members, tend to be of DC type (with employer guarantee)
Move from pure final-salary DB to average-salary DB and hybrids	Netherlands: most final-salary DB schemes replaced by average-salary DB schemes and hybrids, such as conditional DB, 'combination hybrids', and collective DC
Introduction of new DC schemes established by law/regulation	France: PERCO and PERCOI (since 2003) UK: stakeholder pensions (since 2001) Poland: Employee Pension Programmes (since 1999)
Implementation of new law on occupational pensions	Italy: establishment of the 'new' closed and open pension funds (all DC), transfer of TFRs to the 'new' pension funds by the end of June 2007
Introduction of mandatory funded individual accounts (Pillar 1 bis)	Sweden: PPM, with about 700 investment funds of choice and near-universal coverage (since 2003) Poland: mandatory funded system, with choice of 15 open pension funds and covering more than half of the working population (since 1999)

Source: Oxera.

3.4 Overview of emerging DC or DC-type structures

A multitude of scheme structures are emerging from the shift towards DC pensions, and there are significant variations both within and between countries, as is further described in Appendix 1. In particular, in some countries occupational pension schemes can take the form of pure DC schemes. In other countries, the schemes emerging are not far enough along the spectrum to be of pure DC form—they have DC characteristics, but are structured to limit individual employees' exposure to downside risk (and also limit benefits from the upside risk). This is achieved by guaranteeing a minimum level of pension benefit, irrespective of market

performance. These DC-type arrangements involve a sharing of risk by the employer as the plan sponsor or a third party (usually an insurance company).

- **DC with minimum guarantee by the plan sponsor.** Pension schemes can have a minimum guarantee, either in the form of a minimum rate of return or a minimum benefit level at retirement, where the plan sponsor meets any shortfall in the assets accumulated. Such a guarantee may be enshrined in law, such as in Germany, where the minimum ‘floor’ for all types of occupational pension is defined as an obligation on the employer to ensure repayment of the sum of contributions minus certain administrative charges (Beitragszusage mit Mindestleistung). Pure DC occupational pensions are therefore not permitted by law.

Another example of a minimum guarantee by the plan sponsor (also taking the form of repayment of contributions) comes from the occupational schemes established through industry-wide collective agreements in Sweden. The ‘money-back’ guarantee applies, for example, to the scheme for blue-collar workers (SAF-LO), which was fully restructured from DB to DC for all employees, and the scheme for white-collar workers (ITP), which maintains DB pensions for older employees but was changed to DC-type for employees born after 1979.

- **DC with minimum guarantee by a financial institution.** Instead of, or in addition to, the employer sharing part of the investment risk, contractual arrangements may be such that part of the risk is shifted to a financial institution. Schemes operated by insurance companies often come with a minimum rate of return guarantee. For example, in the case of the occupational schemes for blue- and white-collar workers in Sweden, contributions are paid into insurance contracts. Under the ITP scheme that pays DC-type pensions for young employees, at least half of the contributions must flow to deferred annuity with-profit contracts with a guaranteed return (rather than to unit-linked contracts). The SAF-LO scheme for blue-collar workers gives employees a choice, but where the traditional insurance contract is chosen instead of a unit-linked contract, a minimum rate of return (around 3% in nominal terms) applies. The default for both schemes is a traditional life contract with the minimum rate of return guarantee.

A similar level of guarantee (up to a maximum of 2.75% for contracts after 2004) applies to occupational pension schemes in Germany that are funded via direct insurance or Pensionskassen. It does not apply in the case of other external funding vehicles—eg, the Pensionsfonds, which are nonetheless subject to the sponsor’s ‘money-back’ guarantee described above.

Occupational schemes can instead be structured to take the pure DC form, without explicit guarantees. Examples include:

- the closed and open pension funds established in Italy;
- the PERCO scheme that is gaining popularity and growing rapidly in France;
- the contract-based stakeholder pensions in the UK, as well as the trust-based schemes if they have been set up to provide pure DC rather than DB or hybrid benefits.

The mandatory PPM in Sweden also provides pensions in pure DC form, as does the mandatory system of Open Pension Funds (OPFs) in Poland.⁵

Although there is no requirement for a guarantee, these DC plans can be structured to include a guarantee as an option. In addition, the plans can be invested with a view to

⁵ Open Pension Funds are subject to a regulatory requirement to deliver a minimum rate of return. However, the minimum guarantee is a relative rather than an absolute guarantee. It is defined with respect to an industry-average benchmark, so operators of underperforming funds need to cover the shortfall, but there is no minimum guarantee if overall industry performance deteriorates.

delivering specific target outcomes. The cost of guarantees and options for scheme investment are further discussed in sections 4 and 5.

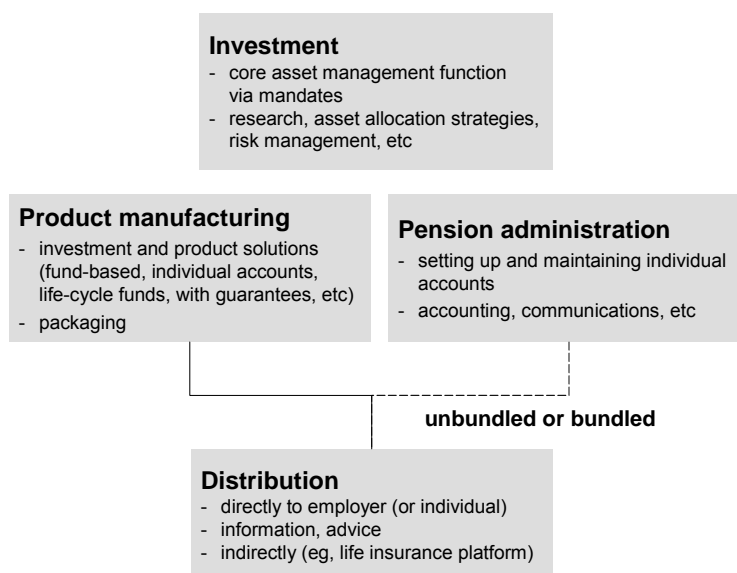
3.5 Functions in DC pension provision

The shift towards DC pensions also changes the role of intermediaries, including asset managers. In DB schemes, asset managers are given balanced or specialist mandates to manage the pension fund portfolio. They can help the employer or pension fund governing body in managing liability risk and provide advice on long-term asset allocation strategies to minimise the risk. In a world of DC pensions, asset managers can also play their traditional role and carry out core investment and advice functions. However, in addition they can have a key role in providing product solutions for pensions, either bundled with pension administration services, or distributed in unbundled form. Thus, asset managers can act:

- **as external asset manager** by means of a mandate and delegation from the sponsor or governing body of the pension scheme (eg, closed pension funds in Italy, Pensionsfonds in Germany, and trust-based occupational schemes in the UK); and/or
- **in the provision of product solutions** for occupational pensions. This includes the creation of funds (UCITS and non-UCITS) to pool assets held by a scheme as well as the packaging of different products. These funds can be wholesaled to a variety of pension products or wrappers and distributed indirectly via pension platforms operated by other pension providers (eg, platforms run by insurance companies). Alternatively, asset managers may distribute their pension products directly to employers (and/or employees), bundled together with the relevant pension administration services. Examples of asset management firms directly providing DC pensions include the open pension funds in Italy and the PERCO scheme in France, where, in addition to fund provision, the management firm is often the holder and administrator of the individual accounts.

A stylised illustration of the functions asset managers can fulfil along the value chain of DC pension provision is provided in Figure 3.6. Where managers position themselves along the value chain depends on the institutional framework and industry model in a particular country, as well as each asset manager's own business model.

Figure 3.6 Functions in DC pension provision



Source: Oxera.

In some countries, occupational pension schemes are, to a significant extent, provided by insurance companies. This can include schemes that are of DC type—ie, the scheme purchases insurance contracts which can provide a minimum guaranteed rate of return and may also have a bonus provision when asset fund returns exceed the minimum guarantee. Instead of traditional insurance, the insurance vehicle may also take the form of pure unit-linked contracts without any form of guarantee and where the investment risk is borne entirely by the policyholder. Examples of insurance schemes are provided above in the context of the discussion of DC schemes with minimum guarantees, and further examples are provided in Appendix 1.

An insurance vehicle may be the natural choice where the occupational pension is to be provided with a certain type of guarantee by a third party,⁶ or where the pension payout takes the form of annuities.

When there is no guaranteed level of payout, DC pension plans in the accumulation phase are effectively no more than a long-term savings vehicle for individuals, which may (or may not) have a constrained form of payout (eg, a requirement to purchase an annuity with some or all of the accumulated savings upon reaching a certain age). The fact that insurance may nonetheless be chosen as the accumulation vehicle in these cases appears to have more to do with tax, regulations or historical precedent than any fundamental differences in the product characteristics between insurance and investment products.

The role of asset managers, as well as their product solutions available for DC pension provision, is further discussed in subsequent sections.

3.6 Summary

There is a clear shift towards occupational pensions in DC form, but the extent and nature of the shift differs significantly between countries. Furthermore, a great variety of pension scheme structures are emerging in terms of how the risks and responsibilities are allocated between the different parties—employees, employers and financial institutions.

The shift can be observed both at the global level, as well as on a country-by-country basis. Quantification of the shift is difficult. This is partly due to a lack of comprehensive and complete data. It is also due to a lack of consistent definitions of the different types of pension scheme structure emerging, which is further complicated in a cross-country context where scheme structure varies with the institutional environment and depends on country-specific factors.

Nevertheless, two types of shift towards DC pension provision can be observed. First, new occupational pension schemes are introduced and these are of DC type, including in countries where private pensions have historically not been significant. Second, there is a shift towards DC within existing occupational pension schemes, due to existing final-salary DB plans being restructured or closed to new members. In many countries, the two types of shift are occurring simultaneously.

Section 4 discusses the economic characteristics of DC or DC-type schemes. The existing schemes described in this section (and in more detail in Appendix 1) are used in sections 5 to 8 to illustrate the risks and advantages of such schemes; how schemes of DC and DC-type can be structured with respect to investment, individual choice and governance, and the role of asset managers and asset management solutions.

⁶ Non-insurance guaranteed products are also available. See section 5.4.

4 Economic characteristics of DC pension plans

The shift towards DC pensions has been subject to much commentary. As described in section 3, the extent of the shift varies and takes different forms. Moreover, there are many ways in which pension schemes can be designed, and the line between DB and DC schemes is blurring.

The comparison of different plan designs is therefore complex, and cannot be limited to a basic ‘either/or’ distinction between DB and DC. Many general criticisms of DC schemes are partial, focusing on specific disadvantages, while at the same time underestimating the risks and disadvantages of DB schemes. DC schemes have some significant advantages, as supported by the academic literature.

This section sets out the main differences between the economic characteristics of DB and DC types of pension scheme. However, it is not the purpose of this report to compare DB and DC schemes, or to conclude that one is better than the other (or identify the circumstances in which one or the other provides the more attractive pension), particularly given that DB pensions are not, and will not become, accessible for many employees.

However, the DB–DC comparison serves to identify the relevant trade-offs in scheme design and the relative risks and advantages of DC schemes. It also highlights the concerns about DC pensions that need to be addressed to ensure that DC schemes provide effective occupational retirement provision. As such, this section provides the conceptual background for the discussion in subsequent sections. The discussion is largely abstracted from observed institutional structures and uses the terms DB and DC to define stylised versions of pensions that lie at opposite ends of the broad pension spectrum.

4.1 No ‘free lunch’ in pension provision

All pension arrangements are premised on the payment of income at a future date. In a funded system, assets accumulate to meet the cost of future pension payments. For a pension scheme to be self-financing, the contributions made to the scheme in the accumulation phase, plus the return on the investments, must generate an accumulated asset value that matches the value of pension payments.

For DC schemes, this method of operation is clear. Employer, employee, or both, make contributions to individual accounts, and the benefit level depends on the total contributions and investment earnings in the account—ie, DC plans are effectively long-term savings accounts.

In pure DC schemes, the account is held at the individual person level—an individual’s pension is solely dependent on the assets accumulated by, or on behalf of, that individual. In more complex DC schemes, there may be a pooling of the assets and rewards over a number of individuals, but unless a third party is guaranteeing some level of predefined benefit, and will contribute more assets if the guarantee is not going to be met, these more complex schemes are still essentially long-term savings plans in the accumulation phase.⁷

For DB schemes, the total value of the pension benefits promised must also be matched by an accumulation of assets that allows the pension promise to be met. While there may be

⁷ In the payout phase, the purchase of an annuity changes the nature of the ‘savings’, but annuities can be purchased with any lump sum—eg, pension pot, savings account or other financial assets.

cross-subsidies between individual pension plan members (including between current and future pensioners), for the pension scheme to be self-financing overall, the value of pension contributions plus returns on investment must be equal to the value of pension benefits. This identity must hold at the level of the sponsoring employer(s), unless the promised pension payments are backed or bailed out by a third party (eg, guarantee funds or government/taxpayers).

Therefore, whether they are described as being DB or DC, pension payments require asset accumulation through contributions and investment returns. Leaving aside the issue of risk, and abstracting from potential frictions in asset accumulation and pension provision, the same level of contributions would be required to deliver the same stock of accumulated assets from which to cover pension payments, regardless of whether the scheme is defined as DB or DC.

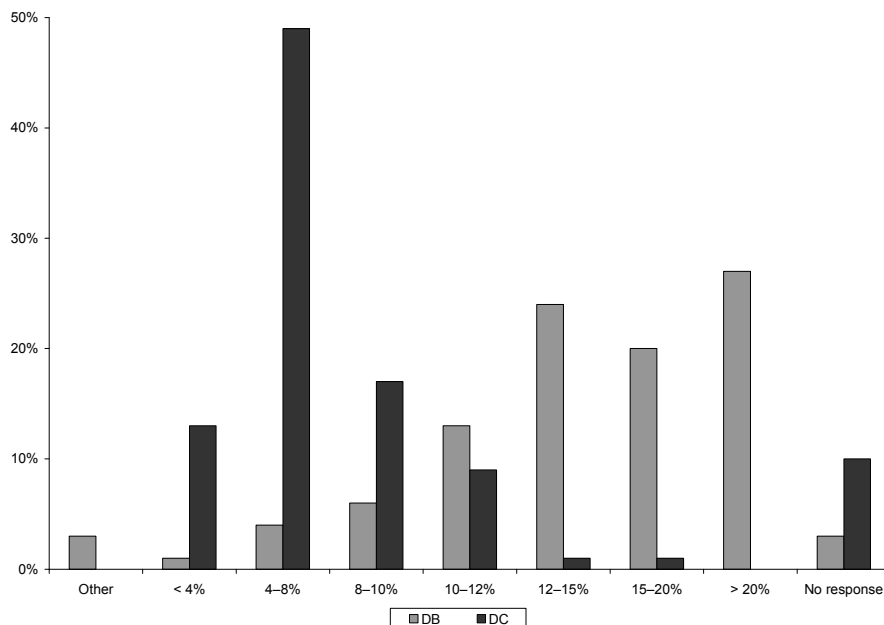
However, contribution rates to DB and DC schemes tend to differ in practice (see Box 4.1, which provides evidence for UK occupational pension schemes). For example, where the shift from DB to DC is explained by the need of employers to reduce their pension costs, it is often accompanied by a reduction in the overall value of the pension contributions and, therefore, a reduction in pension benefits. It is this reduction in the value of the pension to be received by the future pensioner, not the shift from DB to DC, that is the reason for the reduction in costs.

Put differently, lower contributions imply lower pension benefits; however, this has nothing to do with the debate on DB versus DC per se. Rather, the relevant comparison is one where the contribution rates are chosen such that DB and DC schemes are financed at equal cost—ie, where the present value of pension contributions is equal between DB and DC plans.

Box 4.1 Contributions to DB and DC occupational pension schemes in the UK

Figure 4.1 compares the distribution of contribution rates for DB and DC schemes in the UK, based on data collected by the GAD in 2005. The contributions refer to employer contributions to trust- and contract-based occupational schemes.

Figure 4.1 Employer contribution rates (% of salary)



Source: GAD (2005).

Employer contributions to DB schemes vary over time, and there have been periods when employers have taken contribution holidays if the pension scheme is in surplus, in which case the comparison between DB and DC contribution rates could look very different to that presented for 2005. Data enabling a comparison of total contributions (and total benefits) over time is not available; however, the point is that if the shift from DB to DC is accompanied by a reduction in overall employer contributions, overall pension benefits will be lower.

In addition to contributions by the plan sponsor, members can make additional contributions to the schemes. The difference between DB and DC contributions also applies to member contributions, irrespective of pension plan size (Table 4.1). Total contribution rates to DB schemes in 2005 were twice as high as contributions to schemes classified by the GAD as DC.

Table 4.1 Contribution rates by pension scheme size (% of salary)

Scheme size (membership)	DB schemes			DC schemes		
	Member	Employer	Total	Member	Employer	Total
10,000+	4.0	16.5	20.5	2.8	6.8	9.6
5,000–9,999	4.7	16.9	21.6	1.7	6.5	8.2
1,000–4,999	5.1	13.2	18.3	3.0	5.0	8.0
100–999	5.0	15.7	20.8	3.1	6.2	9.4
12–99	4.3	19.8	24.1	3.9	5.9	9.9

Source: GAD (2006).

While not implying that DB and DC schemes are equivalent, this underlines the importance of comparing like with like. In particular, a direct comparison of the level of pension benefits available under newer DC schemes with the more generous (but more costly) benefits promised under older DB schemes is not appropriate. Pension provision is not a ‘free lunch’, and the relevant comparison of outcomes under different pension arrangements is one that holds the total cost of pension provision constant.

4.2 Different risks and advantages

4.2.1 Risks of DC schemes

The differences between DB and DC schemes relate to the allocation of risks, with the primary difference being the allocation of **investment risk**. In a funded DB scheme, employers assume the investment risk—they are obliged to pay a pension benefit that is determined by some proportion of the employee’s final or average salary, upon and during retirement. If investments in the market perform better than expected, employers can retain the additional returns that would accrue to individuals under DC schemes. If the market underperforms, they are required to increase their contributions to maintain the value of accumulated assets required to meet the pension promise; with DC, individuals would see a drop in their retirement wealth below the expected level. Put differently, a DB plan design takes out the volatility in asset accumulation for individuals. The difference between DB and DC arises from the allocation of investment risks—whether employees are better or worse off ex post depends on the actual investment performance.

There are some advantages to the employer bearing the investment risk. In particular, if the DB pension fund is well managed, the employer can average asset returns across different age cohorts of employees retiring. In a pure DC scheme, the investment risk is borne by the individual.⁸

In a DC plan, individuals are also exposed to **longevity risk**, or the uncertainty that they will have accumulated insufficient assets for their actual retirement because they live longer than expected. In the accumulation phase, longevity risk can be reduced—eg, through pre-purchase of future annuities in the market, or, once in the retirement phase, by purchasing current annuities. However, this latter approach has uncertainty in the accumulation phase as regards the terms under which the stock of retirement wealth can be transformed into a flow of retirement income—ie, if longevity risk is shifted to an annuity provider at retirement, there is still a conversion risk during accumulation. DB plans, by guaranteeing a specified income stream on retirement, reduce the risk for employees associated with the conversion (if annuities are purchased by the employer at this point) by imposing on the plan sponsor the requirement to fund any change in the price of annuities between the accumulation and payout phases. Instead of purchasing annuities, the employer can continue to carry the longevity risk directly during the payout phase, by maintaining the responsibility to top up the pension fund if pensioners actually do live longer than expected. This risk relates primarily to the pension payout phase, whereas this report focuses on the accumulation phase.

4.2.2 Risks of DB schemes

While DC plans can expose individual plan members’ asset accumulation to risks, this does not imply that DC plans are riskier for individuals than DB plans, or that DB plans carry no risk. DB plans expose individuals to other types of risk, and the riskiness of DB is often underestimated.

⁸ In some DC-type schemes, such as the ‘collective DC schemes’ in the Netherlands (see Appendix 1), the investment risk may also be pooled across different members in the scheme.

- **Wage path risk.** DB schemes tend to subject employees to wage path risk by tying the pension payment to the final salary or an average of earnings towards the end of employees' careers. If the wage path of an employee is ultimately better than expected, a DB plan would deliver a larger than expected pension compared with the contributions made by, or on behalf of, that employee; if wages turn out to be lower than expected towards the end of the career (eg, due to poor health or labour market conditions), the pension benefit would be lower than expected. With a DC plan, employees do, of course, also face the risk of fluctuating wages, and this can influence the level of contributions that they can pay to a pension scheme. However, with DC, both contributions and hence benefits to an individual directly relate to the lifetime earnings of that individual and can be adjusted throughout. It is the time-averaging feature that reduces the impact of wage path uncertainty—ie, pension benefits are no longer dependent on the level of wages towards the end of the career, but instead on contributions made throughout the working life. Average-salary DB plans, in which the benefit relates to average earnings over the entire working life of the employee, could, in principle, achieve the same risk reduction.
- **Job tenure risk.** A related important risk arises from job turnover. As the concept of lifetime employment becomes obsolete and job mobility increases, with individuals holding a greater number of jobs for shorter periods of time, the value of accruals in DB plans falls. Employees who leave their job early tend to forfeit some pension benefits on the contributions that they have made up to that date and to which they would otherwise become entitled were they to remain with the same employer.⁹ If DC contributions were also tied to tenure and age, uncertainty with respect to job tenure would be similar, but in practice they are not. Thus, higher job turnover, in addition to wage shocks or early retirement, makes DC plans more attractive than DB plans for many employees.

In DB schemes the above two risks arise as a result of the way benefits are distributed between pensioners within the same scheme. For the same contributions, individuals with lower than expected final salaries and higher than average job mobility will tend to receive fewer benefits than another member with the same total contributions, who stays in the same job and has a higher than average final salary.

When these factors, in addition to investment risk, are taken into account, it is no longer obvious which type of scheme offers less-variable pension income for individuals who do not know their future career path. For many, DC schemes could be as good or better than DB plans in providing for their retirement. For example, as discussed in section 5, low-risk investment strategies are available; in addition, stock market returns are largely uncorrelated, so that, over an employee's career, low rates of return tend to be balanced by higher rates of return. By contrast, DB plans tied to the final years of earnings with any one employer expose the employee to considerable wage and tenure risk.

The academic literature examines the advantages of DC schemes in the presence of investment risk and the risks associated with wage and job turnover. As summarised in Appendix 2, this literature shows that DC plans can be superior, particularly when wage and tenure risk are significant and/or DC plans are well invested.

A further risk of DB plans relates to the fact that the pension benefit may be reduced ex post—eg, because of default.

⁹ A simplified example can illustrate this point. An employee who accumulates four periods of final-salary DB pension benefits with four employers, where the reference salary is the (real) final salary that the employee has with each employer, will receive less pension than someone with exactly the same wage path who stays with the same employer, if their real wages rise with age. With a salary of 20,000, 25,000, 30,000 and 35,000 at the end of each subsequent ten-year period, and a defined benefit of 1/80th of the final salary per year worked, the job mover obtains a pension of 13,750, compared with 17,500 for the employee who stayed with the same employer.

- **Underfunding and default risk.** For DB plan members, there is a risk of bankruptcy of the employer or plan sponsor. Although funding requirements of DB schemes have been strengthened (with corresponding increases in employers' costs of providing DB pensions), default risk remains. Unless a mutual guarantee scheme has been set up to pick up the pension liabilities of the insolvent employer (eg, the Pensionssicherungsverein (PSV) in Germany or the Pension Protection Fund in the UK) or another form of subsidy or bail-out, employees are exposed to the risk that their promised pensions will not materialise. DC pension plan members may also suffer financially in the event of employer default, but only if the plan assets are invested in company stock (as seen in the Enron collapse, for example). If investment in company stock is restricted, employer default risk is not an issue for DC schemes. In addition, as long as the assets accumulating for scheme members are properly segregated and 'kept safe', there is no risk of loss in the event of default of the sponsor or indeed the pension provider.

4.2.3 Summary of risks and risk allocations

Overall, therefore, irrespective of whether a plan is described as DB or DC, achieving a given level of pension benefits and retirement wealth has a cost—expressed in expected present value terms, the total value of funds flowing into a pension scheme must equal the total value of pension payments that can be made by the scheme.

The main differences between DB and DC come from the exposure to different types of risk, and how these risks are allocated between employer and employee. Table 4.2 provides a summary of these differences in a stylised form, and draws from the existing literature summarised in Appendix 2. In particular, while individuals in DC plans face investment risk in the asset accumulation phase, the risks for DB plan members relate to shocks to earnings, job changes, early retirement and potential employer bankruptcy.

Table 4.2 Types of risk and risk allocation in DB and DC schemes during the accumulation phase

	DB	DC
Investment risk	Borne by sponsor; indirectly, risk may be borne by different cohorts of plan members	Borne by member, but risk can be managed
Longevity risk	Borne by sponsor; indirectly, risk may be borne by different cohorts of plan members	Borne by member. Can be shifted through purchase of annuity (subject to annuity conversion risk).
Wage path risk	Borne by member	Risk reduced because contributions are based on the specific contributions made by, or on behalf of, a member and depend on lifetime earnings
Job tenure risk	Borne by member	Risk reduced due to greater portability of DC pensions
Default risk	Borne by member (unless pension insurance system where the risk and costs are shifted to a third party)	No risk to member (except where pension plan assets are invested in employer stock) No risk of default of pension provider, provided members' assets are segregated and 'kept safe'

Source: Oxera.

4.2.4 Other characteristics of DC

Other than the allocation of different risks, DC plans have a number of advantages over DB schemes. The assets of a DB fund usually constitute a central pool belonging to the collective membership. Since assets are not allocated to individual participants, it can be difficult to determine precisely what amount is held in the plan for each participant. In

addition, DB plans may be more complicated for individuals to understand and properly evaluate. The benefit paid in DB plans can be based on an age- and service-related benefit formula; an average earnings base; age- and service-dependent early-retirement reduction formulae; special early-retirement supplemental benefits; and actuarial reduction for employees terminating the scheme prior to early retirement. Calculating the resulting pension benefits accurately requires actuarial skills that most individuals do not possess.

By contrast, assets in DC arrangements are allocated in specific amounts to individual participants. This may allow better information about the level of retirement wealth accumulated. It may also give individuals more control over their pensions, allowing them flexibility and choice to adjust the portion of remuneration they choose to commit to the plan and how to invest it. DB plans, however, require individuals to accumulate the pension portion of retirement saving in the form of deferred life annuities and thus limit risk–return choice for a given level of contributions. Risks and returns and the issue of individual choice are further discussed in sections 5 and 6.

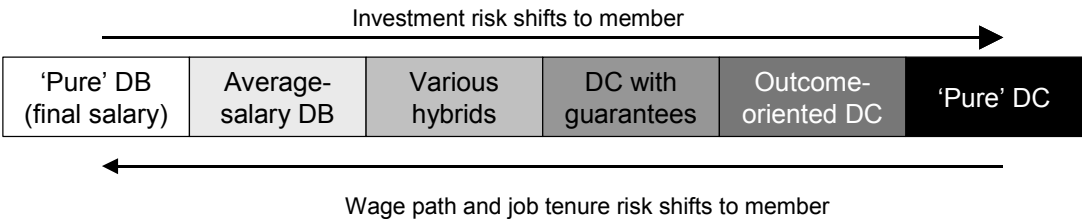
DC plans also have advantages when it comes to portability of pension rights. Portability depends on scheme design and structure, and is closely related to the accrual pattern. As discussed above, employees who change jobs frequently or leave jobs early usually forfeit indexation to future wage levels of benefits already accrued in DB plans. This is not the case with DC schemes. The transfer to a new employer of the value of pension assets accumulated in an individual account may also be easier than a benefits transfer between DB plans.

4.2.5 Structures along the risk spectrum

The above discussion has considered stylised pension schemes that are best described as pure DB, with a fixed benefit level that depends on final salary, and pure DC, where wealth accumulation is determined by the contribution rate and financial market returns. For each type of scheme, there is a multitude of design variations that differ, for example, with regard to contribution or benefit levels, ability to supplement contributions or benefits, retirement ages, availability of lump sums, pension terms and conditions, and financing vehicles used.

Importantly, in the context of the above discussion on risks, pension plan design varies in how the different risks can be allocated. As described in section 3, the stylised pure DB and DC schemes can be regarded as two ends of a broad spectrum of risks (Figure 4.2). In between exist a variety of arrangements that differ in their allocations of risks, combining the DB and DC risk characteristics to different extents.

Figure 4.2 Illustration of spectrum of risks and scheme structures



Source: Oxera.

Figure 4.2 illustrates how the allocation of the main types of risk (investment risk and wage path/job tenure risk) varies between the different scheme structures. It focuses on the allocation between the plan sponsor and individual members. In practice, however, risks can also be shifted to, and managed by, a third party, in particular a financial institution that offers guarantees or delivers investment products to generate specific outcomes.

For example, pure DC plans can be structured to reallocate investment risk away from the plan member. They can achieve a specific target replacement rate if the contribution rate is adjusted periodically to achieve the target, taking into account the discrepancy between expected and actual investment return. Investment products are also available which, through choice of investment strategy, offer certain target outcomes. Moreover, there are ways to protect a plan from short-term negative returns—eg, through the use of portfolio insurance techniques or investment in capital-protected products. Alternatively, the plan sponsor can smooth returns credited to individual accounts from year to year through a reserving mechanism, withholding monies when actual returns are high, and distributing them when returns are low.

Similarly, in pure DB plans, the plan sponsor can assume the wage path or job tenure risk that would otherwise be borne by the individual, by adopting average-salary plans rather than a benefit formula that depends on final salary only. By implementing hybrid arrangements, the plan sponsor can shift some, but not all, investment risk to individual members. Such arrangements include, for example, sequential or combination hybrids where a member can join a DB plan after a period of DC membership, or where they are accruing both DB and DC benefits, among many other hybrid structures.

The distinction between DB and DC is blurring, with DB schemes shifting towards structures with a DC element, or DC schemes being structured (eg, through guarantees or specific investment strategies) to replicate DB-type outcomes. This suggests that the traditional split between DB and DC may not be particularly helpful for this analysis; furthermore, the labels DB and DC can mean different things to different people. What matters is the allocation of risks in different schemes.

Nonetheless, this stylised discussion highlights the main differences between pension plans and the associated trade-offs. It suggests that the observed shift towards arrangements that are of DC type can have both advantages and disadvantages from the perspective of individual plan members and their accumulation of retirement wealth.

4.3 Summary and implications for the analysis

The shift towards occupational retirement provision in the form of DC-type schemes is occurring in all EU countries, although to different degrees and in different forms. Many criticisms that this shift results in reductions in retirement wealth appear to be based on a reduction in overall contributions, rather than any intrinsic difference between DB and DC. If the shift is accompanied by an overall reduction of pension contributions, lower levels of retirement wealth will result, but for reasons that have little connection with the shift to DC-type schemes per se—lower contributions to a pension scheme imply lower pension benefits, irrespective of whether the scheme is DC or DB.

What characterises different schemes is the allocation of risks between the parties. While, in a pure DC plan, investment risk is borne by individuals rather than the plan sponsor, DB plan members avoid this risk. However, they are exposed to other risks, including those associated with salary and job changes, or with the plan sponsor failing to meet its obligations. DC schemes can have additional advantageous properties, including flexibility and greater portability.

The main source of risk to an individual in a DC plan is investment performance—for a given level of contributions, asset accumulation in the individual account depends on financial market returns and the chosen investment approach. Section 5 considers the investment framework of DC schemes. It examines the risks of different investment strategies, the investment options available to manage these risks, and the role that financial institutions, in particular asset managers, can play in providing product solutions.

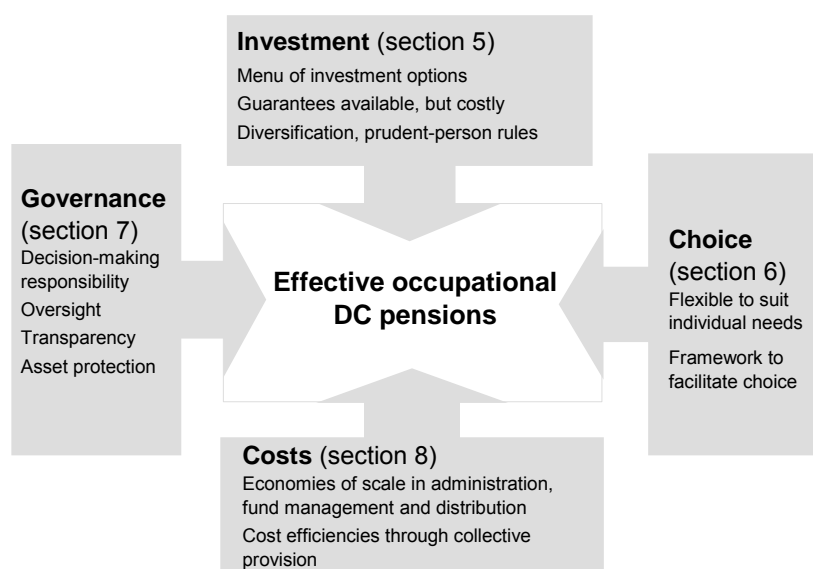
Unlike schemes that offer a defined benefit, DC plans can offer the flexibility to select an investment approach suited to each member's individual risk–return preferences and circumstances. While this flexibility is valuable in principle, there are concerns about the ability of individuals to take decisions and make the 'right' choices. Section 6 considers individual choice and the solutions available to facilitate decision-making.

The typical structure of a pension scheme, whether DB or DC, involves many participants with different roles and responsibilities, so governance is an important factor in ensuring effective retirement provision. Section 7 examines governance arrangements for DC schemes.

Fees and charges reduce net investment returns and can have a significant impact on the level of assets accumulated for retirement. Section 8 examines available data on the costs of different structures of retirement provision, focusing on cost efficiencies that can be achieved through scale and collective pension provision.

The remainder of this report therefore examines four broad aspects of pension plan design that are critical in ensuring that DC schemes deliver effective occupational pension provision (Figure 4.3).

Figure 4.3 Key aspects for analysis of DC pension plan design



Source: Oxera.

5 Investment risk: options, trade-offs and asset management solutions

The shift towards DC pensions results in a reallocation of investment risk to pension scheme members. In pure DC schemes, members bear all the investment risk—they are exposed directly to the effects of the variability of underlying financial asset returns. The focus of this section is on investment risk.

There are two main options for dealing with investment risk: investing in ‘safer’ assets (eg, government bonds) or transferring the risk to another party (eg, by purchasing products with a minimum return guarantee). However, both options involve a cost: there is a general trade-off between risk and (average) returns, so a reduction in risk usually means a reduction in (average) returns. This can have a significant impact on retirement wealth accumulation. Sections 5.1 and 5.2 examine this trade-off, empirically analysing the implications of risk and return for the retirement wealth accumulation of scheme members.¹⁰

The analysis shows that investment in ‘safer’ assets may reduce short-term risk, but also implies on average lower returns. Holding instead a proportion of the pension portfolio in equity during the pension accumulation phase can result in significantly higher retirement wealth, at comparatively low risk over the longer-term investment horizon. Similarly, minimum return guarantees can impose a significant cost in terms of forgone returns if the guarantee is used throughout most, or all, of the pension accumulation phase.

Effective management of investment risk depends on an appropriate regulatory framework and institutional structures that allow DC pension assets to be invested in line with scheme members’ risk–return objectives and requirements. In this context, section 5.3 examines risk mitigation through portfolio diversification, highlighting the cost of quantitative investment rules that impede assets from being invested in the best interest of pension scheme members (and the corresponding benefits of an investment framework that is based on prudent-person principles).

Section 5.4 explores the range of asset management solutions that are emerging in the market for DC pension investment and that are tailored to meet the retirement needs of individuals.

5.1 The trade-off between risk and return

As with other savings and investment plans, there are numerous ways of managing any investment risk inherent in a DC pension portfolio. At the simplest level, there are two main options to reduce risk.

- **Investment in safe assets.** Pension assets could be invested in financial instruments associated with low-risk or risk-free returns.

¹⁰ For the purpose of this analysis, the concepts of *risk* and *return* are defined as follows. Risk refers to the variability of returns, and can be regarded, simplistically, as the range of likely outcomes. For example, an investment where 90% of outcomes are expected to deliver returns in the range of 1–5% is more risky than one where 90% of the outcomes are expected to deliver returns of 2–2.5%. Returns can be thought of as the expected *average* (or in some cases median) return that would be earned if all possible outcomes materialised. In the example above, the average of the more risky investment could be 3%, and the average of the less risky investment could be 2.25%. Thus, with these two examples, there is a trade-off between the risk of the investment and the average return. In choosing between these investments, those with a high risk aversion may prefer the safer investment because this reduces the probability that they will experience a negative outcome—ie, if they invest in the riskier investment they have a higher probability of experiencing a return of 2% or less, compared with investing in the less risky asset, but they also have a lower probability of experiencing returns above 2.5%.

- **Transfer of risk to another party.** In a DB scheme, the risk is transferred to the plan sponsor, which effectively guarantees a certain level of accumulated pension assets. In a world with DC schemes, a guaranteed minimum benefit level can be achieved by investing pension assets in products that come with a guarantee. As discussed in section 3.4, a traditional life insurance contract is an example of such a guaranteed product, but non-insurance products are also available (eg, principal-protection funds, which provide a form of financial guarantee¹¹).

However, as further examined below, both options come at a cost.

- ‘Safer’ assets have low return variability, but also generate low average returns, thereby reducing the average level of retirement wealth that can be accumulated. Moreover, assets that are considered safe (eg, government bonds) may be relatively low-risk in the short term, but not in the long term.¹² Those that are considered risky (eg, equities) may have volatile returns in the short term, but may in fact be relatively safer assets with superior return and volatility performance in the long term.
- The transfer of investment risk via guaranteed products or otherwise is not costless—the risk-taking party has to be rewarded in order for it to take on financial risks. The cost of the guarantee to the individual can be explicit—a direct fee has to be paid for the guaranteed product to the party taking on the risk—and/or implicit, in terms of forgone returns. Guaranteed products, while limiting the risk on the downside, reduce the individual’s participation in the return upside.

To illustrate the trade-off between risk and return and the cost of investing in assets with safe or guaranteed returns, this section examines historical risk–return performance of equities and bonds. The analysis is based on data on real equity returns and real bond returns in France, Germany, Italy, the Netherlands, Sweden and the UK from Dimson, Marsh and Staunton (2006). The data contains a full series of returns since 1900. The analysis is extended in section 5.2 by providing simulations of the implications for retirement wealth.

5.1.1 The equity risk premium

Table 5.1 presents mean real annual returns and their standard deviations for equities and bonds in the six European countries and the world during the period from 1900 to 2005. When comparing risk–return profiles for equities and bonds for each country, it is apparent that, on average, the higher real returns of equities come with higher risk (as measured by the standard deviation of returns). By contrast, the lower risk of real bond returns means that the return is lower on average. Thus, there is a clear risk–return trade-off when looking at returns over relatively short time periods—in this case, for returns per annum.

Table 5.1 also shows the equity risk premium (ERP) for each country, as measured by the difference between mean real equity returns and mean real bond returns. Here, the ERP is measured as the equity returns in excess of government bonds returns rather than in excess of the risk-free rate. Index-linked government bonds, which are typically considered a risk-free asset, have only recently become available, so data over 100 years is unavailable.

The ERP for the six countries varies from 3.9% in France to 5.3% in Sweden, and is 4.1% for the world (ie, 17 major countries). The ERP represents returns in excess of bond returns that equities provide in order to compensate the investors for taking on the risk of investing in equities rather than bonds. Put differently, it indicates that, over the time period, investors would have forgone a return of around 4% or more on average per year by investing in bonds.

¹¹ See section 5.4.

¹² For example, if inflation risk is high, government bonds can have significant real return variability unless they are inflation-indexed.

Table 5.1 Annual real equity and bond returns—means and standard deviations, 1900–2005 (%)

	Equities		Bonds		ERP
	Mean real returns	Standard deviation	Mean real returns	Standard deviation	
France	3.6	23.2	−0.3	13.2	3.9
Germany	2.9	32.6	−1.8	15.8	4.7
Italy	2.5	29.1	−1.8	14.4	4.3
Netherlands	5.3	21.3	1.3	9.5	4.0
Sweden	7.8	22.6	2.5	12.6	5.3
UK	5.5	20.0	1.4	13.9	4.1
World	5.7	17.2	1.6	10.6	4.1

Note: The table shows geometric mean and standard deviation of annual real returns of equities and bonds during 1900–2005. The statistics for the world include 17 major countries, calculated from the perspective of a US investor.

Source: Dimson, Marsh and Staunton (2006).

Table 5.2 presents the ERP measured over ten-year periods between 1950 and 2000, the six-year period between 2000 and 2006, and for the 56-year period from 1950 to 2006. Here the ERP is measured as the excess equity returns over the period, expressed in annualised form. Equity outperforms bonds (ie, the annualised ERP is positive) over most ten-year periods for most countries, and equity has provided superior returns for the 56-year period in all countries—the annualised ERP for the world was 4.4% between 1950 and 2006.

The 2000–06 period captures the sharp stock market downturn at the beginning of the millennium, as is reflected in the negative annualised ERPs for the period. Over that period, annualised real equity returns were indeed negative (−1.2%), but as further discussed below, temporary fluctuations are smoothed out over longer investment horizons—eg, real returns were 4.4% annualised over 1990–2006 and 7.8% over 1980–2006.

Table 5.2 Annualised ERP, 1950–2006 (%)

	1950–60	1960–70	1970–80	1980–90	1990–2000	2000–06	1950–2006
France	13.8	−0.9	−2.8	6.2	3.4	−8.8	2.4
Germany	27.5	0.8	−4.4	9.3	4.0	−10.2	4.9
Italy	17.0	−0.8	−7.2	11.9	−3.1	−5.9	2.1
Netherlands	17.2	6.4	−1.7	10.4	11.1	−10.9	6.2
Sweden	15.8	4.3	0.6	19.0	3.6	−6.8	6.7
UK	16.4	8.1	3.1	7.3	1.7	−4.8	5.8
World	18.5	4.8	−0.7	6.6	1.1	−6.9	4.4

Note: The ERP is measured as real equity returns above real bond returns over the period, but annualised. The statistics for the world include 17 major countries, with investment returns calculated from a US investor's perspective.

Source: Dimson, Marsh and Staunton (2006).

Thus, based on the evidence provided by historical returns, equity is riskier than bonds, but it also provides superior returns on average. Hence, there is a risk–return trade-off in investment decisions—lowering investment risk means also accepting lower returns on average.

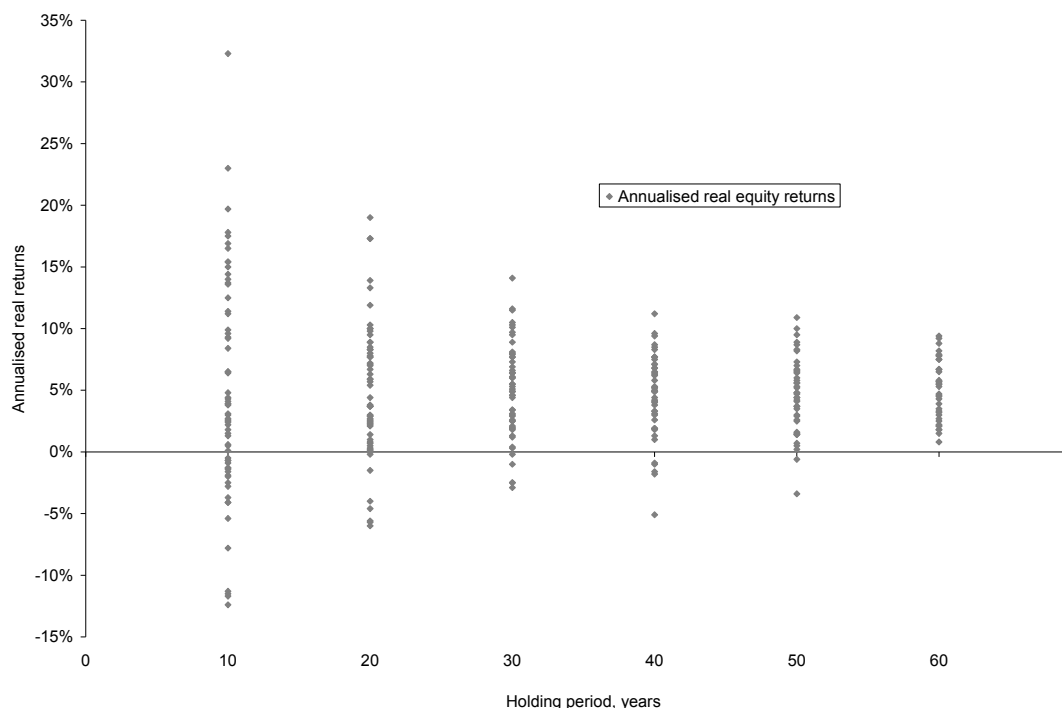
5.1.2 The length of the investment horizon

The length of the investment horizon can significantly affect the risk–return performance of the investments in different asset classes. This is particularly relevant for pension asset accumulation, as the investment period is long-term in nature, with usual holding periods for at least part of the investment portfolio of 40 years or more.

Figures 5.1 to 5.3 illustrate how the risk–return profile of equities and bonds changes with the holding period. The data used is annualised real returns of equities and bonds for holding periods from 10 to 60 years between 1900 and 2006; annualised real returns from France, Germany, Italy, the Netherlands, Sweden and the UK are pooled together. For example, data points for the ten-year holding period are annualised real returns, based on asset returns from 1900 to 1910, from 1910 to 1920, and so on until 2000 to 2006, for each of the six countries. The data for the ten-year holding periods is non-overlapping, although, for 20 years and above, overlapping periods are used—ie, 1900 to 1920, 1910 to 1930, etc.¹³

Figure 5.1 presents data for annualised real equity returns. If investment in equity is for ten years, the annualised real returns in the sample vary from –12.4% to 32.3%. As the holding period increases, the dispersion of annualised real returns declines—for example, if investment in equity is for 30 years (buy-and-hold for 30 years), annualised real returns vary from –2.9% to 14.1%, and for the 60-year holding period the dispersion of the annualised real equity returns is even smaller in the given sample of countries and time periods.

Figure 5.1 Dispersion of annualised real equity returns for different holding periods, 1950–2006 (%)

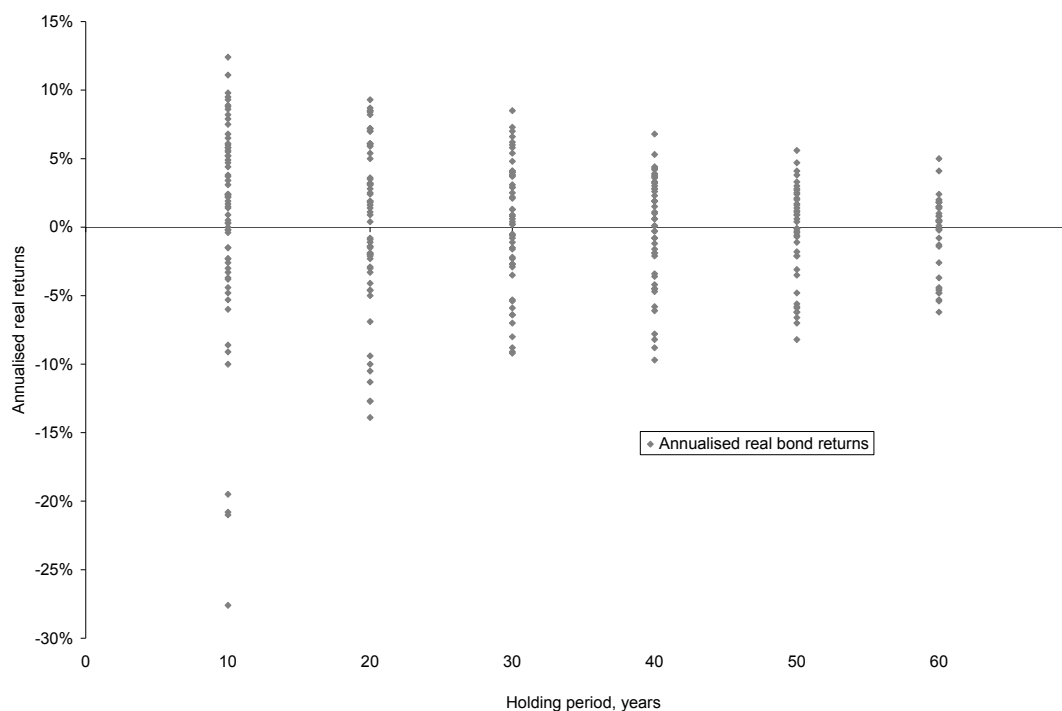


Note: This figure shows annualised real equity returns for different holding periods between 1900 and 2006. For example, the ten-year holding period refers to 1900–1910, 1910–1920, and so on. For the holding periods ending in 2010, data up to 2006 is used. Data for France, Germany, Italy, the Netherlands, Sweden and the UK is shown. Source: Oxera, based on data in Dimson, Marsh and Staunton (2006).

¹³ The data available in Dimson, Marsh and Staunton (2006) is for holding periods with ten-year increments (ie, data for holding periods of 1, 2, 3 years and so on is not presented). For the holding period ending in 2010, data up to 2006 is used. Annualised real returns are real returns required each year to achieve the cumulative real return at the end of the holding period. Although overlapping time periods are used for investment periods of 20 years or more, this does not appear to significantly bias the results regarding the pattern of the dispersion of annualised returns over different holding periods.

Figure 5.2 presents the same data for bonds. It is evident that annualised real bond returns also become less dispersed as the holding period increases. The returns for the ten-year holding period vary from -27.6% to 12.5% ; for the 30-year holding period the returns vary from -9.2% to 8.5% ; and for the 60-year holding period the dispersion is reduced further, although some returns in the sample are still as low as -6.2% .

Figure 5.2 Dispersion of annualised real bond returns for different holding periods, 1950–2006 (%)



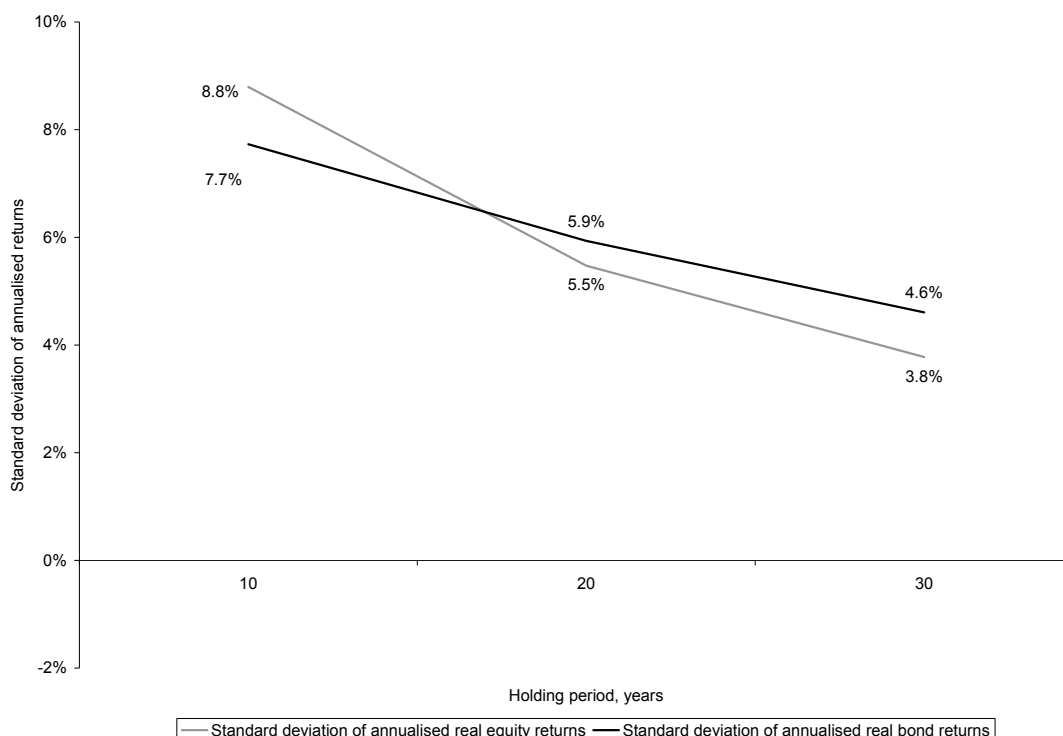
Note: Figure 5.2 shows annualised real bond returns for different holding periods during 1900–2006. See also note to Figure 5.1.

Source: Oxera based on data in Dimson, Marsh and Staunton (2006).

Thus, the dispersion of annualised real returns appears to fall with the investment horizon for both equities and bonds, based on historical returns data. This implies that the uncertainty about, or volatility of, annualised real returns is reduced as the holding period increases. Figure 5.3 presents summary statistics for the dispersion—the standard deviation of the annualised real returns in the sample—and confirms the observation that returns, when annualised, are less variable over the longer term for buy-and-hold investments in diversified equity and bond indices. Thus, for the ten-year holding period, the standard deviation of annualised real equity returns is 8.8% ; that of bonds is lower at 7.7% . In this historical data, for holding periods of around 20 years and longer, the standard deviation for bonds becomes higher than the standard deviation for equities. For example, for the holding period of 30 years, the standard deviation for equity is 3.8% and that for bonds is 4.6% . This implies that, historically, equities have tended to be ‘lower-risk’ than bonds, in terms of variability of annualised returns, for investment horizons of 20 years or more.¹⁴

¹⁴ The reduction in the standard deviation of the annualised returns of equities to a level below that of bonds is likely to be a feature of the specific time period, and is not an outcome that would be expected from the generally expected behaviour of the returns to equities and bonds. The result does not appear to arise from the use of overlapping time periods since the same trend in standard deviations of the annualised equity and bond real returns is observed if returns from non-overlapping time periods are used (eg, for a 20-year holding period, 1900–20, 1920–40, etc, or 1910–30, 1930–50, etc) rather than overlapping periods (1900–20, 1910–30, etc).

Figure 5.3 Standard deviation of annualised real equity and bond returns for different holding periods, 1950–2006 (%)



Note: Data on annualised real equity and annualised real bond returns for France, Germany, Italy, the Netherlands, Sweden and the UK from 1900 to 2006 is used. For the holding periods ending in 2010, data up to 2006 is used.

Source: Oxera, based on data in Dimson, Marsh and Staunton (2006).

These results need to be interpreted in context, and are subject to the following qualifications.

- Historical returns data for a sample of countries is used, which might not be precisely representative for other countries and other time periods, including the future. For example, the ERP may be lower in the future than it has been historically.
- The real bond returns depend directly on inflation—hence, the low real bond returns may be due to high, and unexpected, inflation, and the volatility of real bond returns may result from unexpected and highly variable rates of inflation. Inflation has been high and/or volatile at times during the 1900–2006 period, particularly for some of the six countries included in the sample. If inflation is relatively low and stable in the future, bonds might not be as unattractive (in terms of average real returns and volatility of returns) for long-term investment as they have been in the past. Furthermore, index-linked government bonds are available, which shield investors from inflation risk.
- The returns data presented here is for indices of equities and bonds—ie, the returns are for a diversified portfolio of equities and for bonds; returns of individual equities and bonds may well have a different risk–return profile.
- The bond return data is based on annual return observations, which does not take into account the fact that the risk is reduced if the bonds are held to maturity (at the extreme, for index-linked government bonds held to maturity the risk is virtually zero, since there is no inflation risk and practically no default risk).

Nonetheless, the conclusions are that historical annualised real equity and bond returns are less volatile over a longer investment horizon than in the short term, and that historical annualised real equity returns have been less volatile than bond returns for long holding periods. This historical pattern in the volatility of annualised long-term returns is shown and discussed in a number of academic studies—see, for example, Siegel (1994), Siegel and Thaler (1997), and Campbell and Viceira (2002).¹⁵ As demonstrated in Tables 5.1 and 5.2, equities have had higher annualised returns on average than bonds in the longer term—ie, the ERP has been positive if viewed over longer periods of time, even though there have been short episodes of negative ERPs.

In the period 1900–06, for holding periods of 20 years or more, equities have delivered both higher average returns and lower risks. For the reasons set out above, this aspect of the historical pattern may not be repeated. In the following simulation analysis (section 5.2), the volatility of equity returns does not fall below the volatility of bond returns over any holding period.

5.1.3 Individual preferences and life-cycle considerations

Individuals have different degrees of risk aversion and correspondingly differing preferences for risk and reward. In theory, they would aim to optimise their investment mix, taking into account their preferences and the level and riskiness of their labour income and other wealth. For example, all other things being equal, individuals would be more willing to accept risk in the investment of their supplementary pensions if they can expect to receive a certain level of state pension benefits or if they have accumulated property or other wealth.¹⁶

The solution to this optimisation problem would provide the risk–return characteristics of the individual's optimal portfolio of pension assets. The academic literature uses life-cycle models to explain the optimal asset portfolio over the entire life of an individual, taking into account labour income (Campbell and Viceira 2002). One of the main conclusions from this literature is that, in general, it is optimal to have an individual's pension asset portfolio that is relatively high-return and high-risk early on, and to reduce the risk of the portfolio as the individual approaches retirement.

A life-cycle approach to pension investment could involve investing in equity early in life, and increasing bond holdings as retirement approaches.¹⁷ Investment in equity early in the life cycle ensures a long holding period for equity (eg, 20–30 years), thus giving a potential for wealth accumulation at relatively high returns and relatively low long-run risks, if the long-term returns and risks of equities are similar to what they have been historically. Switching into bonds as retirement approaches means that the holding period of bonds will be relatively short (eg, 5–15 years), so the investor could theoretically benefit from the lower risk of bonds in the short term, if bond returns and risks are in line with their historical profile. As further discussed in section 5.4, an investment approach that involves a switching of the portfolio over an individual's life cycle is observed among real-world DC plans.

¹⁵ Campbell and Viceira (2002) present evidence from advanced modelling and simulations based on US data: it is shown that the standard deviation of annual equity returns falls with the holding period (mean reversion), whereas the volatility of T-bill returns (rolled) increases with the holding period (mean aversion). They also show that the volatility of annualised returns for bonds held to maturity remains relatively low if compared with equity and T-bill annualised return volatility over long holding periods. Siegel and Thaler (1997) report that the standard deviation of 20-year annualised equity returns is 2.76%, whereas that of T-bill returns is higher, at 2.86% (US data).

¹⁶ Using simulations, Appendix 3 shows an example of the effect of having certain wealth (eg, state pension benefits) in addition to the wealth accumulated as a result of investing supplementary pension contributions in equities and bonds.

¹⁷ Advanced life-cycle approaches in the context of DC investment are discussed in Allianz Global Investors (2007).

5.2 Simulations of the impact on retirement wealth

A simulation model was developed to illustrate what different pension asset investment strategies mean in terms of wealth accumulation for retirement. The outputs of the model are distributions of the level of wealth accumulated by individuals in stylised DC pension plans that vary in their portfolio allocations. They allow an ex ante assessment of the likelihood of different retirement outcomes, under different assumptions about investment strategies (equity versus bonds, guaranteed versus non-guaranteed returns), contribution rates to the pension plan and fee rates.

5.2.1 Assumptions of the simulation model

In the base model, it is assumed that the individual (or the employer on behalf of the individual) starts to contribute to the individual account in the DC plan at the age of 25. The retirement age is 65, so the maximum investment horizon is 40 years. The assumption in the base model is that yearly contributions equal 5% of salary, which starts at €20,000 and grows annually in real terms at a rate of 2%. The modelling is in real terms. The individual account is invested in government bonds and equity. The management fee in the basic model is set at 1%, and returns in the individual account are assumed to be exempt from tax. The model is based on a simulation of real bond and equity returns, with the estimates for the parameters (ie, means, standard deviations, covariance) obtained from historical data.¹⁸ Taking the investment strategy, the contribution levels and the asset management fees as given, the accumulated pension wealth for 10,000 individuals is then simulated based on the simulated bond and equity returns. The output of the model is a whole distribution of pension wealth accumulated in the accounts. Further details of the simulation model are provided in Appendix 2. Table 5.3 summarises the assumptions in the basic model.

Table 5.3 Summary of assumptions in simulation model

Investment strategy	Asset allocation	Other assumptions in base model
Bonds	100% bonds	Individuals contribute from the age of 25 to 65
Equity	100% equity	Individuals have a starting annual salary at the age of 25 of €20,000, which grows at a constant 2% per annum (in real terms)
Life-cycle	90% in equity, 10% in bonds for the first 30 years 30% in equity, 70% in bonds for the remaining 10 years	The contribution rate is 5% of salary per year—ie, €1,000 in the first year, growing annually at 2% thereafter The fee is 1% of assets. Returns are tax-free Government bond and equity returns are simulated using estimates based on UK equity and long-dated gilt indices during 1900–2005 as available in Barclays Capital (2006)

Source: Oxera.

The different investment strategies reflect stylised portfolios of DC plans. In addition to the pure equity and bond portfolios, a mixed investment strategy is considered whereby the portfolio allocation follows a life-cycle or lifestyled investment approach—ie, individuals switch from investment in equities to bonds as the planned retirement date approaches.

¹⁸ Barclays Equity and Gilt indices are used; annual total returns, including income reinvested, on these indices are provided in Barclays Capital (2006), 'Equity Gilt Study 2006'. Estimates for the 1900–2005 period are used. In this period, mean (arithmetic average) log real returns for equities and bonds were 5.14% and 1.15%, respectively; standard deviations were 19.4% and 13.2%; and the covariance between equity and bond returns was 1.54%. The results for different time periods would have been similar. For example, estimates for the 1950–2005 would have been: 6.75% and 1.34% mean real log returns for equity and gilts; 22.85% and 12.56% standard deviation; and 1.6% covariance. Although simulations are parameterised with estimates based on log real returns, the simulated series are transformed back to levels, and the return on investments is then calculated.

The results of the base model are presented in section 5.2.2, while sections 5.2.3 and 5.2.4 examine results if key parameters, such as length of investment horizon, contribution levels and fee rates, are changed.

The model is also used to illustrate the impact of investment in guaranteed products (section 5.2.5).

It should be noted that all results presented below are subject to the same qualifications as those discussed above: the results are based on historical return patterns; investment is assumed to be in diversified indices rather than individual equities or bonds; and real bond returns are sensitive to inflation levels and variability. Moreover, real bond returns here are not returns on a risk-free asset, since government gilts are still subject to inflation and other risks.

5.2.2 Outcomes under different investment strategies

Summary statistics for the distributions of outcomes, in terms of pension wealth that can be accumulated in individual accounts, of different investment strategies are presented in Table 5.4. The highest median pension wealth is accumulated by investing 100% in equity (around €140,000), whereas investing 100% in bonds results in less than half that figure (around €62,000). The wealth accumulated under the life-cycle investment option falls in between. It also shows the pension wealth accumulated towards the lower and upper ends of the distribution. For example, the worst 10% of outcomes under the bond-only allocation would deliver only €37,000 of retirement wealth, compared with the best 10% of outcomes that would generate wealth of €112,000.

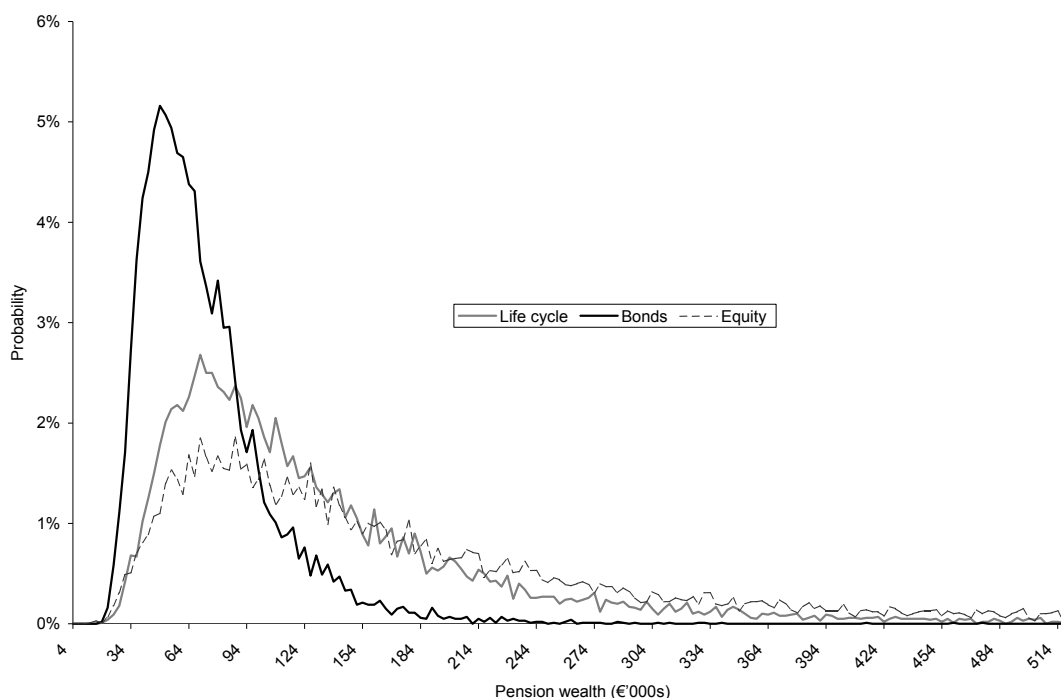
Table 5.4 Pension wealth accumulation under different investment strategies (€)

	Bonds	Equity	Life cycle
10th-percentile	37,102	56,968	52,684
25th-percentile	46,772	85,376	71,781
Median	62,309	139,465	106,435
75th-percentile	83,769	237,538	163,965
90th-percentile	112,336	402,236	249,178
Mean	70,013	200,695	136,007

Source: Oxera calculations.

Figure 5.4 shows the distribution of pension wealth under the different investment strategies. The majority of the individuals who invested 100% in bonds are clustered at the lower end of the pension wealth distribution, whereas individuals who invested in the life-cycle or 100% equity are more dispersed, with more pension wealth being accumulated. For example, the probability of accumulating pension wealth of less than €90,000 is much higher under a 100% bonds investment than under either the life-cycle or 100% equity investment—only 20% of individual accounts accumulate more than €90,000 by investing 100% in bonds, compared with 61% and 72% of accounts that follow the life cycle and 100% equity investment strategy, respectively.

Figure 5.4 Distribution of pension wealth accumulated under different investment options



Note: Datapoints above €532,000 pension wealth are not shown: 1.14% of individuals had accumulated pension wealth above €532,000 with the life-cycle investment strategy, 5.5% with the 100% equity strategy, and none with the 100% bonds strategy.

Source: Oxera calculations.

An important consideration in pension wealth accumulation is how likely it is that individuals will end up with very low pension wealth, or, more generally, how variable the outcomes are. It can be observed that the standard deviation associated with equity or life-cycle investment outcomes is likely to be much higher than for bond investments. However, the very long right-hand tail of the equity and life-cycle investment outcome distributions implies that most of the variation in outcomes is due to the significant 'upside' on the investments. Therefore, given the skewed distribution of accumulated wealth, the standard deviation is not the best measure of the 'risk' of pension outcomes here. A better view of the comparative 'riskiness' of the different pension investment strategies can be obtained by focusing on the lower percentiles and comparing outcomes for the worse-off individuals under the different strategies.

Table 5.5 compares the different investment strategies in terms of the percentage of individuals better or worse off than the median and top and bottom percentiles of the other investment strategies. For example:

- if the entire portfolio is held in bonds, in 88% of cases the level of pension wealth accumulated is lower than the median level of wealth under the life-cycle strategy, and in 96% of cases is it lower than the median with an equity-only portfolio. Thus, in the majority of cases, the accumulated wealth is lower if the portfolio is restricted to bonds;
- accumulated wealth under the bonds-only strategy is lower in 35% of the cases than the bottom 10th percentile of wealth under the life-cycle strategy, and in 42% of the cases is lower than the bottom 10th percentile under the equity-only strategy. Thus, in a significant proportion of cases, restricting the portfolio to bonds results in accumulated

wealth levels that are even lower than some of the worst outcomes under the life-cycle or equity-only strategy.

Overall, the strategies that include equity in the portfolio are superior to a bonds-only portfolio. This is in terms not only of median or average wealth accumulated, but also the 'riskiness' of wealth accumulated—ie, bad outcomes are 'better' (and less likely) under these strategies than under a bonds-only investment strategy.

The simulation results (which are based on historical parameters) suggest that there is little, if any, benefit from investing in bonds instead of equities in terms of the probability of a worse outcome. Indeed, the results suggest that the percentage of cases in which the equity-only strategy delivers a worse outcome than the bonds-only strategy is less than 0.07% (not reported in Table 5.5). Over the long investment holding period, the higher average returns for equities counteract the higher volatility of the returns.

These conclusions tie in with the discussion in section 5.1—ie, equities outperform bonds in long-term investments, based on the observed past returns.¹⁹

Table 5.5 Comparison of pension wealth distribution under different investment strategies

		Bonds	Equity	Life cycle
% of outcomes worse than life-cycle median	(€106,435)	88.2	35.7	–
% of outcomes worse than life-cycle 25th percentile	(€71,781)	62.3	17.9	–
% of outcomes worse than life-cycle 10th percentile	(€52,684)	35.0	7.9	–
% of outcomes worse than equity median	(€139,465)	95.9	–	66.7
% of outcomes worse than equity 25th percentile	(€85,376)	76.6	–	35.6
% of outcomes lower than equity 10th percentile	(€56,968)	41.7	–	13.2
% of outcomes worse than bonds median	(€62,309)	–	12.6	17.0
% of outcomes worse than bonds 25th percentile	(€46,772)	–	5.4	6.3
% outcomes worse than bonds 10th percentile	(€37,102)	–	2.3	2.1

Source: Oxera calculations.

5.2.3 Changing the time horizon

The base model results are simulated using the assumption of an individual starting to contribute and accumulate pension assets at the age of 25 and retiring at 65—ie, the overall length of the accumulation phase is assumed to be 40 years. As discussed in section 5.1, the risk–return performance of equity and bonds depends on the investment horizon. The following therefore considers how the results from the simulation model change if the overall pension contribution and investment horizon is shortened to 20 years, keeping the assumptions about contribution rates, salary growth, fees, risk–return parameters and investment strategies unchanged.

¹⁹ Additional analysis of the investment options was carried out, taking into account individuals' preferences for risk and reward—normally they 'like' reward and 'dislike' risk. Hence, the higher the risk (or dispersion) of investment outcomes, the worse off the individual. The standard constant relative risk aversion (CRRA) utility function with a range of realistic risk aversion coefficients (varying from 0 for risk-neutral individuals to 10 for extremely risk-averse individuals) was used to evaluate the outcomes of different investment options in terms of certainty equivalent wealth (CE wealth). CE represents the wealth that an individual would be willing to accept in place of a riskier, but on average higher level of wealth. (CE wealth is below the mean wealth for risk-averse individuals, representing the 'disutility' associated with risk.) The analysis shows that CE wealth of the life cycle and 100% equity investment is strictly higher than CE wealth for 100% bonds investment for all risk aversion values, except for the most risk-averse (ie, risk aversion coefficient of 10). Thus, the CE analysis confirms the findings that (full or part) investment in equity delivers superior outcomes relative to pure bonds investment, even for risk-averse individuals. More detailed results are presented in Appendix 3.

Shortening the time horizon from 40 to 20 years results in a lower level of accumulated pension wealth for two main reasons:

- given that the contribution rate is assumed to be unchanged, the shorter period implies lower total contributions. More specifically, given the assumptions, the cumulative amount of contributions over the 20-year period is only 40% of the total contributions of the 40-year period;
- the annual contributions made during the first 20 years for the 40-year investment horizon accumulate over another 20 years (ie, until 40 years are reached), whereas the contributions made in the 20-year investment horizon do not accumulate beyond the 20 years.

Other than these two reasons contributing to the lower levels of wealth accumulated for any given investment strategy, it is differences in the risk–return performance of equities and bonds that contribute to the differences in the distribution and levels of the accumulated wealth between the 20- and 40-year investment horizons.

Table 5.6 shows how the pension wealth distributions change if the length of the investment horizon is shortened to 20 years.²⁰ Importantly, although the level of wealth accumulated is lower than under the 40-year time horizon, the median wealth accumulated under the different investment strategies is ranked in the same way as before: the highest median wealth is accumulated under the all-equity investment strategy (€34,573), followed by the life-cycle strategy that represents a mixed equity–bond portfolio (€28,255). The median wealth is lowest if all is invested in bonds (€23,669). The means, 25th and 10th percentiles rank in the same way.

Table 5.6 also considers the ‘risk’ of the various investment strategies in terms of how ‘bad’ and frequent are the worst outcomes if the time horizon is 20 years. For example:

- if the entire portfolio is invested in bonds, in 72% of cases the accumulated wealth is lower than the median wealth under the life-cycle strategy (compared with 88% for the 40-year horizon), and in 88% of cases it is lower than under the equity-only strategy (compared with 96% for the 40-year horizon);
- 21% of the wealth outcomes under the bonds-only strategy are worse than the bottom 10th percentile wealth under the life-cycle strategy (compared with 35% for the 40-year horizon), and 23% of outcomes are worse than the bottom 10th percentile wealth under the equity-only strategy (42% for the 40-year horizon).

Thus, as expected, and in accordance with the discussion in section 5.1, shortening the time horizon to 20 years has an impact on the relative outcomes of different investment strategies. However, the outcomes are, on average, still better for a 20-year investment horizon when an investment strategy involves at least some investment in equity. Even though worse outcomes are more likely for all-equity and life-cycle investments when compared with the 40-year investment horizon case, the ‘bad’ outcomes under such strategies are still ‘less bad’ than under bonds-only investment in the majority of cases, based on the historical data.²¹

²⁰ The complete wealth distribution for the 20-year investment horizon (ie, the equivalent of Figure 5.4 above) is provided in Appendix 3.

²¹ The percentage of cases of a worse outcome under the equity-only strategy than under the bonds-only strategy increases from less than 0.07% when the time horizon in the model is set at 40 years to 0.9% with a 20-year horizon.

Table 5.6 Shortening the accumulation phase to 20 years: pension wealth distribution under different investment strategies

		Bonds	Equity	Life cycle
Median		23,669	34,573	28,255
25th percentile		19,233	24,964	22,383
10th percentile		16,155	18,915	18,462
Mean		25,095	40,540	30,700
% of outcomes lower than life-cycle median	(€28,255)	71.5	33.8	–
% of outcomes lower than life-cycle 25th percentile	(€22,383)	42.9	18.2	–
% of outcomes lower than life-cycle 10th percentile	(€18,462)	20.8	9.1	–
% of outcomes lower than equity median	(€34,573)	88.1	–	70.9
% of outcomes lower than equity 25th percentile	(€24,964)	56.9	–	35.7
% of outcomes lower than equity 10th percentile	(€18,915)	23.1	–	11.3
% of outcomes lower than bonds median	(€23,669)	–	21.8	30.6
% of outcomes lower than bonds 25th percentile	(€19,233)	–	10.5	12.3
% of outcomes lower than bonds 10th percentile	(€16,155)	–	4.8	4.2

Note: As in the case of the 40-year pension accumulation horizon, it is assumed that an individual starts with a wage of €20,000, which grows at 2% per annum (in real terms), and the contribution rate to the pensions portfolio is 5% of the wage annually. The annual fee is 0.5%. The individual stops contributing and accumulating wealth after 20 years. The table shows the distribution of the terminal value of the accumulated wealth for different investment strategies—100% bonds, 100% equity and a mixed 'life-cycle portfolio', containing an equity-bond mix of 90:10 in the first ten years and 30:70 in the last ten years.

Source: Oxera calculations.

5.2.4 Changing contribution and management fee rates

The level of wealth that can be accumulated in individual accounts also critically depends on the level of contributions and fee rates. To illustrate the effect, Table 5.7 shows the impact of changes in contribution rates and fees on the accumulated pension wealth, holding the investment strategy constant (assumed to be the life-cycle strategy discussed above).

Table 5.7 Effect of changing contributions and fees on pension wealth

	Life cycle (5% contribution, 1% fee)	Life cycle (8% contribution, 1% fee)	Life cycle (5% contribution, 0.5% fee)	Life cycle (5% contribution, 2% fee)
Median (€)	106,435	170,290	117,995	86,957
Change in median relative to base model (%)	–	60.0	10.9	–18.3

Source: Oxera calculations.

When the contribution rate is increased from 5% of annual salary to 8%, median pension wealth accumulated increases by 60% from €106,000 to €170,000. The decrease in fees charged from 1% to 0.5% of pension assets per annum also significantly increases the median pension wealth: to €118,000, or by 11%. However, an increase in fees to 2% erodes the median accumulated pension wealth by 18% (median wealth falls to €97,000).

5.2.5 The impact of stylised guarantees

There are several ways to guarantee retirement income. Under a minimum rate of return guarantee, individuals are guaranteed to receive an amount at retirement wealth equal to

their lifetime contributions, plus some minimum rate of return. One variant of this is a 'principal guarantee', which means guaranteeing a rate of return equal to 0%. In this case, individuals are guaranteed to receive at least their contributions at retirement. This guarantee may be provided in terms of a nominal or, more costly, a real rate of return at least equal to zero. Still another more costly alternative would be to guarantee a minimum rate of return, not only at retirement, but also in each period. Instead of a rate of return guarantee, a minimum retirement benefit may be guaranteed, which gives individuals a specified minimum level of retirement wealth, or even retirement income, independent of actual portfolio returns or the prevailing annuity conversion rates, when the retirement income is guaranteed. The cost of these minimum guarantees also depends on when these guarantees are provided (every period versus at the retirement date only), and the horizon (eg, provision of the guarantee from the age at which the employee takes up the scheme, or only at a later age). In the pension context, a guarantee may be provided by the employer or by a third party; the latter may be an insurance company (eg, providing a traditional life insurance contract with minimum return guarantee), but non-insurance products with guarantee are also available (eg, principal-protection funds).

Several academics have investigated the cost of providing minimum guarantees using option-pricing techniques (see, for example, Lachance and Mitchell 2003). The approach is to define the minimum guarantee, and the option that would be needed to attain it, and then to price such options using the relevant techniques. Such an option-pricing approach is not pursued here. Instead, the simulation model has been extended to include a simple illustration of the impact of stylised guarantees on retirement wealth accumulation. The specification and pricing of guarantees are varied and complex. The results should therefore be interpreted as illustrative only.

Among the DC (or DC-type) schemes considered in this study, different forms of guarantees are observed. For example, as discussed in section 3.4, occupational pension schemes in Germany come with the employer guarantee that at least the contributions are repaid. This guarantee corresponds to a 0% nominal rate of return guarantee. However, as a more costly variant, employers may guarantee higher rates (eg, 2.5–3%) and in return are allowed to keep the upside (eg, excess returns above 5%). The 'money-back' guarantee is also observed among the industry-wide schemes in Sweden; in addition, traditional life insurance forms part of the schemes and comes with a minimum return guarantee of around 3% (nominal and gross of charges). Moreover, structured investment products are available that provide different levels of guarantee (see section 5.4 below).

In the modelling, two types of guarantee are considered for illustrative purposes only. These are stylised versions of the observed guarantees (and specified in real terms, given the structure of the model).

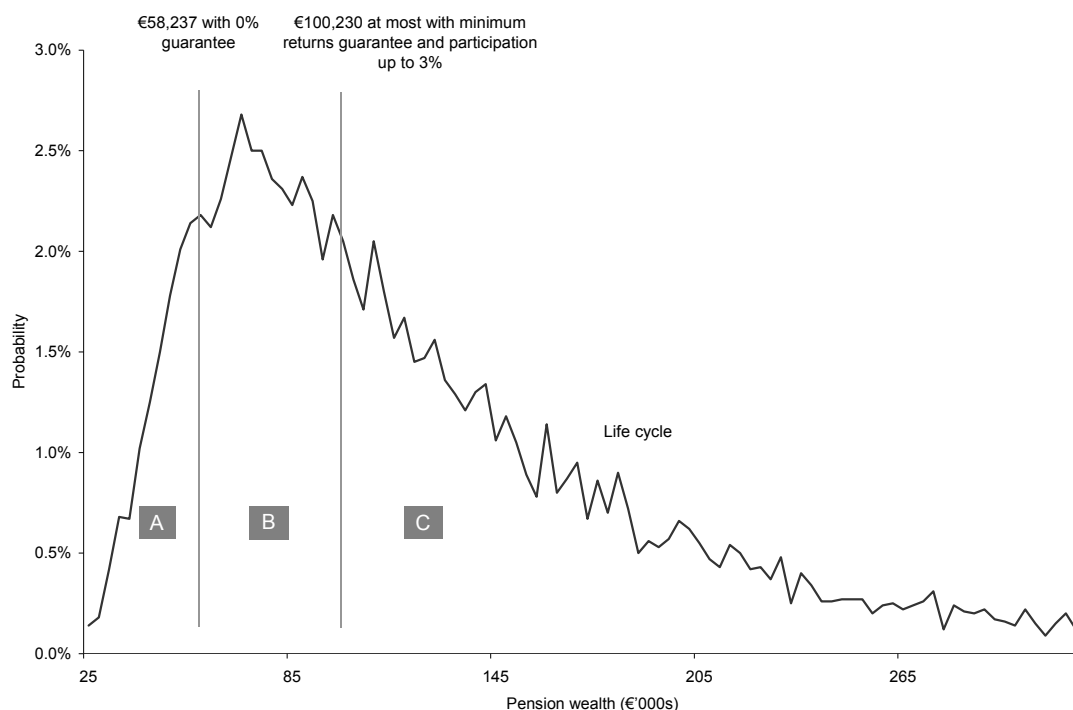
- **0% guarantee.** A guaranteed real rate of return of 0% (net of fees) on the pension assets. This is equivalent to guaranteeing that the individual will get back their contributions in real terms at retirement age. It is more generous than some of the observed money-back guarantees, which are specified in nominal terms (but provide some participation in the upside). However, for this example, it is assumed that the provider of the guarantee keeps all of the upside (ie, real returns realised above the 0%) and does not pay any bonuses or allow the individual a share of the upside.
- **0% minimum guarantee with upside participation (up to 3%).** The provider guarantees at least a 0% real return on the pension assets, but allows individuals a share in the upside. This share is specified such that individuals retain all real returns up to 3%, but the guarantor keeps any returns above 3% in real terms.

Using the same assumptions about income path, contribution rates, etc, as in the base model, the pension wealth accumulated with the 0% guarantee is €58,237. Pension wealth accumulated with the 0% minimum guarantee with return sharing is at least €58,237, but at most €100,230. The results are presented in Figure 5.5, and compared with the distribution

of pension wealth under an investment strategy without guarantees (here, the life-cycle strategy described above).

The advantage of the guarantee is obtaining the certain level of pension wealth of €58,237, but the disadvantage is the cost in terms of forgone returns above the guaranteed level.

Figure 5.5 Guarantees versus life-cycle investment strategy



Note: The distribution of wealth under the life-cycle investment strategy does not show the individuals who have accumulated more than €322,000, which is 4% of individuals.
Source: Oxera calculations.

In Figure 5.5, area A, the smallest area, represents those individuals who would have been better off with the 0% guarantee rather than investing in a life-cycle portfolio without guarantee. The largest area, C, comprises those individuals who would have been better off without the minimum guarantee (including the 3% upside) as they forgo all the investment upside above 3% real returns. Finally, area B comprises all those individuals who are equally well off under the minimum guarantee with upside participation and the non-guaranteed life-cycle investment strategy. In the case of the 0% guarantee without upside participation, those in area B are also worse off under the guarantee.

Table 5.8 below presents the quantification of areas A, B and C, and considers different investment strategies as alternatives to the guarantees. Only 14% of individuals would be better off with the 0% guarantee than with the non-guaranteed life-cycle investment—ie, only in 14% of cases would the guarantee be required. Thus, for the majority of individuals (86%) there would be little advantage in having the 0% guarantee rather than investing in a life-cycle fund, as it would mean forgoing significant returns.

Even with the guarantee that allows individuals to participate in the upside for real returns up to 3%, more than 54% of individuals would be forgoing pension wealth that could be accumulated in excess of €100,000 under the life-cycle strategy. 32% of individuals would be equally well off ex post with or without the guarantee (assuming that the guarantee does not come with a higher management fee).

Similar findings apply for the equity-only investment strategy, which are also reported in the table. They do not, however, apply to the 100% bond portfolio, which, in many cases, would

deliver worse outcomes than a 0% real return guarantee (at least when the guarantee comes with upside participation).

Table 5.8 Comparison of outcomes with and without guarantees

	Life cycle	Bonds	Equity
A: % better off with 0% guarantee	14	44	11
B+C: % forgoing real returns above 0%	86	56	89
B: % equally well off with or without minimum guarantee with upside participation	32	42	22
A+B: % better or equally well off with the minimum guarantee with upside participation	46	86	33
C: % worse off with minimum guarantee with upside participation	54	14	67

Note: A, B and C correspond to the areas depicted in Figure 5.5. For example, the last row shows the percentage of individuals who would have accumulated more pension wealth under the selected investment strategy than with a 3% excess returns guarantee.

Source: Oxera calculations.

Overall, minimum guarantees can impose significant costs in terms of average forgone retirement wealth accumulation in individual accounts. While limiting the shortfall risk for individuals that may result from financial market volatility, such guarantees also limit individuals' participation in the upside benefits. The cost of guarantees depends on the level of the guarantee being offered, as well as on the period of time over which it is applied. The cost can be particularly high if guarantees are used throughout the long accumulation phase, in particular given that equity investment offers higher returns at relatively small risk over a longer investment horizon. It may not be a cost worth paying, except for the very risk-averse individuals closer to retirement and/or for individuals who have low first pillar state pensions and little other wealth to ensure a minimum level of retirement income.

5.3 Benefits of diversification and prudent-person rules

The above discussion has emphasised the trade-off between risks and returns. It has shown that there is no 'free lunch'—reducing risk generally comes at the price of forgoing potential returns. There is, however, one exception: portfolio diversification is a simple remedy against risk, which allows reductions in investment risk without forgoing returns, at least up to the point where the overall risk–return performance has been maximised.

Diversification benefits arise from the fact that different assets are less than perfectly correlated—ie, the relative performance of different assets varies over a given period of time. By holding multiple assets, the risk of poor or negative returns for the entire portfolio is reduced. Essentially, diversification enables elimination of most, if not all, of the non-systematic risk in the market, reducing the total volatility risk of the portfolio.

Thus, in addition to investing individual account holdings in safe assets or guaranteed pension products, diversification of DC investment is a third and efficient way of dealing with investment risk. Once the holdings are diversified, further reductions in risk can only be achieved by accepting lower returns on average, with consequences for retirement wealth accumulation, as illustrated in section 5.2 above.

To show the benefits of diversification in mitigating investment risk, consider the case of international portfolio diversification. Table 5.9 compares the risk–return performance of portfolios that are invested only in domestic equities of the countries considered in this study

with the performance of portfolios that are diversified across European equities.²² The table shows average real returns, the volatility (standard deviation) and the variance coefficient (ratio of volatility to average return) for three equity portfolios: the domestic market portfolio; a portfolio that is invested 60% domestically and 40% in a value-weighted European portfolio; and a 100% diversified European portfolio. The risk–return parameters are estimated using monthly returns over a 30-year period (July 1976 to June 2006), using the MSCI equity return index series for the relevant domestic markets and a European index that includes the EEA constituent markets on a market-value-weighted basis.²³

Table 5.9 Comparison of risk–return performance (real) between domestic and diversified European equity portfolios, 30 years (July 1976–June 2006)

Country	Average returns (%)			Volatility (%)			Variance coefficient		
	Local	Mixed (60:40)	EEA index	Local	Mixed (60:40)	EEA index	Local	Mixed (60:40)	EEA index
France	11.536	10.767	9.623	20.643	17.517	14.999	1.790	1.627	1.559
Germany	9.050	9.279	9.623	20.085	17.348	14.999	2.219	1.870	1.559
Italy	10.228	9.986	9.623	24.404	18.997	14.999	2.386	1.902	1.559
Netherlands	12.292	11.218	9.623	17.755	16.085	14.999	1.444	1.434	1.559
Sweden	9.779	9.716	9.623	16.081	14.898	14.999	1.644	1.533	1.559
UK	9.972	9.832	9.623	16.862	15.605	14.999	1.691	1.587	1.559

Note: Average returns, volatility and variance coefficient are based on monthly MSCI index data over the period, but are annualised for presentation purposes. Nominal returns are adjusted by inflation and measured in local currencies. The EEA index includes equities in countries that are not included in this table.

Source: Thomson Financial Datastream and Oxera calculations.

The results show that moving towards the more diversified European equity portfolios does not always improve the portfolio performance for the countries in terms of average returns—for many, domestic returns exceed the EEA average over the period. However, greater diversification results in a significant reduction in the portfolio volatility—the volatility of the EEA return index is lower than that of each of the domestic market indices. As a result, the variance coefficient—ie, the ratio of the portfolio volatility to the average return—generally declines as the portfolio is diversified to include equity from other European countries. Put differently, for a given level of return, greater diversification across European equity results in a portfolio with lower risk. These results can be generalised to other types of efficient portfolio diversification, not just those that arise in the international context.

The benefits can be captured only in an investment framework that allows diversification. Strict investment regulations that inhibit such diversification impede effective risk management, and, for DC pension schemes, can impose significant costs in terms of less or more volatile retirement wealth accumulation in individual accounts. By way of illustration, Box 5.1 below presents an example of restrictive investment regulation. It is beyond the scope of this report to examine the investment regulations applying to the DC schemes observed in the seven EU Member States.

A restrictive investment framework conflicts with prudent-person principles, which are endorsed at the European level through implementation of the Directive on the Activities and Supervision of Institutions for Occupational Retirement Provision (IORP). In particular, Article 18 specifies that ‘Member States shall require institutions located in their territories to invest in accordance with the “prudent person” rule’, thus moving from a quantitative approach to regulating investment, to a more qualitative one that allows investment to be made in the best interests of scheme members, and takes account of the security, quality,

²² Poland is excluded due to the lack of availability of a return index time series of 30 years.

²³ For a more detailed discussion of the methodology and further results, see Oxera (2007).

liquidity and profitability of the portfolio as a whole. Member States are allowed to be more restrictive in terms of investment regulation only if this is justified, and only up to certain limits.

Box 5.1 Illustration: quantitative limits versus prudent-person principles

This illustration compares investment regulation for funds in the Swedish PPM system with that applying to OPFs in Poland. Both systems provide DC pensions through accumulation in individual accounts. Constituting the mandatory funded tier of the first pillar rather than second pillar occupational schemes, they are not subject to the IORP Directive. The illustration focuses on the framework for international investment.

In Sweden, funds registered with the Swedish Financial Services Authority that meet the requirements of the UCITS Directive can participate in the PPM system. Investment follows prudent-person principles, and there are no restrictions on international investment. Individuals have a wide choice among the many funds participating, but those who do not make a choice are allocated to a default fund managed by the PPM. The default fund's investment strategy is formulated to mirror the asset allocation of an average investor in the system. As shown in Table 5.10, the default fund is internationally diversified, with 65% (80%) of the total (equity) portfolio invested outside Sweden at the end of 2005.

Table 5.10 Asset allocation of the default fund in the PPM system (AP7), end 2005 (%)

	Fixed-income securities	Publicly listed equity	Other	Total
Domestic	10	17	–	27
International	0	65	–	65
Total	10	82	8	100

Source: Oxera (2007).

Corresponding opportunities for international diversification are not available to the OPFs in Poland. More specifically, OPFs are subject to a 5% limit on foreign investment (Article 143 of the Law on Organisation and Operation of Pension Funds). In addition, there are a number of other regulations that indirectly restrict or reduce the attractiveness of foreign investment. Consequently, as summarised in Table 5.11, less than 2% of the total assets of OPFs were invested outside Poland.

Table 5.11 Asset allocation of OPFs in Poland, end 2005 (%)

	Fixed-income securities	Publicly listed equity	Other	Total
Domestic	57.4	31.0	10.3	98.8
International	0.2	0.7	0.4	1.2
Total	57.6	31.7	10.7	100.0

Source: Oxera (2007).

Regulations that strictly limit investment may enforce holdings of a portfolio below the efficient frontier in terms of risk and return optimisation. They tend to focus on the risk of individual assets and may fail to take into account the fact that, at the level of the portfolio, risk can be reduced through diversification.

Of course, within the prudent-person framework, certain categories of investment may be strictly limited (eg, loans without appropriate guarantee, unquoted shares, assets lacking liquidity or sufficient transparency). In particular, restrictions on self-investment—ie, limits to invest in securities issued by the scheme sponsor—can be justified. Over-investment of DC plans in the sponsoring company's shares has been criticised, particularly in the USA, where holders of 401(k) plans have been exposed to, and suffered from, the consequences of

company failure (eg, Enron) (see, for example, Munnell and Sunden 2006). Concentrating investment in company stock means that employees hold a large share of their portfolio in a single stock, which is more risky than a diversified portfolio. Moreover, they concentrate their financial risks in a security directly correlated with their own earnings. Thus, if the company performs poorly, both current earnings and future retirement income will be affected negatively (just as they would in a DB plan). To avoid this, investment in assets of the sponsor is strictly limited in, for example, the new PERCO scheme in France, which is otherwise similar in nature to the US 401(k) plans. Restrictions also apply for schemes in other EU countries.

5.4 The emergence of specific asset management solutions

Asset management offers investors the means to manage risks using the expertise of professionals and providing efficient access to markets through economies of scale and management techniques that most individual investors are usually unable to access directly. This applies to DC pension investment as much as to other forms of investment and asset accumulation. Thus, asset managers can play an important role by offering products and services suited to the preferences and needs of individuals.

Following from the generic discussion above, asset managers can structure DC investment to deliver outcomes along the broad risk–return spectrum. They can offer different solutions for different risk requirements and seek to maximise the risk–return performance of the pension portfolio overall. The solutions may involve individuals tailoring their own allocation by choosing different asset class building blocks for their portfolios; alternatively, the solutions can be pre-packaged. The underlying investments may include index-trackers or managed funds that may be risk-graded (eg, cautious, balanced, growth) and may be composed of different asset classes, which in turn may be diversified by geographic region, sector, theme, management style, and so forth.

Without attempting to discuss asset management strategies and investment styles in detail, the above shows that options are available for managing investment risk. Moreover, specific product solutions have emerged (and are continuing to emerge) which seek to meet the needs of individuals directly when it comes to asset accumulation in DC pension schemes. Further research is required into how to tailor pension investments to meet individuals' retirement needs, and new products solutions would be likely to develop accordingly.

Examples of existing product solutions include the following.²⁴

- **Life-cycle funds.** In life-cycle (or lifestyled) DC investment, most assets are invested in equities for younger scheme members and there is a switching mechanism to increase the proportion in fixed-income assets as the planned retirement approaches. For example, an individual's holdings of units in equity funds are switched five or ten years prior to retirement to units in bond or cash funds. This ensures return generation for most of the accumulation years, but a reduction in exposure to market volatility shortly before retirement. In practice, the structure of the funds can differ (eg, with respect to the length of the switching period and the type of assets involved in the switch). For example, as further discussed in section 6, many default options in DC schemes have a lifestyle overlay. In addition, life-cycling is mandatory for default funds in stakeholder pension schemes in the UK.
- **Target-date funds.** Similar in principle to the life-cycle approach, target date funds have been developed which allow the member to choose the fund that has a date closest to

²⁴ For a more comprehensive review of investment strategies offered by DC schemes, see Byrne, Harrison and Blake (2007). The report contains a detailed discussion of current DC investment strategies in the UK occupational pension market and examines issues concerning individual choice and the appropriate design of the default fund.

the planned retirement date. The asset manager manages the fund risk and asset allocation with the target date in mind.

- **Managed accounts.** Asset allocation in managed accounts is tailored around the individual member's specific circumstances, taking into account not only the age and retirement date of the individual but also factors such as income or the entitlement to state or other pension benefits. Given that the service can be automated, the charges for this more tailored approach can be relatively low.
- **Structured and guaranteed products.** Using the appropriate portfolio management technique, investment products can be designed with a view to ensuring particular outcomes, including keeping the value of the fund above a guaranteed minimum and thereby protecting the initial capital. There is a range of capital-protection products that seek to enable investors to participate in upward market movements, while limiting the loss potential. For example, they may allow the investor to achieve a zero rate of return when the market is falling, and a share (eg, 50%) in any positive returns when the market is rising. Like any type of guarantee (see section 5.2), these products have the disadvantage of forgoing potential returns and reducing, on average, retirement income, especially if used over long periods in the asset accumulation phase.
- **Diversified growth funds.** The funds seek to spread risk and reduce volatility by incorporating a much wider range of asset classes than more traditional balanced funds. While management fees are higher, the benefit of these funds comes from greater diversification, which is achieved in particular through the greater use of alternative asset classes (such as private equity, commodities and infrastructure) that are generally uncorrelated with the equity or bond part of the portfolio.

5.5 Summary

In pure DC schemes, the investment risk is shifted to individuals. The risk can be reduced or even eliminated, either by shifting it to another party (which, in a DB plan, is the employer, but in a DC-type world can be a financial institution) or by investing in safer assets. Both approaches may give individuals some certainty over their investment and corresponding retirement wealth accumulation. However, both come at the cost of average forgone returns (or higher contribution costs for any given level of average pension wealth).

There is a general trade-off between risks and returns. While very risk-averse individuals may consider it worth paying for the cost of safe returns, others will not and may prefer to accept some risk for higher average returns. Importantly, equity generates superior returns and comparatively low risk compared with bonds over a longer investment horizon. The simulations, based on historical return characteristics, show that holding at least some equity during the asset accumulation phase (or until a few years prior to retirement) can have a significant positive impact on retirement wealth for the majority of participants in retirement wealth accumulation.

DC investment can be structured along the broad risk–return spectrum. Asset managers offer solutions for different risk appetites, and, unless constrained by undue investment regulations, can maximise the risk–return performance of the pension portfolio overall.

Product solutions are being developed in the market directly targeted at meeting the needs of individuals when it comes to DC pension investment, ranging from lifestyled approaches to tailored solutions that seek to achieve specific target outcomes. Further research would be useful into how DC pension investment could be tailored to meet individuals' retirement needs.

6 Individual choice: concerns and existing solutions

DC pension schemes tend to place more of the responsibility in planning for retirement on individuals because these plans may require choices and decisions to be made about scheme participation, contribution level, investment, and pension payout at retirement.

This section addresses the issue of choice in DC schemes. Drawing on evidence from existing schemes in the seven countries of analysis, section 6.1 shows that the degree of individual choice and decision-making responsibility varies according to the scheme design, and may be restricted by law or regulation.

Individual choice can have significant advantages, in particular in terms of the flexibility and control it gives individuals to structure their pension savings according to their own needs and preferences. At the same time, there are valid concerns about the ability of individuals to make the right decisions when it comes to planning for their retirement. Section 6.2 sets out the potential benefits as well as the problems with choice. Section 6.3 examines the solutions available to improve individual choice and decision-making abilities, including the measures put in place for existing pension schemes—ranging from the specification of default options for individuals unable or unwilling to make active choices with respect to their pensions, to wider education programmes aimed at improving the financial capability of individuals.

6.1 Overview of individual choice in DC schemes

Individual choice may be required in DC schemes on four main issues: whether to participate; how much to contribute; what to invest in; and how to receive the pension at (or before) retirement.

6.1.1 Participation in a scheme

Where participation in an occupational pension scheme is voluntary, the first decision to be made by an individual is whether to participate. This decision is not necessarily unique to DC schemes; participation in a DB scheme sponsored by an employer may also be voluntary.

Many of the occupational schemes described in section 3 are voluntary, some with respect to whether the employer will offer a scheme (and the type of scheme), and others with respect to the employee's participation in the scheme offered (or a combination of both). For example, in France, the PERCO scheme can be set up by employers in negotiation with the unions. Although it was offered to more than 1.2m employees in 2006, only 200,000 were active and contributed to the scheme set up by their employer; however, the scheme is relatively new, and participation is increasing rapidly.

In the UK, occupational pension schemes are purely voluntary with respect to employee participation; coverage is less than half of the employed population. While schemes are not permitted to make membership compulsory, many of the trust-based schemes in the UK have 'auto-enrolment', whereby new employees automatically become members of the scheme, but have the right to opt out. Schemes with auto-enrolment have a higher proportion of active members among eligible employees (89%) than those without (59%) (GAD 2006).

These voluntary participation approaches contrast with the situation in the Netherlands and Sweden, where occupational pension schemes (which are of DC type only or have a DC element in the scheme) are set up by agreements between the social partners on a comprehensive basis, often on an industry-wide level; as a result, participation exceeds 90%.

Individual participation can be made fully mandatory by law, as is the case in the mandatory individual accounts systems in Sweden and Poland. These systems are part of the social security system, and individuals have no choice as to whether to participate.

A mandatory system of individual accounts, with automatic enrolment, will also be implemented in the UK from 2012, addressing the problem of low take-up rates associated with voluntary pension scheme participation.

6.1.2 Contribution to the scheme

The decision of whether to participate is linked to the decision about the level of contributions. Employees may be given an element of choice regarding the amount of contribution the employer will pay to the scheme on their behalf, or any additional contributions they want to make to the scheme. For example, in the French PERCO scheme, employees are free to contribute up to 25% of their salary; this is in addition to any contributions that flow from profit-sharing arrangements, transfer of existing employee savings schemes, or supplementary employer contributions. Choice is also available in the UK schemes (subject only to an upper limit for tax-relief purposes).

In Italy, employees also have a degree of choice in the level of contributions flowing to the closed and open pension funds which can be set up by their employers. To increase the assets flowing to the pension funds, a decision has been made to automatically transfer termination indemnity payments (TFRs) to pension funds, unless the employee explicitly forbids it.

Choice regarding level of contribution may be limited and determined by the employer or through agreement between the social partners. This is the case, for example, in DC-type occupational schemes in Germany, the Netherlands and Sweden.

In the mandatory individual accounts systems, contribution rates are fixed by law, with no choice for the individual—in the Swedish PPM system, contributions are made at a rate of 2.5% of salary, and in Poland, the contribution paid into OPFs is fixed at just under 7% of gross income (2006). Similarly, under the proposed system in the UK, employees will need to contribute a minimum of 4% of their salary, with matching contributions from the employer and the government.

6.1.3 Investment of pension assets

As shown in section 5, investment can be structured along the whole risk–return spectrum, and DC schemes can offer individuals the opportunity to invest the pension assets accumulating in their individual accounts according to their needs and preferences. The DC or DC-type schemes observed in the seven EU Member States differ significantly in the degree of choice granted to individuals regarding pension investment, both across and within countries.

While choices are relatively unconstrained in some cases, in others restrictions that limit investment options are imposed, either through pension plan statutes, decisions made by the plan sponsors or governing bodies, or through laws and regulations. In addition, provisions have been introduced in many schemes that offer a default investment option for those individuals who do not make an active choice.

On the one hand, constraints on the choice set can be detrimental, since individuals may be restricted in making choices that are optimal to them; on the other hand, a constrained choice set can be one of the solutions if individuals are not in a position to choose—this issue is discussed in more detail in sections 6.2 and 6.3.

DC occupational pension schemes in the UK generally offer a wide range of investment options. According to a survey focusing mainly on trust-based schemes, all but 6% of DC

schemes provided members with investment choice (Byrne, Harrison and Blake 2007). 23% of schemes offered members 20 or more funds to choose from, and 10% of schemes offered 40 fund choices or more. There is also significant choice in stakeholder pensions, the provider of which is usually selected by the employer, although employees can choose a different provider if they wish. For individuals who do not want to make an active choice, regulations of stakeholder pensions require their investment to be allocated by default into a life-cycle fund.

A very wide choice of investment through funds is also observed in the Swedish PPM system. Individuals are free to choose up to five funds among the 705 funds registered in the system (as at 2005). If they do not make a choice, their funds are invested in the default fund (the Premium Savings Fund), which is administered centrally, and the portfolio of which mirrors that of the average investor in the PPM system.

Free choice is, in principle, also observed in the mandatory individual account system in Poland. However, the choice is restricted between the 15 OPFs available in the market (as at 2005). Moreover, due to the stringent investment regulations (see Box 5.1 for an example), the funds are relatively similar in their portfolio allocations, thereby effectively offering only limited investment choice to participants. Where no choice is made, individuals are allocated to a default fund, determined by lottery among all funds that meet certain criteria.

In Italy, closed pension funds have traditionally been very restrictive in the investment options offered to employees, with the governing bodies determining the investment strategy, and in many cases limiting choice to one or two funds. Open pension funds offer individuals a wider choice, with investment options covering a broad range of fixed income, equity, and balanced or guaranteed funds.

In the French PERCO scheme, union and employer representatives pre-select a number of investment funds (usually up to 15, on average 5–10), from which employees can choose freely. There is a requirement for a PERCO to offer at least three diversified funds, which are not more than 5% invested in the sponsoring company's shares, and a 'solidarity fund'.

In Sweden, the occupational schemes for blue- and white-collar workers offer individuals the choice between traditional insurance and unit-linked contracts offered by a pre-selected range of insurance companies.²⁵ If the unit-linked contract is chosen, individuals have a further choice among the mutual funds offered by the provider. Traditional insurance (with minimum return guarantee) is the default option.

Individual choice and employee decision rights are generally limited in German occupational pensions, although this can vary from scheme to scheme. Employees or their representatives are involved in the design of occupational schemes when they are set up; involvement afterwards generally depends on the willingness of the employer to involve them in the operation. The employer may allow choice, for example, in schemes funded by direct insurance or through Pensionskassen, which is particularly common if unit-linked insurance is offered; employees would then choose the underlying mutual funds.

Dutch pension funds are largely (average-pay) DB schemes although other hybrid structures with a DC element are emerging. For the DC element of the fund, the governing body determines the funds to be offered to scheme members (usually around five or six funds, capturing a range of risk–return profiles) and selects the management company. Employees can then choose among the options, with a default specified by the governing body. Where the occupational pension is provided via direct insurance arrangements, the employer would

²⁵ As discussed in section 3, the white-collar worker scheme is only DC-type for those born after 1979, but is otherwise largely DB without choice. Those born after 1979 can choose to invest up to 50% in a unit-linked contract, with the remainder being traditional insurance. The blue-collar scheme is DC-type for all workers and can be 100% unit-linked.

also select around five or six options offered by insurers, with individuals choosing among the pre-selected set.

6.1.4 Payout of pension

In DC or DC-type schemes individuals may be confronted with a choice in the form of pension payment they want to receive on retirement, and/or be given an option for early withdrawal; this is generally not the case in DB schemes, where the individual is guaranteed a certain amount of pension payment by the plan sponsor on retirement. For example, in the French PERCO scheme, employees have free choice between purchasing an annuity or receiving a lump-sum payout of the assets accumulated in their accounts; they may also choose to withdraw funds early, but only in certain cases (eg, purchase of home).

In UK stakeholder schemes, the choice is more restricted; the purchase of an annuity (or similar product) is mandatory (with the option for a lump-sum cash payment, but only up to a limited amount); individuals can choose when to purchase the annuity (ie, any time between their 50th and 75th birthday).

By contrast, employees may be given no option at all, as is the case, for example, in the pension schemes for blue- and white-collar workers in Sweden. There is no option for payout in lump-sum format, and pensions are generally paid in annuity form through the insurance policies into which contributions have been paid.

This report focuses on the accumulation phase only, and hence does not consider any further choices with respect to the payout phase. Also, the first two dimensions of choice are not discussed in any detail because the adequacy of scheme participation and the adequacy of contributions is a policy concern for all types of privately funded pension schemes, irrespective of whether they are occupational or private, or whether they are of DB or DC form. Instead, the focus is on the issue of individual choice and decision-making regarding the investment of pension assets.

6.2 Potential benefits and problems

Individual choice in pension provision can have significant benefits.

- **Better outcomes.** Giving individuals choice may lead to optimal outcomes, for example by allowing tailored investment decisions that match the individual's preferences and circumstances (eg, age or other wealth), which may be superior to 'one-size-fits-all' outcomes.
- **Additional individual welfare benefits.** Choice may have additional welfare benefits for the individual—eg, by increasing motivation, perceived control and freedom, or other psychological effects.
- **Personal responsibility.** When individuals make, or are obliged to make, some choice with regard to their pensions, they may become more interested in the issue. There is evidence of dynamic learning effects—ie, compelling individuals to make financial choices can also enhance individual choice in the future (see Arenas de Mesa and Mesa-Lago 2006, and Engstrom and Westerberg 2003).
- **Competition.** Individual choice may improve the operation of the market through enhanced competition, as market participants seek to respond to the needs and preferences of pension plan members. The ability to choose and switch between products and providers, even if exercised by only a few, creates conditions for competitive pressures on providers to reduce costs and improve service and product offerings.

However, there is a significant body of academic research showing that individuals often have limited financial knowledge, and in particular know little about the characteristics of their pensions, including how much to expect (and how much they need) in retirement benefits. A possible reason for this lack of knowledge is that learning about pensions is difficult. The complexity involved makes the costs of collecting information appear greater than the benefits of understanding pensions. Individuals go through the retirement process only once and therefore cannot learn from their mistakes. In addition, retirement may be viewed as a cause for concern, which means that learning about pensions can involve psychological costs. Furthermore, participants may not appreciate the benefits of collecting information because they expect that the public pension system will provide adequate benefits (see Sunden 2006a).

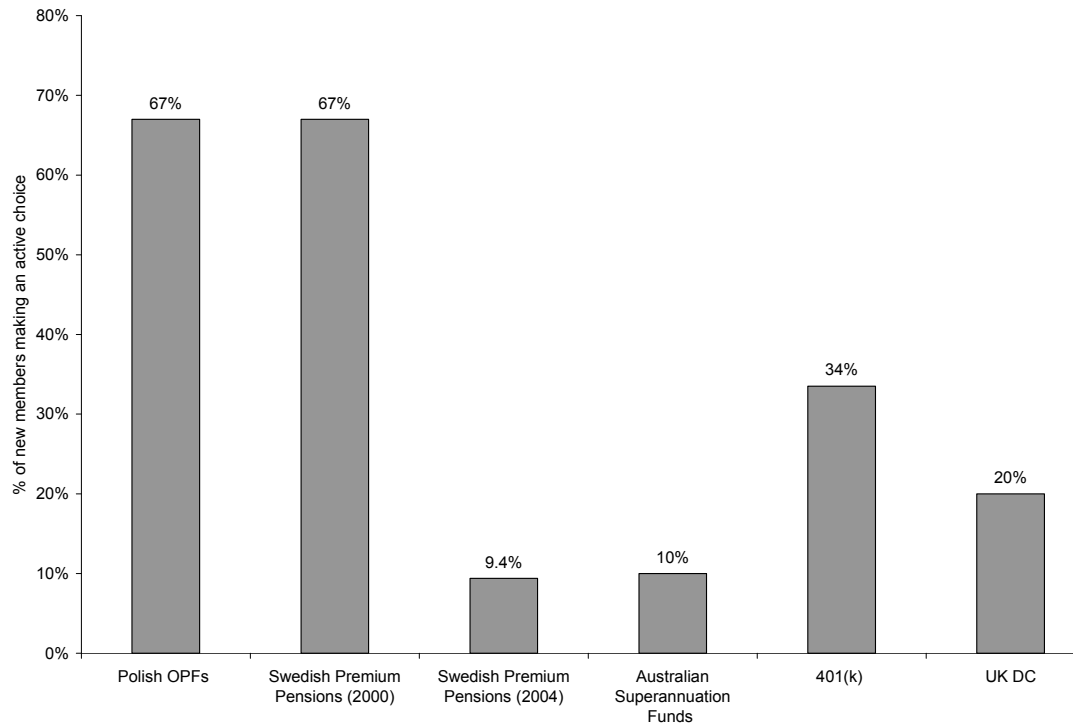
Where participation in a scheme is voluntary, the scheme take-up levels tend to be low, indicating that relatively few employees choose to participate in supplementary pension schemes. Examples include PERCO in France (only around 20% of employees who were offered PERCO chose to participate in 2006), and occupational schemes in the UK (coverage of the working population is around 50%), as discussed in section 6.1.1. There is evidence from the USA, where the DC pensions have a longer history than in Europe, that contributions to the 401(k) plans are inadequate in a large proportion of cases. Munnell and Sunden (2006) report that only 11% of employees contribute the legal maximum to their 401(k) pensions, most of whom are wealthier individuals. In addition, policymakers in Europe are concerned that contributions to supplementary pensions might be too low to deliver adequate pensions.

Munnell and Sunden (2006) identify a number of mistakes made by participants of 401(k) plans in the USA that lead to inadequate pension asset accumulation, such as low levels of participation, inadequate contributions, failure to diversify, over-investment in employer company shares, failure to rebalance (ie, portfolio not adjusted in response to changes in age or returns), and cashing out (ie, many employees, especially young ones, take their money out of the plan when they change jobs).

Analysing the investment decisions made by a random sample of 11,000 individuals in the Swedish PPM system, Hedesström, Svedsäter and Gärling (2004) found the presence of a number of biases that indicate non-optimal choice: bias towards the default option, excessive diversification (ie, diversify by choosing more funds than optimal), aversion to extreme outcomes (members do not choose funds with very low or very high risk), home bias, and equal allocation of the investment among different funds.

In particular, the bias towards the default option is taken as evidence that individuals are either incapable of making, or unwilling to make, decisions concerning the investment of their pensions. Figure 6.1 shows the percentage of new scheme members making an active choice in different pension schemes worldwide, rather than being allocated to a particular fund by default. For example, estimates suggest that 67% of members in the Polish individual account system make an active choice, whereas, in Australia, active choice among Superannuation Funds is as low as 10%. In Sweden, when the PPM scheme was introduced in 2000, 67% of the new members made an active choice; however, by 2005, only 8% of new members did.

Figure 6.1 New scheme members making an active choice (%)



Sources: *Poland*: KNUiFE (2006). *Sweden*: Engstrom and Westerberg (2003), Premium Pension Authority (2005). *Australia*: Gallery, Gallery and Brown (2004). *USA*: Madrian and Shea (2000) and Choi et al. (2001). *UK*: Bridgeland (2002) and Byrne, Harrison and Blake (2007).

The default bias in the Swedish PPM system is examined in Hedesström, Svedsäter and Gärling (2004) and Engström and Westerberg (2003). Madrian and Shea (2001) report significant default bias in the US 401(k) plans, providing as an explanation the inertia of participants and employee perception of the default option as investment advice on the part of the plan sponsor. Sunden (2006b), however, has suggested that the observed default bias in Sweden may have been the consequence of the superior performance (lower costs and comparatively high returns) of the default fund, rather than the lack of active individual decision-making. In other words, rather than 'not choosing', individuals may have made a conscious and rational choice when opting for the default fund.

Choi et al. (2001) show that the default bias may decline over time. In a study of behaviour of 401(k) participants in the USA, they find that, at six months of tenure, between 55% and 73% of participants contribute at the default rate and have their assets invested wholly in the default fund. At 24 months of tenure, the proportion of participants opting for the default falls to 40–51%, with further declines for longer periods of tenure.

While some choice can be good, there is a body of research indicating that excessive choice may exacerbate the problem of poor financial understanding. For example, Tversky and Shafir (1992) show that increasing the degree of choice and complexity of a decision-making task leads to procrastination. Furthermore, increased choice can increase the costs to the individual in making well-informed choices. Information collection, research, learning and executing choice is costly in terms of both money and time, which may inhibit individuals from making optimal choices, or indeed any choices at all.

Iyengar, Jiang and Huberman (2004) also show the problem of choice overload. In a study of 401(k) plans in the USA, they report that an addition of ten funds to the existing range of choices decreases participation by 2% and the portfolio share of equities by 8%, while

increasing the share of 'safe' investments by 5.4%. Benartzi and Thaler (2002) find that, in the context of pension investment, the increase in participants' utility, from being able to choose their own portfolio, is small. However, Papke (2004) finds that a participant in a DC scheme who has choice over their investment contributes over 8.5% more into the scheme than a comparable participant who has not. Overall, these results tend to suggest that, given individuals' knowledge and behaviour, some choice in pension investment is helpful, but excessive choice may have adverse effects.

6.3 Existing solutions

The following describes solutions that have been implemented to address problems encountered by individuals when deciding how to invest their DC pensions. As discussed above, there are other dimensions of choice, such as the decision whether to participate in a voluntary pension scheme, or how much to contribute. Apart from increasing individuals' awareness and knowledge, there are two main adopted solutions to the participation and contribution problems: one involves mandatory or automatic enrolment (with possible opt-outs) and minimum prescribed rates of contributions; the other involves incentivising participation and scheme contributions—eg, through tax incentives or matching employer or state contributions.

Focusing on investment choice, concerns about the ability or willingness of individuals to decide how to invest their DC pensions can be addressed in two main ways. The first involves limiting the choice set available—for example, by restricting the range of products in which they can invest, or specifying the choice for those individuals who cannot or do not want to make active decisions (eg, through specification of a default option). The challenge with this type of solution is that it is not obvious how the choice set should be limited, and/or what the optimal defaults should be; moreover, one default may not be appropriate for all individuals, given their different economic circumstances.

The second solution is to put in place mechanisms to help individuals make well-informed choices; this includes provision of information and financial advice, as well as educational programmes. If fully effective, no limitations on choice would be required and the system could be made default-free, with individuals choosing the option most appropriate to their needs.

In practice, it is the combination of these two solutions that aims to ensure that some decisions are made for those individuals who are unable or unwilling to decide themselves, while seeking to improve the capability and responsibility of individuals to make their own choices effectively. The following provides an overview of these solutions.

6.3.1 Limiting individual choice and specifying a default option

There is evidence in the literature that giving individuals too much choice concerning their pension investment is counterproductive—it adds to the decision-making complexity, increases search costs, can demotivate individuals if they feel responsible for distinguishing good from bad decisions, and may increase the likelihood of bad decisions when the choice set is too broad and includes products that may not be appropriate for many, etc. The simplest response to the problem would appear to be to limit the choice set.

In a recent survey in the UK, most pension experts surveyed thought that DC schemes should offer a relatively narrow range of funds for scheme members to choose from (Byrne, Harrison and Blake 2007). While there was variation in opinion as to what constituted an adequate number of funds, the majority (57%) indicated that around 6–10 funds might be considered appropriate. As shown in Table 6.1, no one considered a choice of zero to be optimal. As regards actual practice among UK trust-based occupational pension schemes, all but 6% of DC schemes offered a choice of investment, with the majority offering fewer than

ten funds to choose from (49%). Nonetheless, one-quarter of schemes offered more than 20 funds (and 10% more than 40 funds).

Table 6.1 ‘Optimal’ and actual number of funds offered—evidence from UK DC schemes

Number of funds	% of survey respondents considering number appropriate	% of schemes offering number of funds
1	0	6
2–5	17	14
6–10	57	35
11–20	9	21
20+	15	23
Don’t know	2	n/a

Source: Byrne, Harrison and Blake (2007).

Limitations on the choice set available to individuals in their pension investment decision-making is also observed among the DC and DC-type schemes in other countries, as already set out in section 6.1.

In addition, many schemes specify a default option for those investors who do not make an investment choice. In the UK survey of pension experts discussed above, 89% stated that a DC scheme should have a default option (Byrne, Harrison and Blake 2007).

A default option exists for those schemes where the remaining choice set is broad—eg, the Swedish PPM system or stakeholder pensions in the UK. In both examples, a default option is determined by law or regulation. To the extent that a significant proportion of individuals fall back on the default, the design or specification of the default option is particularly important.

In the Swedish PPM system, individuals who do not opt to allocate their savings to any of the 705 investment funds registered in the system automatically have their money allocated to the default alternative—the Premium Savings Fund, which is centrally managed by the Seventh Swedish National Pension Fund (AP7). The portfolio of the fund is well diversified in equities and internationally (see Box 5.2 above), and mirrors the asset allocation of the average investor in the system.

In the UK, stakeholder pension regulations require the default option to take the form of a life-cycle fund, with the initial portfolio heavily invested in return-generating assets (equities) and rebalancing into fixed-income securities or cash as retirement approaches (see section 5.4). Implementation of the life-cycle approach, however, varies from scheme to scheme—for example, with respect to the length in the period over which the portfolio is switched and the portfolio allocation before and after the switch.

Table 6.2 provides an overview of the extent to which different schemes limit the degree of investment choice available to individual scheme members. It also summarises the default specification in different schemes. While detailed information was available for some schemes and countries, this was not the case for others. Also, there can be significant variations between schemes within a country. Accordingly, the information in Table 6.2 provides only an indicative summary of arrangements in different schemes and countries.

Table 6.2 Overview of individual investment choice and default options in different DC or DC-type pension schemes

	Degree of individual choice	Specification of default
France—PERCO	Union and employer representatives pre-select investment funds, from which employees can choose—usually up to 15, on average 5–10 diversified funds	Not specified
Germany	Limited. In the case of direct insurance and Pensionskassen, when unit-linked contracts are offered, individuals tend to have choice among the underlying mutual funds	Not specified
Italy—closed pension funds	Governing bodies decide investment strategy. Traditionally, choice limited to one or two funds	Not specified
Italy—open pension funds	Wide choice compared with closed funds, with funds offered along the risk–return spectrum (equity, fixed-income, balanced, guaranteed)	Not specified
Netherlands—closed pension funds	For the DC part, governing bodies select around five or six funds with different risk–return characteristics from which individuals can choose	Governing body determines default (often fixed income)
Netherlands—direct insurance	Employer chooses around five or six options offered by insurance companies, among which individuals can choose	Employer tends to specify the default (often fixed income)
Poland—mandatory individual account system	Individuals can choose freely among 15 OPFs (as of 2005)	Default option is determined by lottery among the OPFs that meet certain performance criteria
Sweden—occupational schemes for blue- and white-collar workers	Choice between traditional insurance and unit-linked contracts offered by insurance companies that are pre-selected by the social partners. If unit-linked, further choice of mutual funds. For white-collar scheme, system only applies for the young, and unit-linked investment is restricted to 50% of total	Default is traditional insurance contract from insurer selected by social partners
Sweden—PPM system	Free choice among 705 investment funds registered with the PPM (in 2006)	Default is Premium Savings Fund, which is centrally managed; portfolio is diversified and follows average investment in system
UK—trust-based schemes	Majority of schemes offer investment choice, usually among funds pre-selected by trustees. Choice can be significant in some schemes, with more than 20 funds to choose from	Trustee tends to specify default, which often is a life-cycle fund
UK—stakeholder pensions	Provider selected by employer (although employee can choose different provider), leaving employee to select from the wide range of funds available on the provider's platform	Regulation specifies that the default is a life-cycle fund

Note: Due to inconsistencies in data availability, the tabular summary contains only illustrative information about the 'typical' scheme.

Source: Oxera, based on interviews and various country-specific publications.

The disadvantage of a single default fund is that it is unlikely to meet in full the risk–return preferences of all members in a pension scheme—although it may be designed such that it is a reasonable ‘second-best’ to suit at least a large number of scheme members, or to meet the requirements of the typical member falling back on the default.

There are options for keeping pension investment simple from the perspective of the individual member, while allowing some flexibility in allocating investment according to the individual’s needs. One such option involves a life-cycle investment approach, referred to above and in section 5. This may, at the basic level, involve switching the investment portfolio with the individual’s age, but can also be structured to take into account other member-specific characteristics. The automatic or dynamic changes in the asset allocation over time limit portfolio risks closer to retirement, and avoid the costs of an overly conservative investment during much of the accumulation phase. Life-cycle models as an asset management solution for DC pension plans are further discussed in Allianz Global Investors (2007).

Byrne, Harrison and Blake (2007) discuss an approach that includes offering a small number of packaged products from which members can choose—eg, with the scheme offering three to five multi-asset strategies with different risk–return profiles, with some form of life-cycle overlay to manage risk over time. Such an approach is already growing in use in the UK. In addition, in some of the other schemes reported in Table 6.2 (eg, PERCO in France, open pension funds in Italy, occupational schemes in the Netherlands), employees are offered a pre-selected menu of investment options with different risk–return profiles from which to choose.

Unless the default option is defined by law or regulation, some institution or individual is required to take responsibility for its specification. The same applies for pre-selecting a range of funds from which individuals can choose. Thus, a governance framework needs to be in place to assign those responsibilities. As summarised in Table 6.2, and as further discussed in section 7 on scheme governance, the relevant body is, in general, the governing body of the pension scheme.²⁶ Furthermore, those making decisions on behalf of individuals need to have the required knowledge and expertise to do so effectively. Various measures have been proposed or implemented in this respect, and are summarised in section 7.

6.3.2 Communications, financial advice and educational programmes

The alternative—or, rather, complementary—strategy to facilitate individual choice and decision-making is to provide individuals with information and decision tools, as well as to enhance their general capabilities to make informed decisions regarding their pensions. In essence, this strategy is directly aimed at enhancing individuals’ decision-making capacities so that first-best ‘optimal’ outcomes can be achieved, rather than limiting the choice set as a second-best solution.

Pension schemes generally make a considerable effort to provide information to scheme participants. This includes tailored information about the scheme (eg, in form of simplified fact sheets or periodic communications containing details about their investment allocation, value of assets, expected retirement wealth, level of returns and charges). In addition, further guidance may be issued showing the effect of changing contributions, illustrating the relationship between risk and return from different investment strategies, or providing a measure of sensitivity of results to changes in one or more of the assumptions. Although the form, content and timing of these communications differ, such arrangements have been put in place by all schemes.

²⁶ Byrne, Harrison and Blake (2007) claim that fear of legal liability may prevent employers, trustees or advisers in the UK from offering narrow fund ranges to members or specifying a default. The authors also make a range of recommendations on how to increase those responsibilities.

As well as individually tailored communications, schemes often provide additional details (eg, through newsletters, annual reports or websites) to convey general information about the scheme. Employers (or the social partners) can also set up or sponsor educational programmes to improve their members' understanding of pensions.

Schemes may also offer help to their members in planning for their retirement and other contingencies by offering one-to-one sessions with financial advisers. Such financial advice comes at a cost, and while potentially effective, its use may be limited. For example, evidence from the UK suggests that this service is available in only 17% of trust-based DC schemes (GAD 2006). However, employees do have the option of independently purchasing advice to help them with their individual pension planning.

As an alternative to this, pension decision tools are being made available in the market, offering risk-profiling and investment recommendations in an automated, and hence low-cost, manner. Such tools (and recommendations for their more widespread use) are described in detail in Byrne, Harrison and Blake (2007).

In addition to information and training initiatives on the part of schemes, further pension-specific information services are generally made available by the regulatory authorities, ministries or specially designated public pension bureaus—this may include publication of brochures, websites with pension planning tools, and call centres.

These measures may be supported by national initiatives to improve individuals' general financial knowledge and literacy. A recent example in this respect comes from the UK government's announcement of its long-term plans to improve financial capability (HM Treasury 2007). This includes a review of how to give greater access to high-quality and affordable generic financial advice. It also includes plans to increase personal finance education in schools, and a range of other government programmes focused on improving financial capability, particularly to help those who are potentially most vulnerable to the consequences of poor financial decisions.

There are clearly limits to achieving mass financial literacy, and the effectiveness of some of the programmes and initiatives remains an open question. Nonetheless, it is clear that information and education to improve individual members' capabilities to make financial decisions can play an important role, especially if well targeted.

There is also academic evidence to suggest that the measures taken can have a positive effect, at least on the rate of pension savings and the level of retirement wealth accumulated.²⁷ Much of the evidence comes from the USA with its longer history of DC schemes and programmes specifically designed to improve individual decisions regarding pensions. A number of studies have examined the effects of financial education by looking at what happens to participation and contributions in 401(k) plans. For example, Clark and Schieber (1998) find that financial literacy played an important role in increasing the probability of participating in a 401(k) plan. Bernheim and Garrett (1996) confirm that employees who used the information materials provided to them had higher participation rates than those who did not. Bayer, Bernheim and Scholz (1996) report that employees who participated in retirement planning seminars had higher participation rates. Similarly, Clark and d'Ambrosio (2002) and Clark, d'Ambrosio, McDermed and Sawant (2003) show that employees who participated in a financial education seminar adjusted their retirement goals in response to the information provided in the seminar about the level of income needed in retirement. Bernheim, Garrett and Maki (2001) establish that introducing financial education in the secondary education curriculum has positive effects in the long term.

²⁷ For a general discussion of information and education in the context of pension decision-making, see Sunden (2006a), which also contains a review of some of the literature and examples of educational programmes from both the USA and Sweden.

Overall, information and education can have positive effects on individual choice and decision-making, even if the effects are limited, in that not all individuals can be reached and/or a longer time period is required for the desired effects to materialise. Further research is likely to be required into how individuals make choices, how they process information and how their financial capability can be enhanced to ensure that they can make the choices that best suit their needs and preferences when it comes to retirement savings.

6.4 Summary

Individual choice can have significant advantages. In particular, it offers the flexibility to structure pension savings in line with individual needs and preferences. However, there are concerns about the ability of individuals to exert choice and make appropriate decisions when it comes to their pensions. Addressing these concerns is a key policy objective and an area for further research.

To address concerns about participation and the level of contributions to supplementary pension schemes, direct solutions include making participation in schemes automatic or mandatory, prescribing minimum contribution rates, or providing tax or other incentives to increase contributions.

As regards problems concerning the choice of how to invest DC pensions, direct solutions involve limiting the choice set available to individuals (eg, pre-selection of investment options, provision of packaged product solutions) and specifying defaults if no active choices are made. These solutions are aimed at facilitating or making choices for those individuals who are unable or unwilling to make decisions.

Provision of targeted communications, financial advice and automated pension decision tools can further improve individuals' ability to make the appropriate decisions. Initiatives to enhance the general financial capability of individuals through educational programmes are also being implemented and have been shown to deliver some positive effects, even if only in the longer term. As individuals are given greater control and responsibility, their decision-making ability is likely to improve through learning and familiarity over time.

7 Pension scheme governance

Pension scheme governance concerns the provision of a framework for defining the duties, associated responsibilities and accountabilities for all participants involved in the functioning of the scheme in order to ensure that the pension promise made to members is delivered. As discussed in section 7.1, governance is relevant to all aspects of scheme operation, including funding, investment, benefit administration, and communications.

While a comprehensive analysis of pension scheme governance is beyond the scope of this study, section 7.2 considers specific governance aspects that are particularly relevant to the asset accumulation phase, focusing on arrangements governing the safeguarding and investment of pension assets that accumulate in schemes that are of DC type. Governance structures differ significantly between existing schemes, depending on scheme objectives and design, as well as the institutional framework of each country. Section 7.3 provides illustrations of some solutions that have been introduced in a sample of the schemes considered in this report.

7.1 Governance as a response to agency problems

Pension schemes function on the basis of relationships between scheme members and the parties involved in the operation of the scheme. Personal pension plans are directly provided to individuals by financial institutions, and the main relationship is between individual and institution. In workplace pensions, the employer channels contributions to the scheme and usually acts as the intermediary between scheme members and the financial institutions involved in scheme administration and management.

These relationships may give rise to agency problems or conflicts of interest because scheme members who own the pension assets or benefit from their investment are not the same individuals as those who control or influence the operation of the scheme. Moreover, individuals do not generally have the skills to monitor those involved in scheme operation, and, even if they were able to in principle, private monitoring costs are high. Hence, incentives for individual monitoring are insufficient, and there may be coordination problems when it comes to collective monitoring.

These agency problems can have a detrimental effect if they result in the scheme not being operated in the best interest of its members. In this sense, governance has been defined as

the set of arrangements, including a well-defined legal and regulatory framework for the protection of plan members' interest. A perfect system of governance would give all the parties involved in the operation and oversight of the pension fund the right incentives to act in the best interest of the pension fund members and ensure the highest degree of retirement security (Yermo and Marossy 2001).

The question of scheme governance is relevant for all pension schemes, whether DC or DB schemes. In DB or DB-type hybrid plans, the pension plan sponsor or the administrator guarantees to pay benefits at a defined level, and this guarantee raises governance issues that are not observed in a pure, unprotected DC scheme (although it does apply to schemes that are of DC type but come with a minimum guarantee). The added responsibility to meet a benefit promise requires additional internal controls and monitoring to ensure that an adequate level of funding is maintained at all times, so that the promised pension benefit is actually delivered.

A main objective for DC schemes is to ensure that pension assets are invested so as to deliver gains that accrue to individual member account balances in line with their investment goals. Individuals can in many cases exercise choice regarding investment and are responsible for their decisions (see section 6), but they need to be sure that other parties implement those decisions. Where decisions are made on their behalf (see also section 6 for a discussion about arrangements to delegate or facilitate individual decision-making), they need to be sure that the decision-makers have the expertise and technical means to do so, and can be held accountable if problems arise. Moreover, plan members need clear property rights over the assets in the individual accounts; they need to be reassured that their contributions and accumulated assets are physically safe and well administered; and they must be able to access information about the performance and value of their savings and be well informed in order to make the right decisions. Therefore, key aspects of scheme governance include:²⁸

- clear allocation of decision-making responsibilities;
- oversight;
- asset protection;
- transparency and disclosure.

7.2 Governance solutions

7.2.1 Legal forms of pension schemes

Occupational pension schemes are generally funded through entities that are separate from the employer as the plan sponsor.²⁹ However, as outlined in section 3, a pension scheme can take a variety of structures and legal forms. Governance solutions depend on these different constitutions, which in turn are the result of the institutional framework of each country. In particular, occupational pension schemes (including the schemes of DC type considered in this study) can, according to Yermo and Marossy (2001), be classified into four types of legal form.

- **Corporate form.** The pension scheme constitutes a separate corporate entity with legal personality and capacity. Plan members have legal title to the pension assets, and there is an internal governing body or board of directors responsible for operation and oversight of the scheme. Examples include the Pensionskassen and Pensionsfonds in Germany, as well as the closed pension funds in Italy if they are set up as associations.
- **Foundation form.** As in the corporate form, the scheme is a separate corporate entity with an internal governing body or board of directors. The difference is that scheme members do not normally have legal title to the pension assets, but are the beneficiaries from the investment and accumulation of assets. Closed pension funds in Italy can be set up as foundations. Another example is the company- or industry-wide pension funds in the Netherlands.
- **Trust-based form.** A trust-based scheme has no legal personality or capacity. The legal title to the scheme assets in trust is vested in trustees, who must administer the trust assets in the sole interest of scheme members, who are the beneficiaries from those assets according to the trust deed. In the UK, DC (as well as DB) pensions are provided via trust-based schemes.

²⁸ For a more detailed discussion of what is seen as constituting good governance, see Yermo and Marossy (2001) and OECD (2005b). National bodies have also issued documents on governance—see The Pensions Regulator (2007) for a recent example.

²⁹ There are exceptions, such as the traditional book reserve schemes, which may not be backed by earmarked assets but where pension liabilities can be insured.

- **Contract-based form.** Occupational pensions can be provided through contract with a financial institution. The scheme assets are held in an account established and managed by the financial institution. Examples include the various direct insurance arrangements, as well as open pension funds in Italy, or group stakeholder pensions in the UK.

Despite these differences, there are strong commonalities, in that all structures have as an objective the safeguarding and investing of pension assets in the interest of the scheme members, with corresponding governance implications.

7.2.2 **Trustee and pension board**

Pension schemes of the first three forms have a trustee or pension board that acts on behalf of scheme members and is responsible for the operation and oversight of the scheme. To ensure that members' interests are met, the schemes are usually subject to some form of co-determination and representation of the employees (ie, the beneficiaries) on the relevant governing body. The governing body may carry out operational tasks itself, or provide instructions and monitor other entities to which the tasks have been delegated, including administration and asset management.

In relation to the investment process, the trustees or pension board members are responsible for selecting asset managers and for reviewing the performance of managers and the investment. As described in section 6, they can also take further responsibility in facilitating the investment decisions of individual plan members in DC-type pensions—eg, by pre-selecting a range of funds, specifying default options and providing plan members with information.

Additional checks and safeguards come from the existence of other bodies, in particular custodians charged with the safekeeping of pension assets and auditors.

7.2.3 **Governance in contract-based schemes**

In contract-based schemes, there is in principle no equivalent to a trustee or designated pension board with both employer and employee representation. Rather, the scheme is established through contract with a pension provider. Contributions are made by the employer on behalf of employees (and/or by the employee directly), but the contract is between individual and provider. The provider is responsible for the functioning of the scheme, including administration and investment, but may outsource functions to other entities. While there is often no entity recognised in law or regulation that acts solely on behalf of scheme members, there are checks and safeguards.

The pension providers are financial institutions that are subject to existing regulations. The supervisory frameworks should ensure that the institutions are solvent and that they manage pension assets prudently. In addition to the general rules applying to the companies, supervisory authorities may impose additional requirements (eg, greater disclosure or fee regulation) that are greater for pension products than for other financial products provided by the institutions.

The relevant product providers may be insurance companies, asset management firms or other financial institutions. Focusing on asset managers, existing regulatory requirements include the authorisation process before the companies can engage in activities, as well as prudential regulation, training requirements and fit-and-proper tests to ensure competency of key personnel, asset segregation requirements, disclosure rules, and other conduct-of-business standards. Additional regulatory requirements apply to asset management firms if the operation and management is carried out via collective investment schemes (such as UCITS), including the following.

- In collective investment schemes, unit holders have a legal title to, or beneficial interest in, the underlying investments of the funds. The structure provides for the transparent calculation of the size of individual holdings, with clear accounts available, regular pricing and disclosure.
- The assets are under the control of a depositary responsible for safeguarding asset holdings. The depositary, which itself is subject to regulation, has additional fiduciary obligations to ensure the safety of the assets. These include various monitoring and control functions, and the depositary can be held liable for breaches of duty.³⁰

As such, the governance requirements and other rules of collective investment scheme structures have much in common with those of a pension scheme of DC type—they are implemented to provide a long-term savings vehicle which allows the safe accumulation of assets.

Pension providers, be they asset managers, insurance companies or other financial institutions, have the technical capacity and the professional qualifications and experience to deliver occupational pension products. The main potential governance issue relates to ensuring sufficient involvement and representation of employers and employees in the functioning of the scheme.

With contract-based schemes, once employers have selected a scheme, there may be relatively few requirements for their continuing involvement in its ongoing administration and review. However, to the extent that employers channel contributions to the scheme and are interested in the overall remuneration package of their employees, they retain an interest in its efficient operation. Employers have responsibilities in selecting the scheme, and have the ability to change it, which gives them influence over the provider.

Moreover, employer-led pensions committees or boards can be established to select schemes (and the range of investment options to be made available) and to monitor the performance of the provider in relation to both administration and investment. The committees or boards have member representation to ensure that members' interests are addressed.

7.3 Governance arrangements in practice: illustrations

The following illustrates the governance solutions described above, using as examples the arrangements in place for DC schemes in France, Italy and the UK.

7.3.1 France—PERCO

A PERCO pension scheme is implemented in a company or group of companies (PERCOI) after negotiations with union representatives. The scheme is fund-based, with asset management carried out via by a special type of collective investment scheme designated for employee saving—the FCPEs (fonds communs de placement d'entreprise). Like other FCPs (fonds communs de placement), the FCPE is of contractual form and represents co-ownerships of transferable securities, established and managed by asset management companies.

All FCPEs and management companies are subject to supervision by the Autorité des Marchés Financiers (AMF). Among other rules applying to the FCPE (as with other collective investment vehicles), there is a requirement for asset protection by a depositary. In addition to safekeeping of the FCPE assets, the depositary has oversight obligations, including monitoring the asset management company, the investment operations and the valuation.

³⁰ For a detailed discussion of the regulation and role of depositaries, see Oxera (2002).

Besides the supervisory and governance standards applying to the fund, the FCPE structure in a PERCO pension scheme involves a supervisory council (conseil de surveillance), which is required to meet at least once a year. The council constitutes the governing body of the scheme and is responsible for the oversight of the investment and administration functions. For example, it has the power to change the funds underlying the scheme, or replace an asset management company. The council consists either entirely of employees or union representatives, or a combination of employees (majority) and representatives of the scheme sponsor. The chairman of the council must be an employee.

By law, each plan sponsor is required to offer two or three days of training on the relevant financial or structural issues to employee or union representatives who sit on the council. Moreover, some of the larger unions have formed a committee to enhance the education and financial literacy of council members to ensure that they are in the position to make well-informed decisions and to carry out proper oversight.

Governance arrangements are further enhanced through self-regulatory codes of conduct, implemented by the French industry association for asset management companies, Association Française de la Gestion Financière (AFG). There is a general code of conduct applying to all collective investment schemes, and a separate code containing specific provisions for managers of the FCPE (for details, see AFG 2005). The special code recognises that FCPE managers not only set up and manage the funds, but in most cases are also the holders of the individual accounts of the scheme members. Given that the administration function requires significant logistical means, asset management companies are typically affiliated to banking or financial groups, which are involved in the marketing of pension products and services. The special code contains provisions for the relevant management companies to promote better governance of the scheme, in relation to both investment and administration, and to avoid conflicts of interest.

7.3.2 Italy—closed and open pension funds

Closed pension funds can be set up as associations (corporate form) or foundations. Asset management, administration and benefit payment must be delegated to authorised institutions. Closed pension funds are endowed with corporate governing bodies such as the general assembly, the board of directors and the board of auditors. All these governing bodies must include employee and employer representatives in equal numbers. One of the main responsibilities of the governing bodies is to determine the strategic lines of investment and asset allocation in line with regulatory guidelines. In addition, they are charged with selecting the financial institutions for tactical asset allocation and the day-to-day management of the pension fund assets, through regulated and public procedures that are binding to the mandate. They are also responsible for overseeing other parts relevant for the functioning of the closed pension fund. Closed pension funds are subject to the appointment of an independent custodian.

Open pension funds are contract-based schemes that can be used as occupational pension vehicles and for personal pensions. Collective investment scheme providers, banks and insurance companies are authorised to establish and manage open pension funds. Unlike closed pension funds, the open funds do not have autonomous legal status that is separate from the financial institutions which have set them up, but there is a requirement for the funds to consist of separate accounts.

The pension fund provider is required to appoint a responsabile del fondo, who acts as the general manager and supervisor of all activities of the managing company in relation to the pension fund.

Further protection and governance obligations are set out in the supervisory framework. The pension fund providers are themselves regulated financial institutions. Additional product regulations apply, which are similar to those for collective investment schemes (UCITS) and include requirements for safekeeping by an independent depositary, controls over the

investment process, frequent valuations and disclosure. In addition, open pension funds are required to appoint external independent auditors, enhancing the transparency of these schemes.

There has also been a decision by Covip, the supervisory authority for pension funds, to further regulate the transparency of pension funds. This involves periodic communications to scheme members providing information about, for example, the different investment lines, the characteristics of financial management, the individual responsible for the fund, and the depository bank.

7.3.3 **UK—trust- and contract-based DC schemes**

Trust-based pension schemes are arrangements between the employer and the trustees, with the latter looking after the interests of members in relation to how a scheme is run. Regulatory responsibility for trust-based arrangements in the UK falls to the Pensions Regulator.

Trustees include representatives of the employer as well as of the employees. They have responsibility for all the functions of the pension scheme. This includes responsibility over the investment process, although investment management must be carried out by authorised asset managers. While trustees may seek authorisation to act as asset managers, this function is usually delegated, in which case trustees are responsible for ensuring that suitable asset managers are selected. Trustees also appoint auditors and a custodian for the safekeeping of pension fund assets. The additional responsibilities include, for example, administering the scheme (and selecting and reviewing any third-party administrators) and informing members about the scheme and their personal pension entitlements. For example, trustees must submit an annual report to members, which includes the value accumulated in the DC account, the contributions made, and the yield earned over the year. Trustees can be held liable for their decisions and are required to take expert advice from suitably qualified parties, for example when making investment decisions.

There has been considerable debate and discussion about the role and qualifications of trustees in the UK, and several regulatory measures have been taken to improve trustee performance. For example, there are legal requirements concerning trustee knowledge and understanding. The Pensions Regulator (2007) has produced:

- codes of practice on trustee knowledge and understanding, as well as guidance on the scope of knowledge required;
- a trustee toolkit—an e-learning programme which aims to help trustees acquire the knowledge and understanding required, and which includes special modules on DC schemes;
- a training syllabus, which has been handed over to the Financial Services Sector Skills Council and is the building block of the Pension Management Institute's award in trusteeship.

In addition to trust-based schemes, DC schemes in the workplace can take the form of group personal or stakeholder pensions. These are contract-based schemes that do not have a trustee; rather, the pension provider (in many cases, but not exclusively, a life insurance company) constitutes the main governing body of the pension plan.

Pension providers require authorisation by the Financial Services Authority (FSA) and are subject to FSA regulation with respect to their capital adequacy, systems and controls around processes, and the training and competency of key personnel. There is additional regulation with respect to the type of products and also charges. (Stakeholder pensions are subject to a cap of 1.5% for policies issued after April 2005 for the first ten years and 1% thereafter.) Moreover, the FSA provides cost comparison tables and operates a disclosure regime that requires issuing personalised illustrations and key features documents to individual pension plan members.

In addition to the FSA, regulatory responsibilities also fall to the UK Pensions Regulator, which is primarily concerned with ensuring good administration of work-based schemes and protecting members' benefits. The other institutions involved in enhancing regulatory protection (eg, redress for scheme members) are the Financial Ombudsman Service, the Financial Services Compensation Scheme, the Pensions Advisory Service and the Pensions Ombudsman.

Although there is no equivalent of a trustee in contract-based schemes, some employers have appointed pensions committees (including member representation) to monitor the performance of the provider in terms of investment returns, charges and administration standards. These committees can also review investment options and provide information, guidance or advice to help members select appropriate products in which to invest.³¹

In light of the shift to DC schemes in the UK, the Pensions Regulator has set itself goals and specified actions to improve the governance of both trust- and contract-based schemes (see The Pensions Regulator 2006b and The Pensions Regulator 2007). For example, to improve scheme administration, the Regulator has implemented codes of practice on internal controls, reporting breaches of the law, or reporting late and non-payment of contributions, with supporting guidance on compliance with the requirements of legislation. It also intends to promote and share good practice among trustees, employers, providers and third-party administrators—eg, through the provision of service-level agreements and specific examples of internal control and risk management processes.

Similarly, to promote good investment practices in DC schemes, the Regulator intends to provide good-practice guidance to aid the selection and review of investment manager; the review of fund performance; the choice of investment options; and the issuance of clear and simple information that can be provided to members.

7.4 Summary

Governance in DC pension schemes provides the structures and processes to ensure safeguarding and investing of pension assets in the best interest of the scheme members. There is no single governance solution that works in all circumstances; rather, arrangements emerge from, and need to be adapted to, the specific institutional framework and scheme structure and design.

Existing governance solutions vary significantly between countries and schemes, but they all seek to provide a framework for allocating decision-making and oversight responsibilities between the relevant parties, ensuring asset protection, and promoting transparency and disclosure. This review of existing arrangements provides examples of clear structures and processes being implemented in this respect, through laws and regulations as well as market solutions (eg, self-regulatory codes of conduct). Importantly, pension scheme governance remains high on policymakers' agendas, and initiatives are being proposed and implemented to develop the framework and ensure effective pension provision.

³¹ Examples of such committees are described in NAPF (2005). The paper discusses means of encouraging effective governance of DC contract-based workplace schemes.

8 The cost of pension provision

For any given level of pension scheme contributions, variations in the level of charges can have a significant impact on the retirement wealth of pension scheme members. As demonstrated by the results of the simulation model in section 5.2, higher charges reduce net returns and pension assets accumulated.

There are three broad types of charges (or costs) incurred by a pension scheme:

- administration (section 8.1);
- investment management (section 8.2); and
- distribution and marketing (section 8.3).

Administration costs relate to functions such as record keeping, communication with scheme participants, compliance, and calculating and making benefit payments. Investment costs relate to the management of pension assets and include wages of portfolio managers and analysts, brokerage fees, and costs of electronic trading facilities, and other costs. Distribution costs can include marketing and advice expenses, and in some cases may be captured within estimates of pension administration costs. Investment costs may also be included in some cost estimates of total pension administration costs.

There is only limited evidence available on the different costs of pension provision. The main difficulties lie in the availability of data. Lack of comprehensive data is due in part to different charging structures between schemes and countries, and to differences in the degree of disclosure and transparency. Furthermore, the charges disclosed may not correspond to the actual cost of provision. It is beyond the scope of this study to gather and analyse costs on a comprehensive basis. Instead, this section explores some of the evidence available from secondary sources on the costs of pension provision, focusing on how cost efficiencies can be achieved through scale and collective arrangements. In addition, section 8.4 considers relevant trade-offs in pension provision, in particular the need to balance the objective of minimising costs against other objectives, including returns, choice, flexibility and quality of pensions.

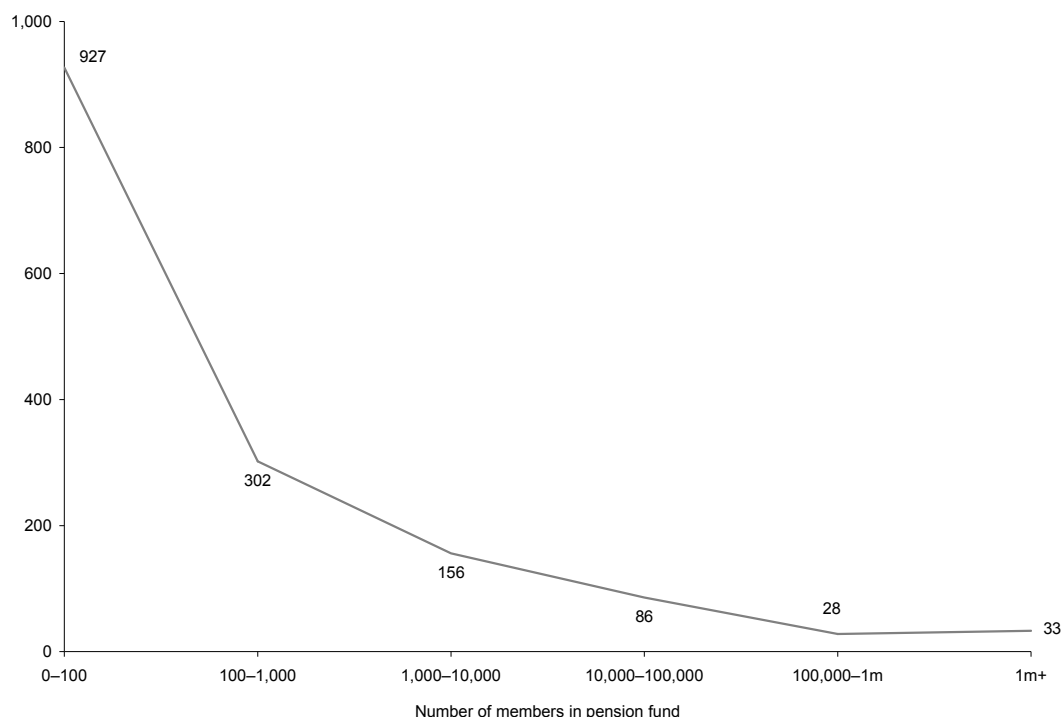
8.1 Economies of scale in pension administration

Although comprehensive studies on pension plan costs are limited due to problems with data on costs, there is evidence to support the existence of economies of scale in pension administration, at least up to a limit. The main reason for decreasing average administration costs as the membership base increases relates to the fixed costs associated with setting up and running the administration and record-keeping body and systems.

Bikker and de Dreu (2006) provide a comprehensive analysis of costs and their drivers for pension funds in the Netherlands, distinguishing between administration and investment costs. The analysis suggests significant economies of scale in pension fund administration. As shown in Figure 8.1, as pension fund size increases from below 100 members to over 1m, annual administration costs per member fall from €927 to just €33.

Moreover, using regression analysis that controls for other factors, it is shown that an increase in pension fund size by 1%, in terms of number of participants, would raise administrative costs by only 0.59%.

Figure 8.1 Administrative costs per member of Dutch pension funds, 2004 (€per member)



Source: Bikker and de Dreu (2006).

The administration costs in Figure 8.1 apply to all pension schemes in the Dutch market, without distinguishing between DB or DC plans. Bikker and de Dreu (2006) also compare cost differences between the two types of plan. As shown in Table 8.1, administrative costs as a percentage of total assets are found to be lower for DB plans than DC plans—this is partly explained by the fact that most DC pension funds are relatively new, hence assets per participant are significantly lower in DC plans than in DB plans (€34,000 versus €7,000). When measured per scheme member, administrative costs are on average lower for DC plans (€25) than DB plans (€49), even though the average number of members is higher in DB funds than in DC funds (26,000 versus 13,000).

Table 8.1 Administrative costs of Dutch pension funds, 2004

Type of pension plan	Administrative costs (% of total assets)	Administrative costs (€per member)	Total assets per participant (€)	Average number of participants
DB	0.14	49	34,000	26,000
DC	0.37	25	7,000	13,000

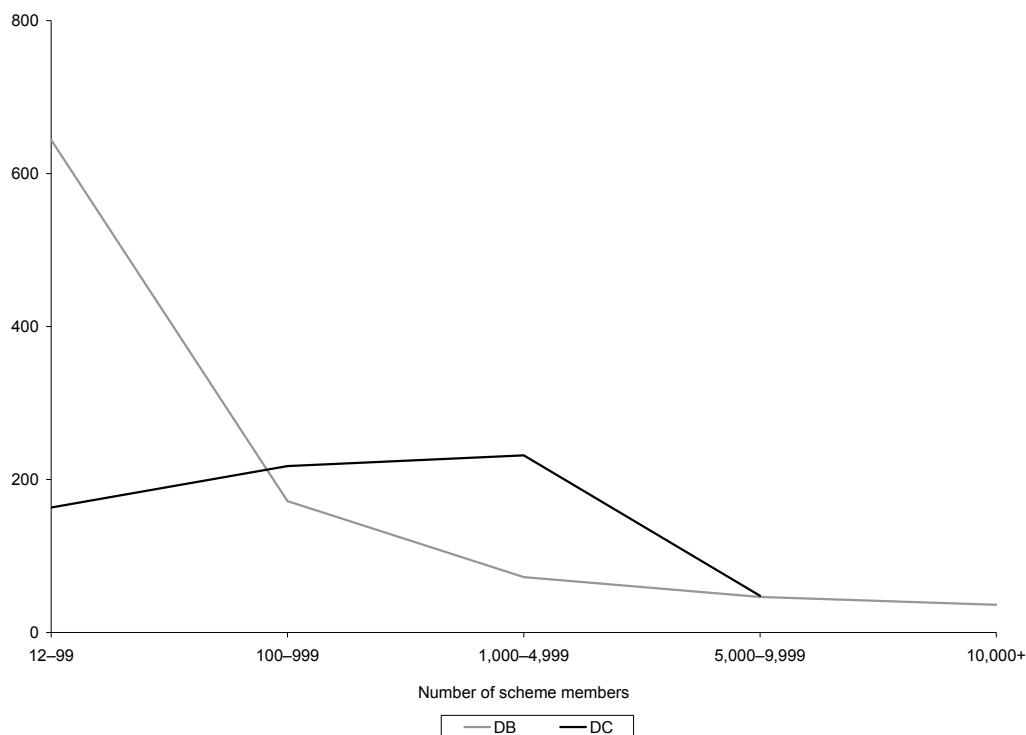
Source: Bikker and de Dreu (2006).

To isolate the effects of different factors on the level of costs, Bikker and de Dreu (2006) estimate a multivariate regression model. The results support the view that DC pension plans are associated with lower administrative costs than DB plans when controlling for factors such as size, fund type (industry versus company), administration arrangements, and liability reinsurance. Holding all other factors constant, a DC pension plan is found to have 20–40% lower total administrative costs than an otherwise equivalent DB pension plan. Bikker and de Dreu (2006) conclude that administrative costs are lower under DC plans because they are easier to administer and manage and because—at least in the Netherlands, where DC plans

have limited choice and are of a collective nature—the marketing and financial education costs are relatively low.

Scale economies in pension scheme administration are also reported by GAD (2006), based on a survey of UK occupational pension schemes. Figure 8.2 relates to trust-based schemes only, distinguishing between those of DB and DC type. Scale economies apply in particular for DB schemes, with high administration costs per scheme member observed among the very small schemes (fewer than 100 members), but also for DC schemes, of which the largest in the survey had, on average, lower administration costs.

Figure 8.2 Administration costs of trust-based occupational pension schemes in the UK, 2005 (£ per member)



Notes: The administration costs are averages of the costs reported in GAD (2006), which disclose costs according to type of administration (eg, in-house or third-party).
Source: GAD (2006).

The data reported in Figures 8.1 and 8.2 suggests that significant efficiencies in pension scheme administration can be realised. The benefits from scale economies phase out after a certain scheme size has been reached. Thus, while it may be inefficient to run very small pension schemes, increasing scheme size beyond a certain number of members has little further impact on administration costs.³² Figure 8.1 would suggest that this number is somewhere between 100,000 and 1m members for closed pension funds in the Netherlands; Figure 8.2 does not cover the entire size spectrum, but shows limited additional reductions in average costs beyond around 5,000 members for closed pension funds in the UK.

Among the occupational schemes (whether of DB or DC type), this scale can be reached by the closed pension funds of a single large employer or closed funds that provide industry-wide pensions.

³² For a more detailed discussion of economies of scale in pension administration and their limits, see Oxera (2006). The report cites evidence on pension administration costs from countries with mandatory individual accounts, including the systems in Poland and Sweden.

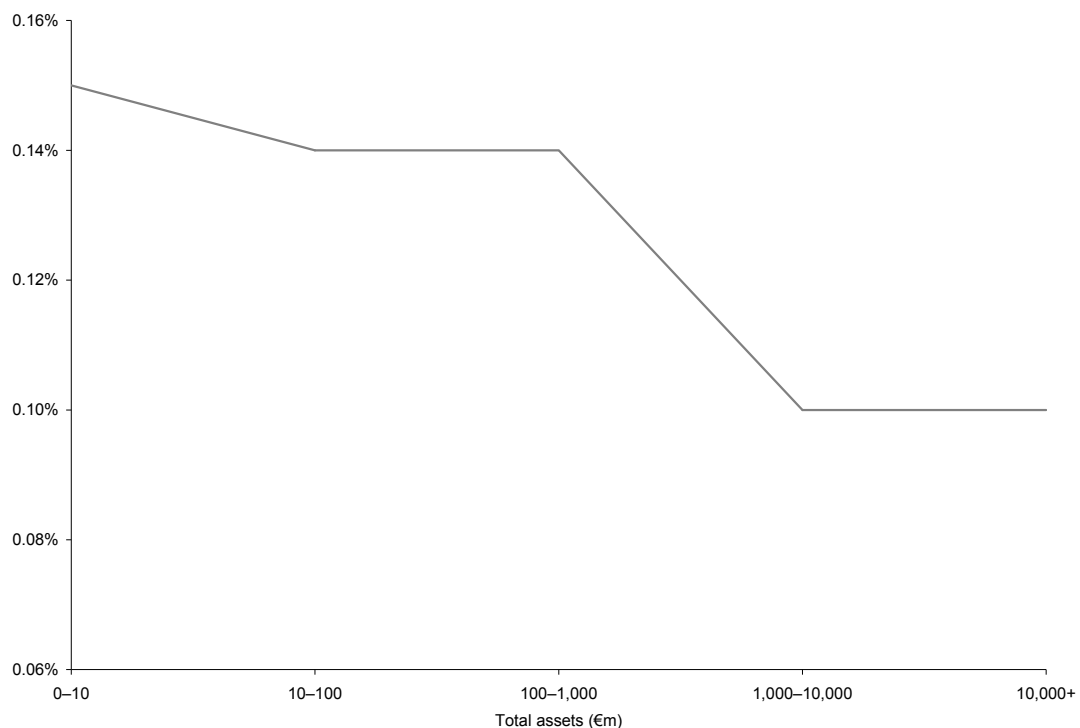
This scale can also be reached by open pension funds or contract-based forms of occupational pension scheme, where pension provision can be pooled across both plan sponsors and individual members, and administration is centralised at the level of the pension provider or the platform. For example, in the PERCO scheme in France, administration charges per individual account are as low as €10–20 per annum.³³

8.2 Economies of scale in investment management

There are also economies of scale in the investment of pension scheme assets. Costs that are fixed or that are likely to increase less than proportionally with total assets include, for example, the costs of trading facilities, research, risk management, and compliance with regulatory standards and reporting requirements. Unlike for administration costs, these economies relate to the value of funds under management rather than the number of scheme members or the number of individual accounts in which the assets of DC schemes accumulate (although pension scheme membership and funds under management are often highly correlated).

Bikker and de Dreu (2006) report economies of scale in the investment cost of Dutch pension funds, with costs decreasing as a percentage of fund assets (see Figure 8.3). They also confirm economies of scale using regression analysis, where it is estimated that an increase in total assets by 1% would raise investment cost by only 0.86%.

Figure 8.3 Investment costs of Dutch pension funds, 2004 (% of assets)



Source: Bikker and de Dreu (2006).

Evidence on the investment costs of pension schemes is otherwise limited in the literature. There is, however, related evidence from the large body of literature of costs incurred by mutual funds. This literature confirms economies of scale in fund management—however, it

³³ Based on interviews with asset managers.

shows that the economies become less significant beyond a certain point and eventually disappear (see, for example, Dermine and Roller, 1992, and Indro, Jiang, Hu and Lee, 1999).

Any economies of scale in the investment function that exist up to a point can in principle be exploited by all types of pension scheme, irrespective of their structure or type (eg, DC or DB, closed fund or open fund, occupational or personal scheme). For example, where the pension fund portfolio is not sufficiently large, assets of a closed (single-employer or industry) pension fund can be invested through collective investment vehicles. Similarly, open pension funds can be built around fund-based solutions, which can be distributed directly to employers for occupational pension purposes or to the retail sector for personal pensions, or both. Pooling of assets and investment through collective investment vehicles can reduce investment management expenses through economies of scale, and provide professional and specialised services at a lower price.

8.3 Benefits from collective pension provision and distribution

There are different ways of providing pensions: at one end of the scale are personal pension schemes provided in the retail market, where individuals choose their own pension products and prices are set by the provider; at the other end are pensions invested through the institutional market with products and price negotiated for a larger group (eg, at employer or industry level) and where individual choice may be constrained by group choice.

These arrangements differ with respect to distribution and marketing. The more centralised they are, the less costly the arrangements are likely to be—ie, there may be economies in collective arrangements whereby pension products are distributed and marketed to or via employers as plan sponsors rather than directly to individuals in the retail market. The savings may be the result of directing distribution and marketing efforts to the plan sponsor rather than seeking to reach the many plan members individually. In addition, the plan sponsor (or the plan's governing body) may have greater bargaining power than individuals in the retail market.

Evidence from Australia serves as an illustration of how pension scheme costs differ across arrangements. Bateman and Mitchell (2004) provide an analysis of administrative and investment management costs for Australian Superannuation Guarantee pension plans, using 1998–99 cost data of 1,920 pension plans, roughly half of which are DB and the other half DC (of which around 93% are employer-sponsored plans and 7% are retail plans). Administration costs include marketing and distribution.

The analysis is based on multivariate regressions that control for plan size (number of members and assets), sponsor type (employer versus retail), administration and asset management arrangements, and other factors. Using the results from the regression model, Bateman and Mitchell predict pension plan costs of DB and DC occupational schemes (and DC retail plans), where all factors other than plan size and type are held constant. The results are shown in Table 8.2.

Table 8.2 Predicted pension plan administration and asset management costs by plan size and type in Australia, per year

Type of pension plan	Small		Medium		Large	
	€ per member	% assets	€ per member	% assets	€ per member	% assets
DC employer-sponsored	186	0.77	144	0.58	57	0.24
DB employer-sponsored	260	1.07	202	0.81	81	0.33
Retail plan (DC)	375	1.55	291	1.17	117	0.48

Note: The exchange rate applied is €1=A\$1.65 (ECB, Annual average spot exchange rate of 1999).
Source: Bateman and Mitchell (2004).

The estimates show that occupational DB plans are around 40% more costly than DC plans, regardless of plan size. Bateman and Mitchell (2004) note that higher DB costs are due to costs associated with hiring actuaries, reserving for specified benefit promises, and paying guaranteed annuities.

The results also suggest that retail plans, which are marketed to the general public rather than employer-sponsored, tend to be more expensive than occupational pension plans, holding everything else constant. Bateman and Mitchell (2004) conclude that:

rich data on a wide array of pension plan structures show that the least costly Australian pension design is an employer-sponsored DC plan. DB and retail pensions available to the general public are 30–70% more costly. (p. 74)

As reported in Table 8.2, DC retail plans are found to be twice as expensive as DC occupational plans. A possible reason given is that retail plans ‘are more expensive to administer in view of their need to advertise and compete in the marketplace’.

Data on cost differences between different types of pension scheme is also available for Italy. Table 8.3 shows the costs of DC schemes in Italy—closed pension funds that are used as vehicles to fund occupational pensions for a single employer or industry-wide group of employers; open pension funds that can be vehicles for both occupational pensions and private pensions; and the insured plans (PIPs) which are used for private pension provision only.

Table 8.3 Costs of various DC schemes in Italy, 2005

Scheme type	Financing vehicle	Length of plan	Average annual cost (% of assets)	Type of cost
Occupational	Closed pension funds	n/a	0.47	Management costs
Occupational or individual	Open pension funds	3 years	1.9	‘All-inclusive commission’
		35 years	1.2	
Individual (PIP)	Insurance companies	3 years	5.1	‘All-inclusive commission’
		35 years	2.3	

Source: Commissione di Vigilanza sui Fondi Pensione (Covip) (2006).

The costs reported for closed pension funds are the lowest, at 0.47% of assets per year. However, this includes the management costs only—closed pension funds outsource the asset management function via mandates, and there are no distribution or marketing costs as such.

The costs incurred for open pension funds, which can be used for both employer-sponsored and private pensions, are higher and include ‘all-inclusive’ fees. The simple tabulation of cost

differences is, however, somewhat misleading. For example, open pension funds may be smaller (in terms of both members and assets) than closed funds; furthermore, they tend to offer a greater choice of investment options than closed funds.

The pure private plans (PIPs) are reported to incur the highest cost in Italy. This may be due in part to the direct distribution to individuals. The higher cost may also be due to the fact that savings in a PIP involve an insurance company as an additional layer of intermediary compared with the investment-based open pension funds. On the other hand, a PIP may offer additional benefits compared with a pure savings product (eg, death benefits), so the costs are not directly comparable.

Similar data allowing cost comparisons between types of scheme was not available for the other countries examined in this report. Even if data were available, cost comparisons would be difficult given the numerous distinctive features of different schemes and the different cost and charging structures.

Overall, it nonetheless seems possible to conclude that collective pension arrangements, coordinated at the level of the employer or industry, may have cost advantages over pure personal arrangements because of economies in distribution and marketing that can reduce costs per plan member.

Clearly, personal pensions always have a role in supplementing employer-operated or sponsored pensions and to cover those that are not reached by occupational pensions. DC schemes offered on an individual basis without direct employer involvement can be offered cost-efficiently.

One very specific example is the PPM system of mandatory individual accounts in Sweden, which is operated on a centralised basis and built around a system of investment funds. The collective withdrawal for fees for the average saver is estimated to be just over 0.6% of managed assets; expectations are that this could fall to around 0.3% by 2020, of which 0.25% can be attributed to investment management fees and 0.05% to administration costs of the central administration authority (Statens Offentliga Utredningar 2005). Other models can also deliver high-quality low-cost pensions in a mandatory individual account system (see James, Smalhout and Vittas 2005, and Oxera 2006).

Outside mandatory systems, cost efficiencies in personal pensions may be achieved by combining individual and employer-led pension provision. This may take the form of supplementary individual contributions to employer-sponsored plans. For example, in the French PERCO scheme, marketing and distribution is directed at the sponsoring companies, which contribute on behalf of their employees, with the employee able to make additional contributions to increase the funds accumulating in their accounts.

Combined provision can also take the form of pension vehicles that are offered by providers for both occupational and personal pension purposes—ie, they can be second and third pillar products. The open pension funds in Italy are one example; stakeholder pensions in the UK another. If occupational in nature, contributions made by the employer, as well as additional employee contributions, can flow to the pension plan, but the plans can also be offered as a vehicle for personal pension saving only—this may allow economies of scale to be realised also in terms of the administration and investment functions.

Occupational plan sponsors (or the governing bodies) in general have responsibilities for selecting and overseeing pension product and other service providers. Good governance requires that they must understand the charges associated with the various products and services provided and make informed decisions on that basis. Examples of governance arrangements are discussed in section 7.

Charges for pension products and services, for both occupational and personal plans, are also controlled through market forces—ie, the ability to switch, even if exercised only by a

few, creates conditions for competitive pressures on providers to reduce costs and improve service and product offerings.

The regulatory framework may seek to reinforce the check on charges. In the most direct form, this may result in caps on charges imposed by regulation. Such caps may have negative unintended consequences—if set too low, entry into the market may be unprofitable, resulting in reduced competition and choice among providers. If set too high, they may be ineffective—ie, they become a de facto minimum as well as the legal maximum fee, thereby decreasing price competition. Charges on stakeholder pensions in the UK are already subject to a cap (see section 7), and providers are required to complete an annual declaration confirming that charges are within the cap. However, providers often actually charge less than the 1% cap.

Regulatory efforts may instead be targeted at improving disclosure and transparency. Focusing again on the UK example, the FSA publishes cost comparison tables on its website to help employers, trustees and individuals. It also requires providers to issue personalised illustrations and key features documents on contract-based schemes, which disclose to each plan member the impact of charges on net returns and accumulated pension savings. Disclosure and transparency requirements also apply to occupational and personal pension schemes in other countries.

8.4 The costs and trade-offs

Fees and charges clearly can have an important impact on retirement wealth, and a policy aim must be to provide cost-effective pensions. However, cost-effectiveness does not necessarily mean minimising fees and charges per se—what really matters are net returns.

There are trade-offs in pension provision, and higher costs may be compensated by higher returns and advantages offered in terms of choice, flexibility, and, indeed, quality. Examples include the following.

- Greater choice of investments may increase administrative costs if each member's investment choice has to be set up individually. Limiting choice reduces costs, but may result in pension assets being invested less than optimally given an individual's preferences and needs.
- Flexibility in terms of ability to change provider or rebalance investments (ie, switching between different providers or investment options) has benefits, but may also increase administrative costs and charges, as well as investment management costs. Flexible choice of providers can also increase distribution and marketing costs.³⁴
- Tailored and individualised investment solutions may ensure a better fit with what plan members need, but tend to increase both administrative and investment management charges.
- Certain investment options involve higher management costs (eg, actively managed funds rather than passive investment).
- Greater portability of the pension plan may raise some administrative costs and charges (eg, one-off entry or exit charges).

³⁴ Studies of costs in mandatory individual account systems show that marketing costs are generally reported to be among the most important cost categories in countries where individuals are free to choose—and to switch—pension funds and providers. For example, Dobronogov and Murthi (2005) and James, Smalhout and Vittas (2005).

- Higher-quality administration and asset management are likely to be associated with higher costs.
- More choice and flexibility may imply a need for greater information provision and financial advice efforts, which will come at a cost.

Subject to the constraints imposed by these trade-offs, effective pension plan design seeks to minimise costs without unduly compromising on desired pension outcomes and reducing the benefits that DC schemes offer to individual members in terms of choice, flexibility and portability.

As discussed, one type of solution comes from the implementation of collective pension arrangements that seek to offer high-quality, low-cost pension products (possibly standardised to a degree and with some limitations on individual choice) to a large number of scheme members. The other, and arguably more difficult, solution relates to improving individual member's ability to act as an informed participant in the market—ie, being able to exert choices and make decisions with full understanding of their pension needs, the product offerings, and the costs involved.

8.5 Summary

The costs of pension provision can have significant effects on the level of pension wealth accumulated (or the level of contributions required to achieve a given stock of wealth at retirement), since they may have an impact on the net returns earned on pension investments. Evidence on the level of costs, and how they vary depending on scheme design, is limited, due in part to a lack of comprehensive and comparable data. However, the evidence available does suggest that cost-efficient solutions for DC pension provision can be found by seeking to exploit economies of scale in the administration, asset management and distribution functions, subject to constraints imposed by the desired degree of individual choice and flexibility, as well as the chosen objectives for the investment of pension assets in the individual account.

Pension arrangements at the occupational level can deliver efficiencies over personal pensions, mainly through cost savings in distribution and administration. Despite their collective character, they can be structured to offer pension solutions that are to a significant degree individualised. Moreover, pension structures are developing in the market that can serve both occupational and personal pension provision in DC form, which might lead to increased cost efficiencies for both.

Appendix 1 Country descriptions

This appendix provides more detailed country-by-country descriptions of the shift towards DC occupational pensions described in section 3. For each of the countries considered in the report (France, Germany, Italy, the Netherlands, Poland and the UK), it summarises the main trends and the type of emerging pension scheme structures. The reported statistics are based on national sources, and as such may not be directly comparable between countries if different definitions are used.

A1.1 France

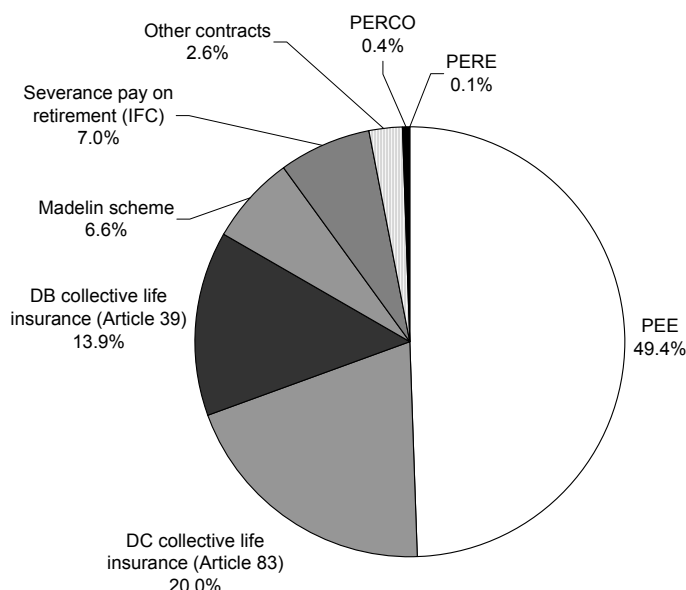
The market for second pillar occupational pensions in France is still relatively small, due to generous state pensions and statutory PAYG schemes such as AGIRC–ARCCO.³⁵ The main types of scheme are insured pension plans and company savings plans.

- Insurance-based occupational pension plans comprise DB plans (Article 39 plans) and collective DC plans (Article 83 plans), which appeal in particular to highly paid individuals (executives, directors) due to their favourable tax treatment.
- Company savings plans are comprised mainly of PEE (Plans d'épargne entreprise) and PERCO (Plan d'épargne retraite collectif). PEE, established since 1967, is a short-term savings plan and hence can be viewed as a near-pension product—employees can invest up to 25% of their net income per annum in mutual funds or in shares for a minimum of five years. PERCO, created by the Fillon Law in 2003, is largely based on the same principles as PEE, but investment is until retirement (with early withdrawal possibilities).

Figure A1.1 shows the split of the total of €140 billion of assets by type of pension scheme, as at the end of 2005. PEE is the largest scheme in terms of assets (49.4%), followed by collective life insurance plans (34%). PERCO is still small compared with other schemes (0.4%), mainly because it is relatively new.

³⁵ The Social Protection Committee reports that privately managed pension schemes contribute around 3% of the total pensions received, with voluntary occupational schemes covering around 10% of employees. Social Protection Committee (2005).

Figure A1.1 Occupational pension schemes in France, 2005



Note: The Madelin scheme is for self-employed individuals. PERE (Plan d'épargne retraite d'entreprise) is another company pension scheme, which is frequently offered only to managers or other top-level employees, and funds must be managed by an insurance company.

Source: AFG (2006).

This study focuses on the PERCO scheme (and PERCOI, which is a PERCO for multiple companies), since this has grown significantly—over 37,000 companies had implemented such schemes by the end of 2006, including around half of CAC40 firms. It is seen as having great potential to become a significant voluntary occupational pension scheme, especially given the further decline in the generosity of state pensions. Table A1.1 illustrates the growth of PERCO since its inception in August 2003.

Table A1.1 Growth of the PERCO scheme in France, 2004–06

	End 2004	End 2005	End 2006	End June 2007
PERCO assets (€m)	77	329	761	1,210
Number of companies offering PERCO	4,134 ¹	23,200 ¹	37,359	45,346
Number of employees participating in PERCO	n/a	100,576	201,367	286,350

Note: ¹ Approximate.

Source: AFG (2007a and b), Direction de la Recherche des Études de l'Évaluation et des Statistiques (2006).

PERCO is implemented in a company or group of companies (PERCOI) after negotiations with union representatives. Once implemented, PERCO has to be offered to all employees of the sponsoring company; however, employee participation is on a voluntary basis. Although PERCO covers over 1.2m employees, only around 200,000 of them were active (paying

contributions and making investment decisions) at the end of 2006.³⁶ 46% of the total PERCO scheme assets, amounting to €1.21 billion at the end of June 2007, were invested in stocks, and 27% in each bonds and money market assets.

The scheme can invest in at least three mutual funds (FCPEs) that have different investment profiles, and each of the products must hold no more than 5% of the sponsoring company's stock; a 'solidarity' fund (FCPE solidaire) must also be offered.³⁷ The company and union representatives select asset manager(s) as well as an administrator and holder of the individual accounts, which can be an asset manager. The monitoring and governance function is performed by a supervisory council (Conseil de surveillance) of FCPE, made up of employee representatives.

Employer and employee contributions are agreed in the initial company–union negotiations. Contributions have significant tax advantages, and can take the following forms:

- amounts paid to employees from corporate profit-sharing schemes;
- contributions by employees of up to 25% of gross annual income;
- transfer of assets from PEE;
- additional voluntary contributions by the company (abondement), not exceeding three times the employee's contributions, or not more than €4,600 per year.

Employees can receive the assets accumulated in PERCO on retirement in the form of a life annuity and/or a lump-sum payout. Early withdrawal of PERCO assets is also possible in order to purchase the primary residence, or in special circumstances (eg, long-term unemployment, invalidity).

A1.2 Germany

The German pension system has been subject to much reform. This includes the 2001 'Riester reform', which has spurred the growth of occupational pension schemes that are of DC type (with minimum guarantee), although DB plans still dominate the market.

Employers can choose among five funding vehicles for occupational pension provision.

- **Book reserves (direct pension promise)** remain the most popular funding vehicle, making up more than half of the occupational pension market. Pension liabilities were previously backed through the general assets of the company, but employers are increasingly earmarking specific assets for pension purposes and investing them externally, as further described below.
- **Direct insurance schemes.** Employers can take out life insurance policies on behalf of their employees and pay contributions (usually a percentage of salary) into the contract. In most cases, contributions are awarded a guaranteed rate of return (usually 3–4%, or 2.75% for policies taken out after January 1st 2004), but the retirement benefits may be regularly increased due to profit-sharing and bonuses.
- **Pensionskassen** are special insurance companies that can be set up as a mutual insurance association or as a joint-stock insurance company in order to meet the pension obligations of one or several employers. The structure is typically similar to that of direct insurance schemes.

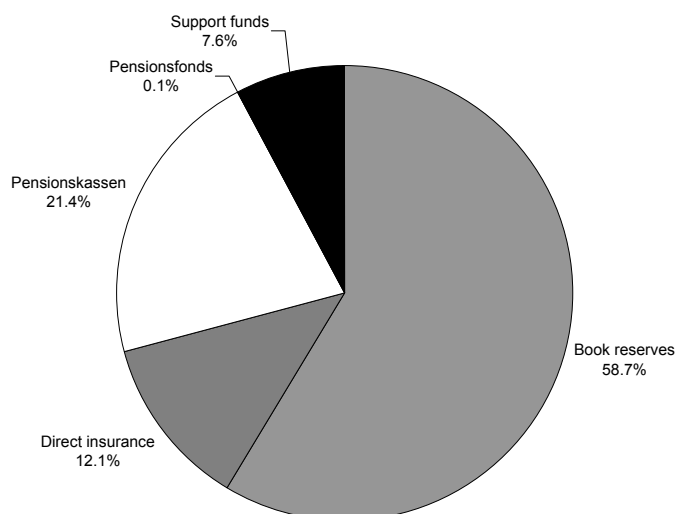
³⁶ AFG (2007a)

³⁷ FCPE is a special type of collective investment vehicle in France, designated for employee savings. Like other FCPs in France, it is of contractual form and represents co-ownership of transferable securities.

- **Pension funds** (Pensionsfonds) have been available since 2001, and can be set up by a single company, a financial services provider, or an industry-wide pension scheme sponsored by the employers' association and the unions. The legal form for a pension fund is either a joint-stock company or a mutual pension fund association. Typically, a Pensionsfond is of DC type, although there is a minimum guarantee, requiring the repayment of the sum of contributions minus certain administrative charges (Beitragszusage mit Mindestleistung).
- **Support funds** (Unterstützungskassen) are separate legal entities (associations, less frequently a limited liability company or a foundation) set up by a single employer, or as group support funds used by several companies. Employees have no legal claim against the support fund, but against the sponsoring employer. Favourable tax treatments apply for support funds that cover their pension obligations with insurance, and many follow that route. Although the oldest occupational pension vehicle, support funds are losing significance in the market.

Figure A1.2 shows the relative importance of these five funding vehicles. Of the total of €366.1 billion of assets covering occupational pensions in 2003, the direct pension promise accounted for well over half.

Figure A1.2 Funding vehicles for occupational pensions in Germany, 2003



Source: Arbeitsgemeinschaft für betriebliche Altersversorgung (2005).

Following the Riester reform of 2001 there was growth in occupational pensions and a shift from traditional DB schemes to more flexible DC-type arrangements. However, pure DC plans are not permitted in Germany—the employer remains legally obliged to guarantee a minimum pension benefit.

- In addition to creating Pensionsfonds as the fifth type of funding vehicle, the reform introduced plans that are of DC type (Beitragszusage mit Mindestleistung). The difference between these and a pure DC plan is that the employer has to guarantee the sum of the contributions paid in, less certain administrative disbursements. These DC-type plans can be funded through Pensionsfonds as well as Pensionskassen, and direct insurance contracts. For example, unit-linked insurance products may be offered provided that the total amount of contributions to be available at retirement age can be guaranteed.

- Employees became legally entitled to participate in a deferred compensation scheme, whereby employees defer part of their salary in exchange for pension benefits. Several other changes were implemented to make occupational schemes—particularly DC-type plans—more attractive. These included, for example, deferred taxation for limited contribution amounts to Pensionskassen, Pensionsfonds and direct insurance.
- The 2001 reform also introduced the ‘Riester pensions’, which are tax-incentivised supplementary pensions. Individuals have the option to seek supplementary cover either on a completely individual basis or by using the occupational plan offered by the employer.

Among the most notable developments in recent years has been the shift away from traditional direct DB pension promises financed through book reserves backed by the general assets of the company. Among the smaller and medium-sized companies offering occupational pensions, this has typically involved closing the DB book reserve schemes to new members and instead offering deferred compensation plans through insured products.

Many large companies have shifted their pension liabilities off-balance sheet by transferring pension assets to a trustee via Contractual Trust Arrangements (CTAs). The trustee holds the plan assets, but the responsibility to meet the pension promise remains with the employer. Book reserves can also be transferred to Pensionsfonds, but CTAs remain the more popular option, with around two-thirds of firms trading on the DAX using this investment vehicle.³⁸

For existing scheme members, the pension promise remains of DB type, but for new scheme members employers define the contributions rather than the benefits, subject to the minimum guarantee of returning contributions. In the new DC-type arrangements, the employer makes contributions to the individual accounts of employees that are set up and maintained by third-party administrators. Employers rather than employees tend to choose how the assets are invested. Investment is usually based on funds rather than based on insurance contracts, with assets placed in Spezialfonds (collective investment vehicles for one or a small group of institutional investors) or normal mutual funds. This shift to external asset funding of book reserves has offered asset managers significant opportunities through a large and continuing flow of funds to the industry.

Overall, there has been a shift towards occupational pension schemes that are of DC type, partly driven by legal reform and increased external funding of traditional book reserve plans. However, pure DC plans are not observed in the market, given the legal requirements for the employer to repay at least the amount of contributions—ie, DC plans always come with a minimum guarantee.

Finally, and although not classified as a second pillar occupational pension product, it is worth noting the development and growth of time accounts (Zeitkonten), a special arrangement in Germany that allows employees to accumulate part of their income (as well as compensation for overtime work) in individual accounts. The accumulated assets can be used to provide for early retirement and supplementary income in retirement. Time accounts constitute a form of deferred compensation scheme linked to employment, and can be of the pure DC-type (ie, without the minimum guarantee). These accounts are mostly invested in investment funds, with the employer selecting a small range of funds among which the employee can choose.

³⁸ See, for example, IPE (2007a and b).

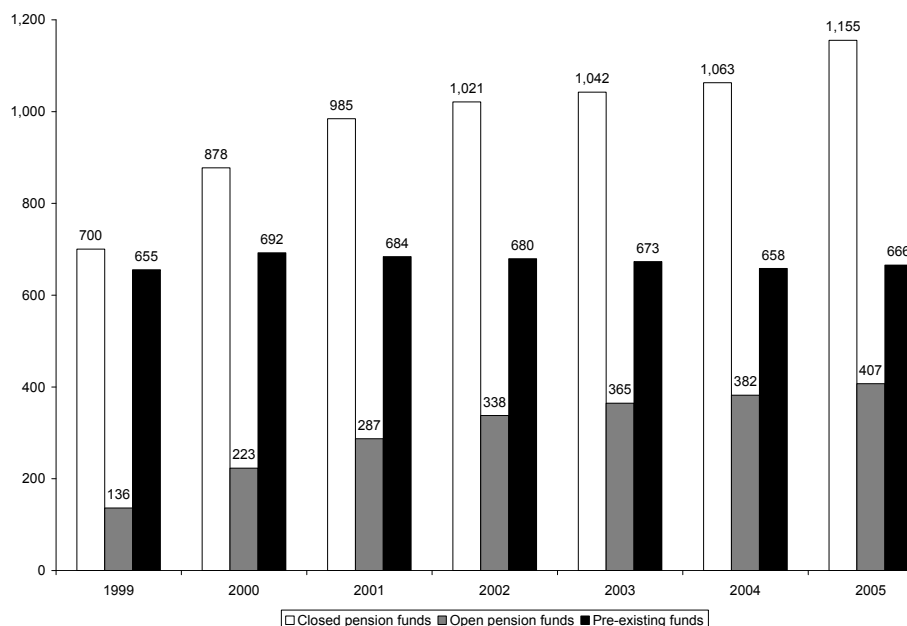
A1.3 Italy

- **Pre-existing funds** refer to schemes established up to the end of 1992, and still operate in their original form. They can be autonomous pension funds or book reserve schemes, and are structured on a DB, DC or hybrid basis. (After 1993 all existing DB plans had to be closed to new members, and many of them were therefore restructured to DC.) At the end of 2005, there were 455 pre-existing pension funds, most of which were sponsored by banks and insurance companies.
- **TFRs** are indemnities paid by employers to employees upon termination of employment, and, although not strictly a pension plan, are similar to a book reserve scheme. Around 7% of the salary is paid into the scheme, with assets growing at a rate specified by law. With the 2004 pension reform, the TFRs had been transferred to a closed or open pension fund by July 2007, unless the employee explicitly forbids it (the ‘silent-assent’ mechanism). TFR transfers are expected to significantly increase the size of pension funds in Italy.
- **Closed pension funds** (fondi negoziali) are pension funds implemented either as company pension funds or as industry-wide pension funds, set up as a result of collective bargaining between employers’ associations and trade unions for specific groups of employees (according to industrial sector, job type or territorial unit). Participation is voluntary, and normally contributions are a fixed percentage of the salary (plus future TFR transfers). Closed pension funds are legally separate entities from the sponsoring companies, and are permitted to be only on a DC basis. Day-to-day asset management is contracted out, but the funds remain responsible for defining the strategic asset allocation. At the end of 2005, there were 43 closed pension funds established in the occupational pensions market.
- **Open pension funds** (fondi aperti) can be set up by banks, insurance companies, investment firms and asset management companies for a generic group of participants. The funds, which operate exclusively on a DC basis, are vehicles that can be used for both collective pension provision in the form of an occupational pension and personal pension provision. Although open pension funds do not have independent legal status, their assets are required to be separated from those of the financial institution managing them. At the end of 2005, there were 89 open pension funds established in the market.³⁹

Figure A1.3 shows the evolution of membership of pre-existing, closed and open funds. Membership of the new pension funds has grown steadily, from 700,000 members in closed pension funds and 136,000 members in open pension funds in 1999, to 1.2m and 0.4m members, respectively, in 2005. The membership of pre-existing funds has remained relatively constant at 660,000, with around 4% of members having DB plans, 77% DC plans, and 19% hybrid pension plans. Thus, at the end of 2005, 52% of participants in occupational pension plans were members of closed pension funds, 18% were members of open pension funds, and 30% were members of the pre-existing funds.

³⁹ Covip (2006).

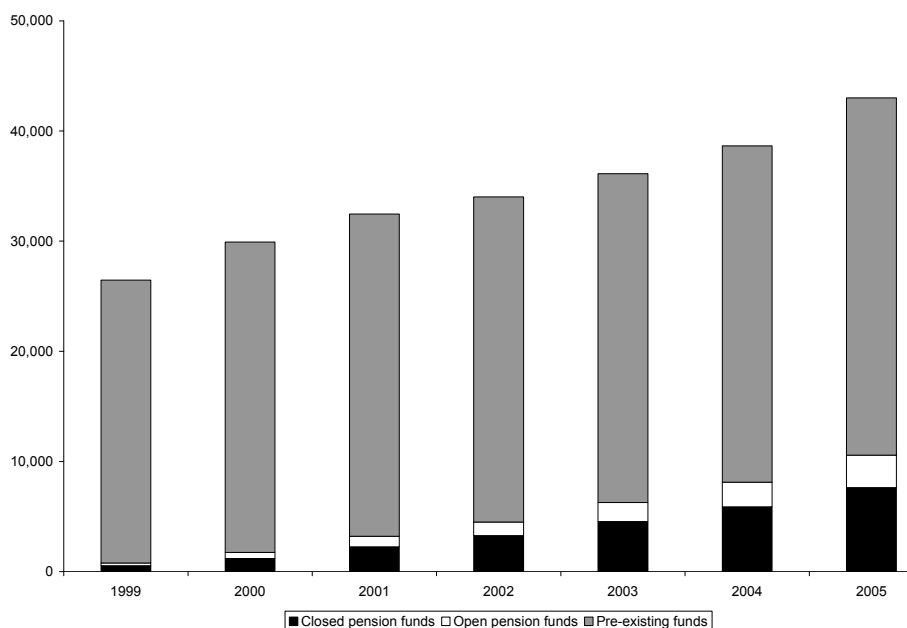
Figure A1.3 Pension scheme membership in Italy by type of scheme, 1999–2005 ('000s)



Source: Covip (2006).

The 'new' pension funds have been growing significantly in terms of assets, as shown in Figure A1.4, although they still hold a comparatively small proportion of the total occupational pension assets. In 1999, the 'new' pension funds accounted for only 3% of all pension fund assets, whereas in 2005 they accounted for around 25% of the assets (with an approximate 70/30 split between closed and open pension funds). Nonetheless, given that the majority of pre-existing funds also provide pensions in DC form, occupational pensions in Italy are mostly DC.

Figure A1.4 Pension scheme assets in Italy by type of scheme, 1999–2005 (€m)



Source: Covip (2006).

A1.4 The Netherlands

Occupational pension plans cover the majority of the working population in the Netherlands and provide a significant source of retirement income. As reported in section 3, total assets from occupational schemes amounted to more than 130% of GDP at the end of 2005.

Occupational pension plans in the Netherlands are financed either via pension funds (industry- or company-wide) or via direct arrangements with insurance companies.

Table A1.2 provides an overview of their relative importance.

Table A1.2 Size of occupational pensions in the Netherlands by type of scheme, 2005

	Number of schemes	Members	Liabilities (€billion)
Pension funds¹	831	6,246,000	452²
Industry-wide pension funds	102	-	365.3
Company pension funds	714	-	174.7
Insurance contracts (direct arrangements)	45,751	878,000	31.2

Note: The total number of pension funds does not add up correctly because 'Other pension funds' (occupational, company savings funds, etc) are included in the total but not listed separately. ² The value of the pension funds' investment portfolios as at March 31st 2006.

Source: De Nederlandsche Bank (2006).

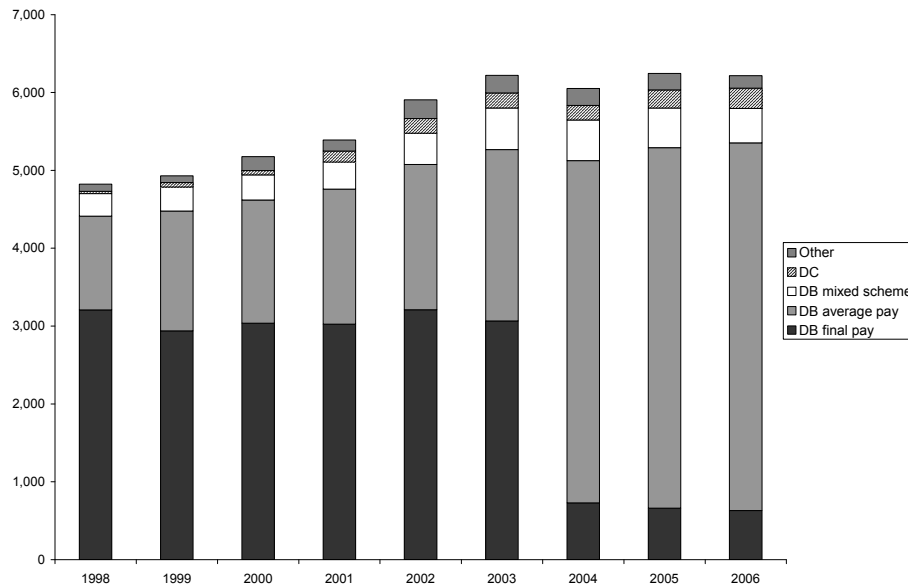
- **Pension funds.** 88% of the employees covered by occupational pension plans belong to schemes financed via pension funds. The majority belong to industry-wide funds, but companies with more than 500 employees tend to offer company pension funds—at the beginning of 2005, there were 102 industry-wide pension funds with approximately 5.1m active participants, and 714 company pension funds with around 0.9m active participants. Industry-wide pension funds account for a market share of 68% of pension fund assets. A collective labour agreement usually determines the participation in an industry-wide occupational pension scheme.⁴⁰ The pension fund is governed by a board, comprising an equal share of employer and employee representatives.
- **Insurance.** Only 12% of the employees covered by occupational pension plans belong to schemes financed via insurance companies. In particular, smaller companies tend to provide occupational pension schemes in the form of individual or group insurance contracts.⁴¹

The shift from DB towards DC has been taking place for both pension fund schemes and insurance schemes, but in different forms and to different extents. As Figure A1.5 illustrates, final-pay DB plans have been largely substituted with average-pay DB plans for pension fund members—67% of members belonged to final-pay DB plans in 1998, whereas only 10% were members of such schemes in 2006. The percentage of pension fund members having average-pay DB rose from 25% in 1998 to 76% in 2006; only 4% of members had DC plans by the beginning of 2006 (up from 1% in 1998). Box A1.1 reviews the scheme structures emerging in the Netherlands as an alternative to the DB schemes.

⁴⁰ De Nederlandsche Bank (2006).

⁴¹ On average, a pension scheme based on insurance has 44 members. A large proportion of insured pension schemes (40%) are found in the 'other business services' industry, which comprises non-traditional and fast-moving sectors (eg, IT). Source: De Nederlandsche Bank (2006).

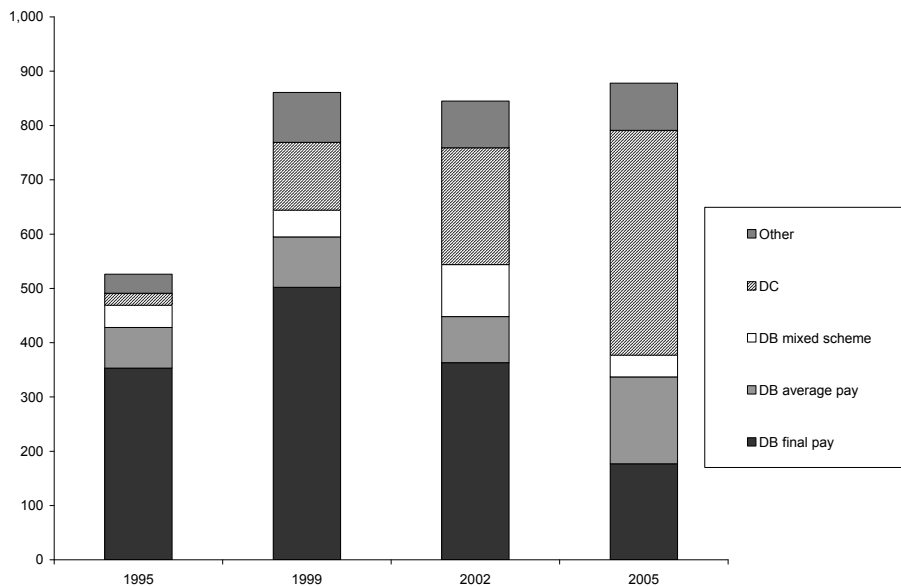
Figure A1.5 Membership of DB, DC and other pension funds in the Netherlands, 1998–2006 ('000s)



Source: DNB Pensioenmonitor.

Within the schemes financed through insurance contracts, final-pay DB plans have been replaced largely by DC plans, but also by average-pay DB plans. Figure A1.6 illustrates that the percentage of scheme members having final-pay DB plans fell from 67% in 1995 to 20% in 2005 (from 353,000 to 177,000 members), whereas the percentage having DC plans increased from 4% in 1995 to 47% in 2005 (from 22,000 to 414,000 members).

Figure A1.6 Members with DC, DB or other direct insurance arrangements, 1995–2005 ('000s)



Source: DNB Pensioenmonitor.

Box A1.1 Pension scheme structures emerging in the Netherlands

A distinctive feature of the traditional, final-salary DB pension schemes in the Netherlands is that there is an agreement between the pension funds and their sponsoring companies that the latter will contribute additional payments to the fund if the funding ratio weakens, but only up to a limit. The high cost of sustaining pure DB schemes has led to a shift away from final-pay DB schemes and adoption of several different types of plan. Solutions include career average plans instead of final-salary plans, split second pillar ('combination hybrid'), as well as DC plans with DB features (collective DC, hybrid plans, with-profit funds). Some typical hybrid solutions are described below.

- **Conditional DB**—nominal pension benefits are guaranteed, but the compensation of the pension rights for inflation is conditional on the funding position of the pension fund.
- **Combination hybrids**—average-salary DB pension applies to the income level below a limit (typically 2.5 times the minimum wage or the average Dutch wage level), and DC pension applies to the income above that limit.
- **Collective DC**—an average-salary plan structured to provide benefits similar to those of the traditional DB schemes (ie, employee and sponsor contributions are set to achieve the required funding and the desired replacement rate). Members do not have individual accounts; instead, the contributions are pooled for investment purposes, and members receive conditional salary-related benefits (pension indexation and precise benefit entitlement in a given year depends on the investment performance of the pension fund as a whole). The only obligation on the employer is to pay contributions (fixed at a percentage of wages), but they do not have any additional liability in the event of poor performance.

Source: Boender (2007), Van Dalen (2006a and b), and Pension Rights Center.

A1.5 Poland

Take-up of voluntary occupational pension schemes in Poland has been limited. Occupational pension plans (Employee Pension Programmes, PPEs) are approved schemes that employers can set up for their employees. All pension plans are DC plans. Both employers and employees can contribute to PPEs, with the 'basic contributions' (up to 7% of wages) made by the employer, and the 'additional contributions' (no restrictions on contribution levels) made by the employee.⁴² PPEs can be operated by investment funds (whereby the employer transfers employees' contributions to the investment fund) or insurance companies (whereby employees conclude a group life insurance contract).⁴³ In September 2004, 100,000 employees were members of PPEs.⁴⁴

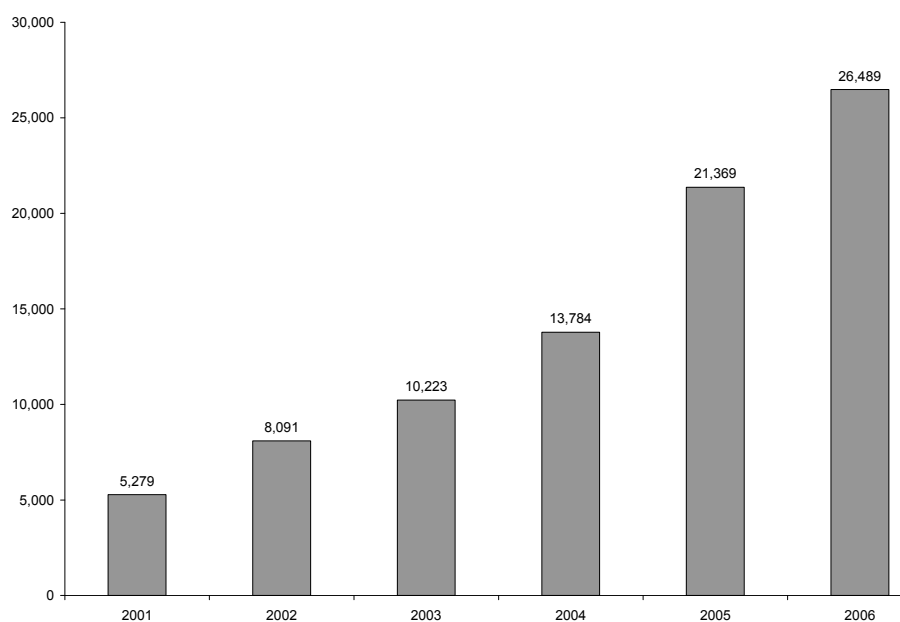
The main form of private pension coverage comes from the statutory privately funded pension scheme, introduced in 1999, that forms part of the social security system (Pillar 1 bis). It takes the form of OPFs, managed privately by common pension societies (PTEs). Employees can choose from the authorised funds. Operating on a pure DC basis, contributions are set at 7.3% of the employee's gross income, collected by the Social Insurance Institution (ZUS) and paid to the employee's chosen OPF. There were originally 21 PTEs, but this number had fallen to 15 by the end of 2005. The total volume of assets held by the OPFs between 2002 and 2006 is presented in Figure A1.7.

⁴² Social Protection Committee (2005).

⁴³ Act of April 20th 2004 on Occupational Pension Schemes.

⁴⁴ Polish Ministry of Social Policy (2005).

Figure A1.7 Net assets of OPFs in Poland, 2001–06 (€m)



Note: Converted to euros at average annual exchange rates from Financial Thomson Datastream.

Source: Insurance and Pension Funds Supervisory Commission (KNUiFE).

The Financial Supervision Commission, which took over the functions of the Insurance and Pension Funds Supervisory Commission (KNUiFE) in September 2006, monitors the OPFs' portfolio risk and compliance with investment limits. There are stringent quantitative restrictions on the investment of pension fund assets. For example, only 5% of the assets can be invested in foreign assets, and investment in equities is limited to 40%. There is also a requirement in Polish law for the OPFs to guarantee a minimum rate of return, which is based on the industry's average return; if the OPF underperforms and is not achieving the minimum rate of return, the management company is obliged to provide additional funds in order to reach the minimum rate of return.

A1.6 Sweden

Most employees in Sweden are covered by second pillar occupational pension schemes that are based on nationwide collective agreements between the employers' confederations and the trade unions. Approximately 90% of employees are covered by some form of collective pension scheme agreement, with the four largest collective agreements—for white-collar workers, blue-collar workers, local government employees and civil servants—covering approximately 80% of the employees.⁴⁵ DB plans previously dominated the market but there has been a clear trend towards DC-type schemes in recent years.

- **SAF-LO** is the collective scheme for blue-collar workers in the private sector, covering around 1.8m workers. Although historically DB, since 2000 (following a four-year transition period starting in 1996), this scheme operates exclusively on the basis of DC-type pensions for all employees. Contributions are paid either to deferred annuity with-profit contracts in an insurance company, or to unit-linked contracts. Where a unit-linked contract is chosen, the employee can select the type of fund in which the pension capital is invested. Traditional insurance (with minimum return guarantee) is the default for those who do not make a choice, with the central pension coordinator (comprising the social partners) selecting from the insurance companies in the market.

⁴⁵ Natali (2004).

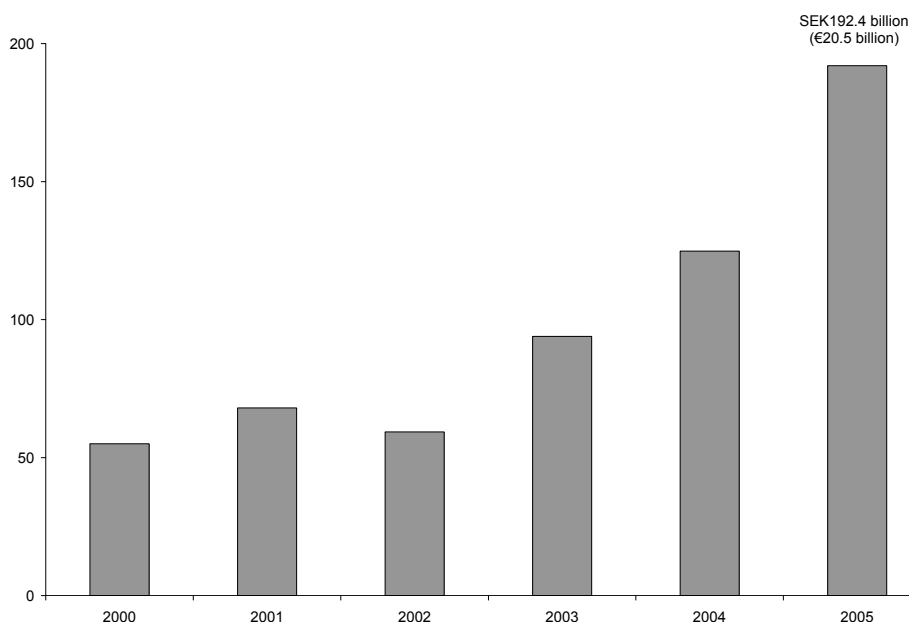
- **ITP** is the collective scheme for white-collar workers in the private sector, covering around 1.5m employees, which is around one-third of the working population. ITP used to be a DB scheme, with contributions of approximately 5–10% of salary, combined with possible contributions (2% of salary) to a special early-retirement DC plan (ITPK) as well as an opt-out option for very high earners. ITP followed SAF-LO and recently converted the DB scheme into DC-type pensions, but only for those born after 1979. Young employees can now choose between unit-linked or traditional life insurance contracts. However, whereas SAF-LO offers complete choice, at least 50% of contributions must flow into traditional insurance (which comes with a minimum rate of return of around 3% gross of tax and charges). As with SAF-LO, the pension coordinator pre-selects the insurance companies, with individuals choosing between the selected insurers and deciding how much to invest through unit-linked contracts (and in which funds). A traditional life contract is the default for those who do not choose. As with SAF-LO, the scheme is not a pure DC plan, because, in addition to traditional life insurance guarantees for all or part of the portfolio, there is a guarantee met by employers that at least the sum of contributions is returned.

In addition to the private sector schemes, schemes in the public sector (PFA for local government employees and PA03 for civil servants) have also followed suit with the SAF-LO PFA for local government employees, and shifted towards DC-type pension benefits, or implemented a combined system in which a tranche of the pension rights is based on DC.

The shift to DC in the Swedish pension system is also manifesting itself through the inflow of contributions and growth of funds of the PPM—the system of mandatory individual accounts that constitutes the second tier of the public pension system. The system was introduced in 1998 and is supervised by the Premium Pension Authority. While not an occupational scheme in the second pillar, under the PPM, individuals contribute 2.5% of their salary to their individual account, which is invested in investment funds. Towards the end of 2005, 82 private asset managers offered a total of 705 funds in the system,⁴⁶ from which individuals can choose as many as five. The contributions of members who do not make an active choice go to the default fund, managed by AP7 (the Seventh National Pension Fund, set up by the government). Benefits in the PPM can be withdrawn from the age of 61, either in the form of a life annuity or through keeping the account balance invested in securities funds. Given the regular contributions to the PPM, the total value of assets of the funds has grown significantly (see Figure A1.8), and at the end of 2005 amounted to SEK192.4 billion (€20.5 billion).

⁴⁶ Statens Offentliga Utredningar (2005).

Figure A1.8 Assets of the PPM in Sweden, 2000–05 (market value in SEK billion)



Source: PPM annual reports and Statens Offentliga Utredningar (2005).

A1.7 The UK

Given the low replacement rate from first pillar state pensions, occupational and private pensions are relatively important in the UK, contributing to around 30% of the retirement income, with around 43% of the employed population currently contributing to occupational pension schemes.⁴⁷ There are two main types of occupational pension scheme: trust-based schemes and contract-based schemes, the latter including group personal pension and stakeholder pension schemes.⁴⁸

- **Trust-based schemes.** These occupational pension schemes are set up under trust law by one or more employers for the benefit of their employees. A distinction can be made between public and private occupational schemes—since all of the public sector occupational schemes are of DB type and their features are normally defined by law, this study includes all other trust-based occupational schemes, which are classified as ‘private’ schemes. In 2004, according to the GAD, around 5m employees were members of public and private sector occupational schemes.

Again according to the GAD, there were around 66,000 private sector occupational schemes in 2005 (69,000 if schemes that are being wound up are included), and around 80% of these had fewer than 12 members. Around 400 of these schemes were multi-employer schemes (most large DB schemes). In general, larger schemes tend to be DB or hybrid schemes (around 86% of the schemes with more than 5,000 members were DB or hybrids in 2005), whereas small schemes are run largely on a DC basis (91%, or 48,000, of the schemes with fewer than 12 members were DC in 2005).⁴⁹

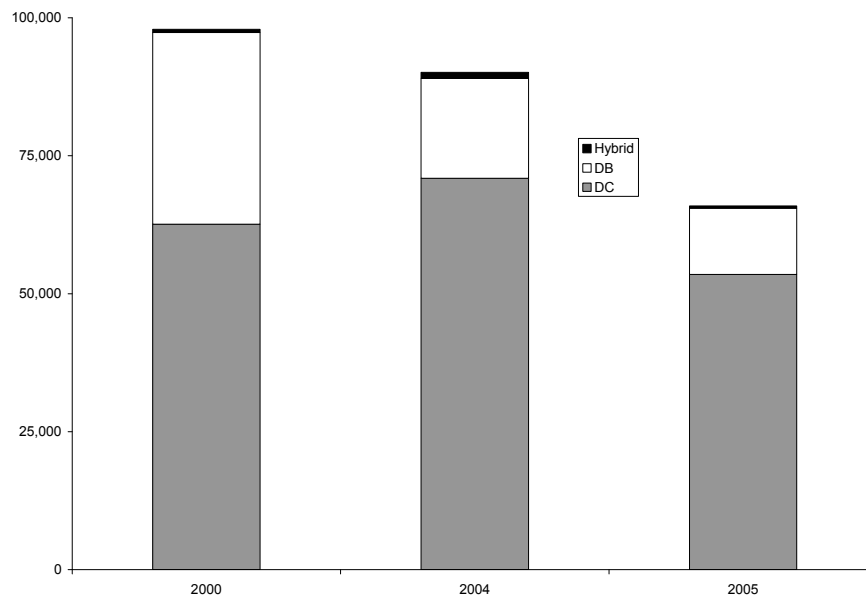
⁴⁷ Social Protection Committee (2005).

⁴⁸ Stakeholder pensions are usually considered as third pillar schemes, even though they are employment-related: ‘Stakeholder pensions are a subset of personal pensions, and can be either group personal pension or individual personal pension in form.’ GAD (2005).

⁴⁹ GAD (2006).

Figure A1.9 shows that there are two main trends in the number of trust-based occupational schemes. First, the number of private sector trust-based schemes has been falling (around 98,000 schemes in 2000 compared with 66,000 in 2005). The fall in membership has also been significant: there were around 6.5m active members in 1991 and only 4.8m in 2004. Second, the share of trust-based schemes that are DC-type has increased from around 64% to 81%, with the growth mainly observed among smaller companies. As a result, in terms of membership numbers, around 22% of private sector occupational scheme members had a DC plan in 2005, up from 16% in 2000.⁵⁰

Figure A1.9 Number of trust-based occupational pension schemes in the UK by type of scheme, 2000–05



Source: GAD.

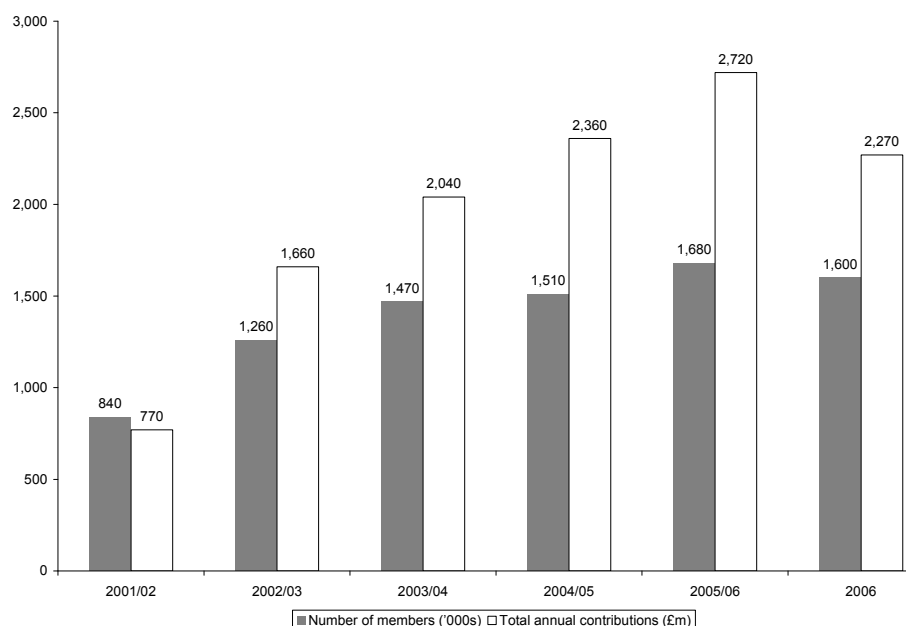
- **Contract-based schemes.** Stakeholder pensions became available in the UK on April 6th 2001. They are run mostly by insurance companies, and are based on a contract between the employee and the provider.⁵¹ Stakeholder schemes are all of DC type, and there were 45 schemes registered as of March 2007, according to the Pensions Regulator.

Figure A1.10 shows the growth in stakeholder pensions in terms of both the number of members and the total annual contributions made under the schemes. Stakeholder plans are experiencing growth. There are some employers closing or restricting membership to trust-based schemes and offering contract-based schemes instead, although the conversion has slowed down—eg, because of difficulties in dealing with the assets held in legacy schemes and decisions on the part of trustees concerning whether the conversion is in the best interest of scheme members. The growth is spurred by new schemes being set up. In particular, stakeholder schemes are favoured by smaller companies and by companies in specific sectors (eg, professional services).

⁵⁰ GAD (2001, 2005 and 2006).

⁵¹ In principle, stakeholder pensions can be either trust- or contract-based, although providers such as insurance companies have tended to favour the contract-based structure, as this is easier to administer.

Figure A1.10 Stakeholder schemes in the UK—membership ('000s) and contributions (£m), 2001–06



Note: 2006 includes data only for the first three-quarters of financial year 2006/07.

Source: HM Revenue and Customs (various years).

The shift towards DC in the UK pension market has gained further momentum through proposals to introduce a mandatory system of personal accounts in which individuals will save from 2012. Under the plans, employees will be automatically enrolled in the system. They will pay in a minimum of 4% of their salary and see their savings matched one-for-one by a combination of contributions from their employer and the government. The personal accounts will offer a structured choice of investments for individuals, including a default fund for those who do not make a choice.⁵²

⁵² Department of Work and Pensions (2006 and 2007).

Appendix 2 Literature on the shift towards DC pensions: an overview

There is a large body of academic literature, in addition to professional studies, examining the reasons behind the shift from DB towards DC pensions. This appendix provides a short summary of the main underlying factors, particularly those put forward in the academic literature. It also summarises studies in the academic literature that compare the risks (and risk allocation) between DB and DC schemes.

A2.1 Factors underlying the shift towards DC

Academics argue that, from a historical point of view, occupational pension schemes emerged because they offered important benefits to employers. Company success depended on company-specific knowledge, trust and loyalty of employees, and both expected salary progression and pensions played an important role in providing this employer–employee bond. DB occupational schemes were a solution that offered the desired design of deferred pay to employees (Neuberger 2005).

Over recent decades, many factors affecting this supply side of occupational pensions have changed—the cost of providing DB pensions has increased, and changes in technology have led to a decline in the importance of firm-specific skills and the employer-employee bond, rendering DB schemes less attractive for employers. A number of factors on the demand side have changed as well, such as different composition of the workforce and increased labour mobility. Using a simple model, Aaronson and Coronado (2005) demonstrate that a reduction in the probability of remaining in the same job leads to a lower value for DB pensions. The interaction of these demand and supply factors has led to both an overall and an industry-specific shift away from the pure DB schemes, and, in many cases, substitution into DC occupational pension schemes.

A2.1.1 Increased cost of providing DB schemes

The cost of providing DB occupational pension schemes has increased, largely due to changes in accounting standards and other regulation, adverse trends in financial markets, and increased longevity. At the same time, pension reforms have been implemented to facilitate occupational pension provision in DC form.

More stringent regulation

The past few decades have seen increased regulation of occupational and private pension plans. For example, several academic papers have shown that the trend away from DB schemes can be largely explained by the high administrative and compliance costs that have been imposed on sponsors with the introduction of the Employee Retirement Income Security Act (ERISA) in the USA (see references in Aaronson and Coronado 2005). Neuberger (2005) argues that meeting the minimum funding requirement (MFR) in the UK and the requirements set by the Pension Protection Fund have increased the costs of providing a DB scheme, without offering significant benefit to the employers. Moreover, difficulties of already underfunded schemes are occasionally exacerbated by the required levies to be paid into the Pension Protection Fund (McCarthy and Neuberger 2005).

Accounting standards, financial market downturn and underfunding

DB pension scheme underfunding and the associated costs to the sponsor due to regulations have reduced the desirability of DB pensions in a number of countries. Recent financial

market downturns and increased longevity have contributed to the underfunding problem by increasing DB scheme liabilities and decreasing assets.

Moreover, the introduction of International Accounting Standards (IAS) in Europe has led to DB pension plan liabilities being exposed on the sponsoring companies' balance sheets, which shows companies with underfunded schemes in a negative light. The UK's accounting standard FRS17 requires immediate recognition of actuarial gains and losses on the companies' financial statements—a requirement that results in greater volatility of the reported pension obligations, and makes DB plans even less attractive to the companies (see Whittington 2006).

Increased longevity

Increased life expectancy of employees has resulted in increased costs of running a DB scheme, because employees receive the promised benefits for a longer period. With increasing longevity and decreasing mortality rates, the original provisions of a DB contract are more costly than expected (ie, pension liabilities are greater than planned).

Using a stylised example, Muir and Turner (2003) show that, from 1980 to 2002, DB costs grew more than 1% per year, compounded annually due to the increase in life expectancy, and that the nominal cost of providing a DB plan has increased by roughly 30% over that time period. In the UK, the effect of increased longevity is regarded as one of the reasons why employers are replacing DB plans with DC plans (Pension Policy Institute 2003). The Pensions Regulator of the UK estimates that each additional year that members of a DB scheme live beyond the longevity assumed by the employer could add 3–4% to the value of scheme liabilities (The Pensions Regulator 2006a).

A2.1.2 Changes in technology

An important characteristic of a pure, final-salary DB scheme is that the accrual of benefits is 'backloaded', in that most pension benefits are heavily dependent on the earnings in the period just before retirement. Thus, pure DB plans favour employees who stay with a company for a long period until retirement. From the supply-side perspective, companies for which it is beneficial to offer DB plans are those for which firm-specific skills and/or long tenure are important.

There is both theory and evidence to support the argument that new technologies and processes that are less employee-specific, or which require more transferable skills, contribute to the shift away from pure DB pensions. A model developed by Freidberg and Owyang (2004) demonstrates that a decline in the value of existing jobs relative to new jobs reduces the expected duration of employment with any particular employer, and thus reduces the appeal of DB pensions. Aaronson and Coronado (2005) suggest that DB pension plans could be unstable when there is a change in the production technology that leads to an increase in the returns to transferable skills as opposed to firm-specific skills. In a comprehensive econometric study on the factors affecting the shift from DB to DC occupational pension schemes in the USA, Aaronson and Coronado (2005) found that industries which had more rapid multifactor productivity growth or which had an increase in the proportion of professional and technical employees, reduced their provision of DB plans and increased the provision of DC plans.

DC schemes are usually portable and are not 'backloaded'; therefore they facilitate shorter employment relationships. Changes in production technologies, particularly in certain industries, may reduce the need for life-long employment which is an important supply-side force contributing to the decline in DB plan popularity.

A2.1.3 Increased labour mobility and changes in workforce composition

Current and expected job tenure has fallen significantly over the last two decades—for example, Schrager (2006) finds that, in the USA the probability of job separation increased from 11.8% in 1980–89 to 13.1% in 1990–2000, with the largest increase in manufacturing and finance industries. More liquid labour markets change the demand for pension plans as more mobile employees tend to prefer the more portable DC plans to the traditional DB plans. An increase in separation rates means an increased likelihood of holding more jobs for shorter periods of time. This makes DB plans less attractive because:

- following frequent separations, an employee receives several small annuities when they retire that do not accumulate beyond their value when they leave their job (whereas, under a DC plan, the pension ‘follows’ the employee on separation and continues to accrue);
- frequent job changes expose the employee to more wage risk, which also decreases the attractiveness of DB schemes.

Aaronson and Coronado (2005) provide evidence that the decline in DB coverage is indeed associated with shorter employment relationships, and that the increase in low-tenure employees is positively correlated with the increase in DC occupational schemes.

Furthermore, they show that it is primarily demand forces that are behind the shift away from DB. Other studies also confirm that pension plans changed from the pure DB to the more flexible and portable DC plans to complement a more mobile workforce.

The past few decades have also seen important changes in workforce composition—in particular, more active participation of women in the labour force. This demographic change means that the number of dual-earner households has risen. It is seen to have led to an increase in the proportion of employees with a weaker attachment to specific employers and greater demand for pension flexibility and portability. As a result, the demand has shifted away from DB plans in favour of DC occupational plans. Aaronson and Coronado (2005) provide some evidence in favour of this argument—an increase in the share of dual-earners in an industry is highly correlated with reduced DB coverage and increased DC coverage. In addition, an increased share of women with children in an industry is associated with a decrease in DB coverage, reflecting lower demand for the low-portability DB occupational plans.

There is also some evidence that a decreasing presence of unions is responsible for the downward trend in DB pension plans. For example, Aaronson and Coronado (2005) find that a reduction in the proportion of employees covered by a union contract reduces DB coverage.

A2.2 Comparison of DB and DC schemes

There is a large and growing body of academic literature evaluating pension scheme design and comparing the outcome of pension arrangements that are of DB or DC type. This includes the theoretical literature that evaluates different types of pension scheme using life-cycle models of lifetime earnings and consumption. It also includes empirical studies that apply simulation techniques to examine retirement outcomes under different pension scheme specifications. These studies generally conclude that DC-type pension plans can be superior, in many respects, to those of DB type.

Bodie, Marcus and Merton (1988) were among the first to examine conceptually the trade-offs involved in the choice between DB and DC plans. They show that DB schemes, while offering a certain replacement rate, are not without risk, and that in the presence of both wage risk and investment risk, it is not obvious which type of plan is best overall.

McCarthy (2003) extends the life-cycle model in order to explore the conditions under which risk-averse individuals might prefer one type of pension plan over another. The model also

takes account of wage and investment uncertainty over time, varying initial incomes and financial wealth, and investment choices. The results show that, in the younger age groups, DB pension plans are a less desirable vehicle for retirement saving. This is because the earnings of younger employees are too volatile to justify average DB returns that are close to the risk-free rate. Furthermore, younger employees have most of their wealth invested in human capital—ie, their overall lifetime wealth is currently in the form of potential future earnings, which is highly correlated with the final benefit of the DB plan. For the young, equities provide an opportunity to diversify away from human capital. Over time, wage uncertainty falls and DB benefits become the more attractive option, by providing diversification from the financial markets and potentially cheaper access to annuities.

Cocco and Lopes (2004) empirically compare different plans available under the UK pension system in a model where the employer can choose between three types of pension: the state DB plan, a private DB or a DC plan. They find that individuals who face higher income growth are more likely to choose DB final-salary plans and less likely to choose the DC plan; individuals who face higher earnings volatility are less likely to choose DB final-salary plans; and individuals with higher earnings are more likely to choose either the private DC or the DB plan.

Empirical studies have focused on the US markets with a longer history of DC pension plans and use simulations to compare the accumulation of retirement wealth under 401(k) plans with that under existing DB plans. Samwick and Skinner (2004) use US data from the 1980s and 1990s to compare the distribution of pension benefits, by simulating a broad range of earnings paths, portfolio composition and portfolio returns for samples of DB and 401(k) plans. The results suggest that, in general, 401(k) plans, particularly those in later years, are as good as, or better than, DB plans in providing for retirement, even for more risk-averse individuals. The results are not dependent on the extraordinarily high gains in equity markets during the 1990s because equity returns after 1990 were excluded in the estimations of the return parameters.

Schrager (2006) empirically investigates the consequences of relying on assets accumulated in a DC plan compared with receiving an annuity based on a final salary form of DB plan. Using US data on individual earnings histories and job change patterns, it is shown that job separation rates and wage variance increased in the 1990s and that this increase made DC schemes dominant, offering greater opportunities for retirement wealth accumulation than DB plans.

Poterba, Rauh, Venti and Wise (2006) simulate the distribution of retirement wealth, as well as the average level of such wealth, under representative DB and DC plans in the USA. To simulate the wealth in DC plans, individuals are randomly assigned a share of wages that they and their employer contribute to the plan. The analysis considers several asset allocation strategies, with asset returns drawn from the historical return distribution. The DB plan simulations draw earnings histories from US data during the 1990s, and randomly assign each individual a pension plan drawn from a sample of large private and public DB plans. The resulting estimates of the average level of wealth accumulated in DC and DB plans suggest that private sector DB plans are almost always dominated by DC plans. The comparison of current DB plans in the public sector is less definite because public sector DB plans benefit from higher contributions and are more generous on average. Nonetheless, it is shown that if equity returns follow historical patterns, an individual in a DC plan who makes substantial equity investments will usually achieve a better outcome in a DC plan than in a public sector DB plan.

Appendix 3 Methodology and additional results of the simulation model

This appendix describes the methodology used for the simulation model that underlies the results obtained in section 5.2, and presents some additional results.

A3.1 Methodology

The objective of the model is to simulate the distribution of retirement wealth in an individual savings account for different parameters, and different allocations of pension assets. All modelling is undertaken in real terms, thus controlling for the effect of inflation. Returns accumulated are tax-free.

As the base case, it is assumed that the individual starts to contribute to the individual savings account at the age of 25 and retires at the age of 65. Thus, the contribution and investment horizon is 40 years ($s = 1 \dots 40$). A shorter horizon of 20 years is also considered. In each year s the individual obtains labour income $Y(s)$ and contributes a fraction c of this income to the individual savings account. As the base case, it is assumed that the contribution rate is 5% of the income ($c = 0.05$); the effect of a higher contribution rate of 8% is also considered.

To focus on the impact of volatile financial asset returns on the pension wealth accumulation, it is assumed that labour income is deterministic (ie, not risky), and that it grows at an annual rate g over the life cycle.

$$Y(s) = Y(s - 1) \times (1 + g)$$

The starting labour income at the age of 25 is set at €20,000, and it increases at 2% per annum (in real terms).

Let f denote the annual pension asset management fees, which are a fixed proportion of the value of the assets in the individual savings account. As the base case, it is assumed that the fees are 1% of pension assets ($f = 0.01$), but higher (2%) and lower (0.5%) fees are also considered.

Asset return evolution

The assets available and their return properties are defined in Feldstein and Rangelova (2001). More precisely, it is assumed that there are two assets, equities and bonds, the prices of which are assumed to follow a geometric random walk with drift. This implies that the log returns for each type of asset are serially independent and identically distributed with given mean and variance. Let $r_e(s)$ and $r_b(s)$ denote the real log returns on equities and bonds at time s . The equity and bond real log returns are given by:

$$r_e(s) = \mu_e + u_e(s)$$

$$r_b(s) = \mu_b + u_b(s)$$

Where $u_e(s) \sim \text{i.i.d.N}(0, \sigma_e^2)$ and $u_b(s) \sim \text{i.i.d.N}(0, \sigma_b^2)$, and the covariance between bond and equity returns is denoted as σ_{eb} . Equity and bond real returns in levels $R_e(s)$ and $R_b(s)$ are given by:

$$1 + R_e(s) = e^{r_e(s)}$$

$$1 + R_b(s) = e^{r_b(s)}$$

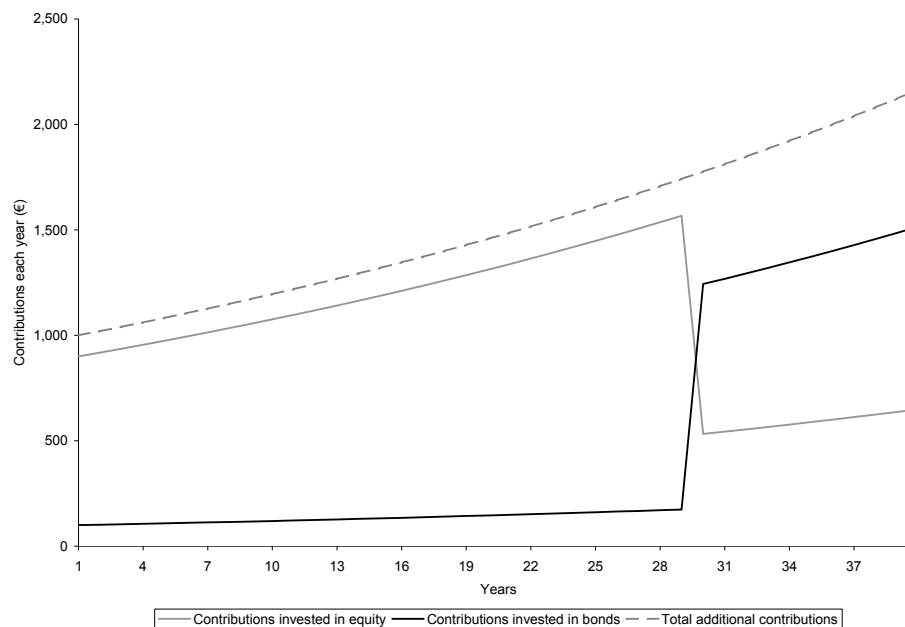
Log real returns of equities and bonds are simulated according to the values for the parameters $\mu_e, \mu_b, \sigma_e^2, \sigma_b^2, \sigma_{eb}$.⁵³ The simulated log returns series are then transformed into level returns series according to the two equations above.

Pension asset allocation

$\alpha(s)$ denotes the fraction of pension assets invested in equities at time s . The allocations considered include pure equity ($\alpha(s) = 1$), pure bonds ($\alpha(s) = 0$), and a life-cycle allocation.

In the life-cycle allocation the share invested in equities is reduced ten years prior to retirement (ie, when the individual is 55 years of age). Thus, $\alpha(s) = 0.9$ for $s = 1 \dots 30$ and $\alpha(s) = 0.3$ for $s = 30 \dots 40$. This portfolio allocation rule implies that the allocation in riskier assets in the portfolio is decreased as the investor approaches retirement; the advantages of such a life-cycle approach are shown in Cocco, Gomes, and Maenhout (2005). Figure A3.1 shows the annual contribution pattern in the model and how contributions are invested over the 40 years of pension asset accumulation for the life-cycle investment strategy.

Figure A3.1 The pattern of contributions throughout the 40-year pension accumulation period: life-cycle investment strategy (€)



Source: Oxera modelling.

Evolution of pension wealth

If $W(s)$ denotes the wealth in the individual savings account at age s , the equation describing the evolution of wealth in the individual saving account is:

⁵³ Since log returns of equities and bonds are jointly normally distributed, simulation has to take into account the interaction between equity and bond returns. Hence, the *conditional* means and variances of equity and bond returns are first calculated (ie, σ_{eb} is accounted for), and equity and bond returns can be simulated separately based on these.

$$W(s+1) \equiv W(s) \times [\alpha(s)[1+R_e(s)] + (1-\alpha(s))[1+R_b(s)] - f] + c \times Y(s)$$

In this equation it is assumed that the age s contributions to the individual savings account take place at the end of the year.

Parameterisation of equity and bond returns

To simulate equity and bond returns, parameters $\mu_e, \mu_b, \sigma_e^2, \sigma_b^2, \sigma_{eb}$ are estimated from the historical returns. Annual returns of UK equity and long-dated gilt indices during 1900–2005 are used to obtain the estimates of the five parameters. Annual total returns (including income reinvested) on Barclays Equity and Gilt indices are provided in Barclays Capital (2006). In the given period, mean log real returns for equities and bonds were 5.14% and 1.15%, respectively, standard deviations were 19.4% and 13.2%, and the covariance between equity and bond returns was 1.54%.

A3.2 Additional results

Certainty equivalence analysis of pension wealth outcomes

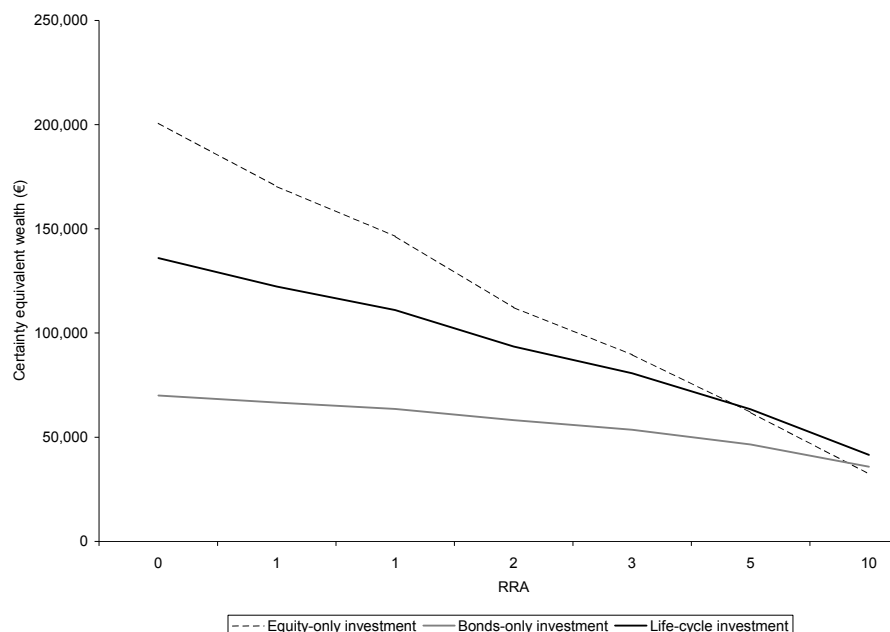
The modelling results in section 5.2 show the levels of pension wealth accumulated under different investment strategies and how it is distributed. This does not take account of individuals' preferences for risk and reward—normally they 'like' reward and 'dislike' risk. Hence, the higher the risk (or dispersion) of outcomes, the worse off the individual tends to be. Put differently, individuals may prefer a level of wealth that is on average lower but more certain.

Certainty equivalence analysis provides a framework for comparing different pension wealth outcomes taking into account individuals' risk–return preferences. This analysis involves a comparison of outcomes in terms of certainty equivalent (CE) wealth. CE represents the wealth that an individual would be willing to accept in place of a riskier, but on average higher, level of wealth. When the pension wealth outcomes are uncertain, CE wealth is below the average wealth for risk-averse individuals, representing the disutility associated with risk. For a risk-neutral individual, CE wealth would be equal to the average wealth, as the individual would be indifferent to the wealth being uncertain.

The application of CE analysis requires the specification of a utility function that reflects the preferences of individuals and their risk aversion. Following common practice in the literature, the constant relative risk aversion (CRRA) utility function was chosen with a range of realistic coefficients of relative risk aversion (RRA)—these range from 0 for risk-neutral individuals to 10 for extremely risk-averse individuals. For example, Feldstein and Rangelova (2001) consider that a 'plausible' relative risk-aversion coefficient would be less than 3, and probably even less than 2.

Figure A3.2 shows the simulation results reported in section 5.2 (base case, 40-year investment horizon), in terms of the CE wealth of pension outcomes under the different investment strategies, for different levels of RRA.

Figure A3.2 Certainty equivalent wealth of pension outcomes under different investment strategies, as a function of the degree of risk aversion (£)



Source: Oxera modelling.

The results show that the more risk-averse the individual, the more they tend to prefer investment in bonds—CE wealth of the equity-only (and life-cycle) strategies declines with the degree of risk aversion of the individual. However, the equity-only and life-cycle strategies deliver higher CE wealth for individuals with RRA of less than 10. That is, all individuals, even if they are risk-averse, would prefer to invest their pension portfolio in equities, given the simulated equity and bond returns—the exception are individuals with extreme risk aversion (an RRA of 10).

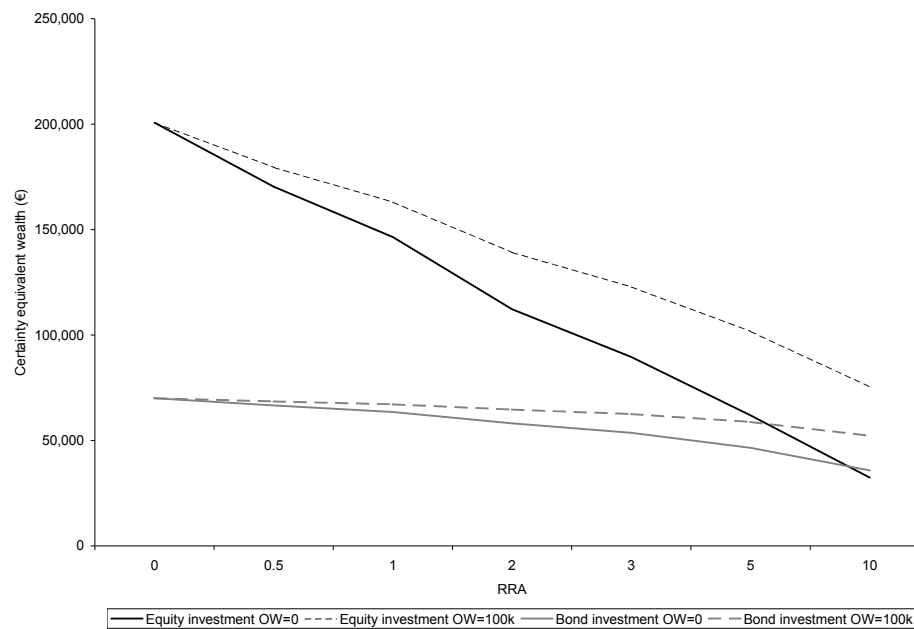
CE analysis can also be used to illustrate how individuals' preferences for different investment strategies and pension outcomes change if they have other sources of (certain) wealth. For example, individuals usually receive a certain replacement rate from PAYG state pensions in addition to their supplementary pensions. The level of other sources of wealth varies between individuals and countries, with implications for the attractiveness of different investment strategies—ie, the larger the other sources of wealth or retirement benefits, the greater individuals' willingness to accept risk in their supplementary pension investment should be. This is illustrated in Figure A3.3.

The figure shows the level of CE wealth derived from the pension accumulation under two assumptions of the other wealth available to the individual: €0 and €100,000. The assumption of no other wealth corresponds to the results reported in Figure A3.3 (base case, 40-year time horizon). The results are shown for two investment strategies: equity-only and bonds-only.

Figure A3.3 shows that, for any given level of risk aversion and investment strategy, the CE wealth is higher for individuals that have access to other wealth, and the difference is more pronounced for the equity investment strategy (which is more risky). Put differently, more wealthy individuals (or individuals for whom the accumulated supplementary pension saving is not the only source of retirement wealth) are more able to tolerate risk in their pension investment. In particular, equity investment becomes more attractive. While individuals with extreme risk aversion (RRA of 10) would have slightly preferred to invest in bonds only, equity investment becomes the preferred strategy if they have available other sources of wealth to live from in their retirement (here assumed to amount to €100,000, but a lower

amount would be sufficient to make equity the preferred investment). For individuals with 'normal' degrees of risk aversion, equity is the preferred strategy with or without access to other wealth, but having access to other wealth further increases this preference.

Figure A3.3 Certainty equivalent wealth of pension outcomes, as a function of the risk aversion and other wealth (€)

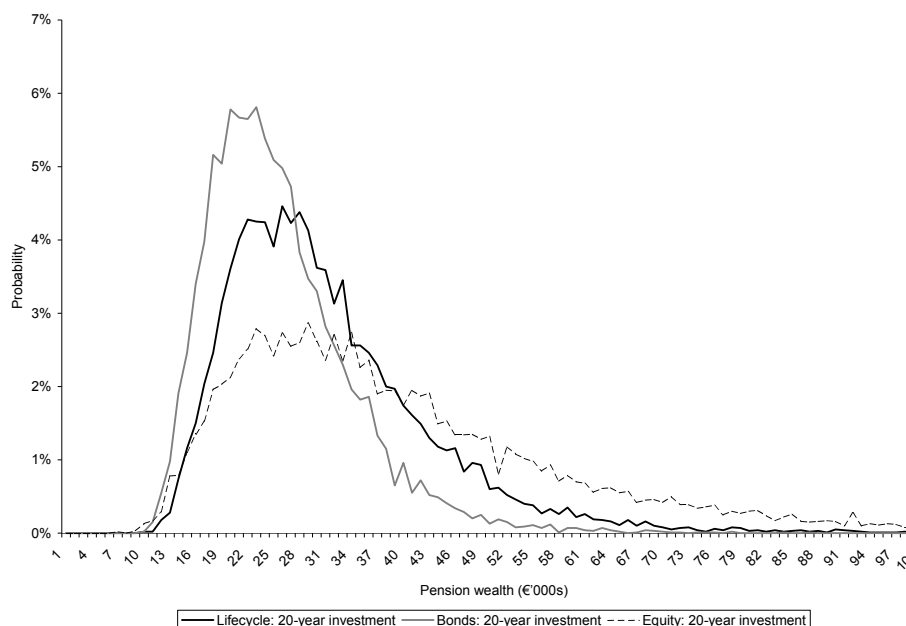


Note: OW, other wealth.
Source: Oxera modelling.

Accumulated pension wealth with 20-year investment horizon

Figure 5.4 shows the distribution of pension wealth for different investment strategies, using the base-case 40-year time horizon. Figure A3.4 repeats the results, but for the shorter 20-year time horizon. All other assumptions are unchanged—eg, the individual starts with a wage of €20,000, which grows at 2% per annum (all in real terms), and the contribution rate to the pension portfolio is 5% of the wage annually. The individual stops contributing to pensions investment and accumulating wealth after 20 years.

Figure A3.4 Distribution of pension wealth accumulated under different investment strategies—horizon reduced to 20 years



Note: Datapoints above €100,000 pension wealth are not shown: 0.1% of individuals had accumulated pension wealth above €100,000 with the life-cycle investment strategy, 2.7% with the all-equity strategy, and none with the all-bond strategy.

Source: Oxera calculations.

A3.3 Simulation results compared with outturn for the UK market: 1900 to 2005

The results of the pension wealth simulations indicated that on a forward-looking basis (but using historical parameters for equity and bond returns) and over longer time horizons, the probability of an investor being worse off by investing in all-equity portfolio (or the life-style portfolio) than by investing in bonds-only portfolio is very small. Concentrating on the equity-only and bonds-only investment strategies as the two extremes, with the 40-year accumulation horizon, the percentage of cases in which the equity-only strategy delivers a worse outcome than the bonds-only strategy is less than 0.07%, and this increases slightly to 0.9% with a 20-year horizon.⁵⁴

Charts with simulated results shown at the end in Figure A3.5 demonstrate how the cumulative distributions of simulated pension wealth outcomes for all-equity and all-bond investment changes as the holding period is gradually reduced from 40 to 1 year (all other assumptions are as in the base case, presented in section 5.2). Here, the cumulative probability line shows the probability that *at least* the given amount of pension wealth is accumulated for each of the investment strategies—this differs in the form of presentation of the data from the frequency distributions used in section 5.2 or above in Figure A3.4.

The cumulative distribution line (or part of the line) that is to the right of (or above) the other line indicates that the respective investment strategy is ‘superior’ than the other, since more pension wealth is accumulated with the same cumulative probability. Hence, the ‘cross-over’ point of the cumulative distributions of the two investment strategies indicates the percentage

⁵⁴ These two estimates were obtained by running 700,000 simulations of the base model, in order to achieve a more precise picture of the far left-hand tail of the cumulative distribution of pension wealth outcomes.

of cases where the bonds-only strategy delivers higher accumulated pension wealth than the equity-only strategy. This percentage is negligible for 40- and 20-year horizons, but increases as the investment horizon shortens further, rising to over 25% of cases being worse off under equity-only investment with a 1-year investment horizon.

The simulation model results are based on taking a limited number of parameters from the historical record, which then determine the simulation outcomes. In particular these are the average returns and the standard deviation of those returns, combined with an assumption that the performance of bonds and equities in any one year is completely independent of the performance of bonds and equities in the previous years (technically, the assumption is that there is no mean reversion).

To provide a cross-check that the results of the simulations were not being driven by these simplifications, an analysis was performed using the actual returns experience of bonds and equities indexes for the UK market from 1900 to 2005.⁵⁵ The same investment pattern as in the base simulation model was used (ie, annual contributions that are paid into the pension investment portfolio and grow with the individual's income throughout the accumulation phase). The results are presented below in Figure A3.5, next to the results based on simulated returns.

More specifically, Figure A3.5 show, for different investment horizons, the cumulative distributions based on actual returns data (chart to the left) and on simulated returns data (chart to the right). For example, the chart with 'Simulated' results in Figure A3.5 shows the cumulative distributions of wealth accumulated over 40 years if the returns on equities and bonds were as simulated. The chart with 'Actual data' results shows the cumulative distributions of wealth that would have resulted from an actual investment of the pensions portfolio in equities or bonds for 40 years, where the accumulation would have started in 1900, 1901, etc, up to 1965.

Comparing the wealth distribution charts for actual data and simulated data, the relative shapes and locations of the all-equity and all-bond investment distributions are very similar. Thus, it appears that the simulation results are broadly in line with what actual pension accumulation would have been, indicating that the simulation approach chosen has not biased the conclusions.

This is also evident from Table A3.1, which summarises some of the information contained in Figure A3.5 below in tabular form. The table shows, for both simulated returns and actual UK returns data, the percentage of cases in which an all-equity investment would have been worse.

The pattern of wealth distributions based on the simulated returns and the actual UK returns data is very similar—a very low percentage of cases when equity is worse if the investment horizon is 10 to 40 years, and 23% (actual data) or 26% (simulated returns) of worse cases if the investment horizon is one year.

⁵⁵ Given that there were 67 40-year periods between 1900 and 2005, accumulated pension wealth is calculated for 67 'individuals', who would have started the investment one year after each other—this forms a distribution of accumulated wealth based on actual historical returns.

Table A3.1 Comparison of accumulated wealth outcomes for all-equity and all-bond investments, based on simulated data versus actual UK data (%)

	Investment horizon (years)				
	1	5	10	20	40
Simulated returns data					
Cumulative probability of getting a worse outcome by investing all in equity	25.7	9.5	3	<0.9	<0.1
Percentage of cases in which, in hindsight, investing in bonds would have produced a better outcome	40	28.8	22.7	15.9	7.5
Actual returns data					
Cumulative probability of getting a worse outcome by investing all in equity	23.4	0	<3	0	0
Percentage of cases in which, in hindsight, investing in bonds would have produced a better outcome	31.3	20.9	14.9	13.4	1.5

Note: The results for simulated returns are as in the simulation model presented in section 5.2—ie, returns are simulated based on the historical mean and standard deviation of UK equity and gilt returns from 1900 to 2005 (10,000 simulations, except for 20- and 40-year horizon, where results with 700,000 simulations are presented). The results for the actual returns data are based on pension wealth, which is calculated using 40-year periods of historical UK equity and gilt returns from 1900 to 2005 (ie, 67 series of returns, each covering 40 years). In contrast to cumulative probability, which compares *ranked* outcomes, the percentage of cases in which, *in hindsight*, investing in bonds would have been better compares outcomes that are *not ranked*—ie, the all-equity and all-bond investment is compared for each observation or individual.
Source: Oxera modelling.

The results presented in the report up to now, effectively, look at pension accumulation under different investment strategies in a *forward-looking* manner—ie, the ex ante distribution of wealth is analysed (even though simulations are based on historical return parameters), which shows that the forward-looking probability of achieving a worse outcome under equity-only investment is small.

However, ex post there will be a higher number of cases in which, in hindsight, it would have been better to adopt the bonds-only investment strategy—ie, the percentage of cases when bonds-only investment would have been a better strategy for *each given individual* ex post is higher than the ex ante assessment (which ranks the outcomes before comparison).

Rows two and four in Table A3.1 set out the frequency with which, ex post, it would have been better to invest in bonds than in equities (based on both simulated data and actual UK returns). Focusing on the pension wealth accumulated based on historical returns, 7.5% of individuals would have been better, in hindsight, by investing all in bonds rather than equities with a 40-year horizon, compared with 16% with a 20-year horizon, 29% with a 5-year horizon, and 40% with a 1-year horizon. The respective figures based on actual UK returns data are 6–9 percentage points lower (this implies that the simulation model, in fact, shows equities in a worse light than they have been historically).

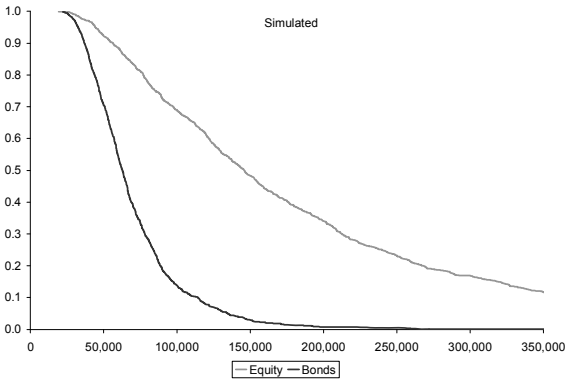
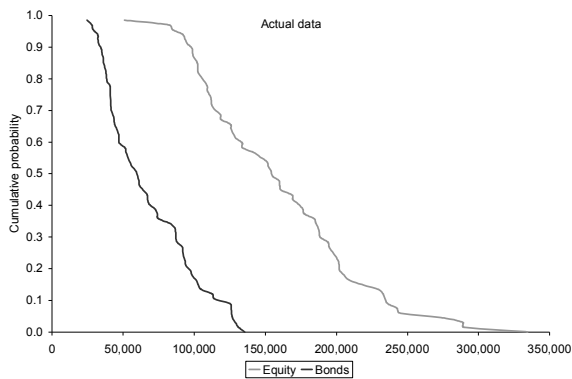
This additional analysis leads to the conclusion that:

- investing all in equities over longer time horizons results in a low percentage of cases of a worse outcome compared with investing in bonds, and
- with hindsight, the number of cases when investing in bonds would have produced a better outcome is higher.

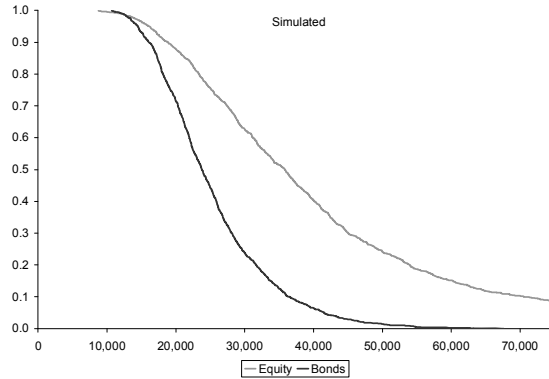
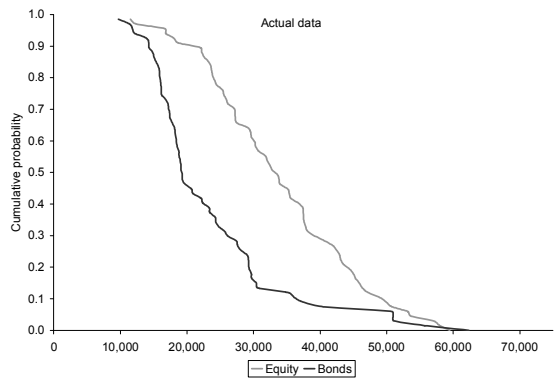
These results hold for pension wealth accumulated based on both simulated returns and on actual returns in the UK. It is therefore unlikely that these features of the simulation are being driven by the necessary simplification of investment performance required to operationalise the simulations.

Figure A3.5 Accumulated pension wealth distribution: various investment horizons

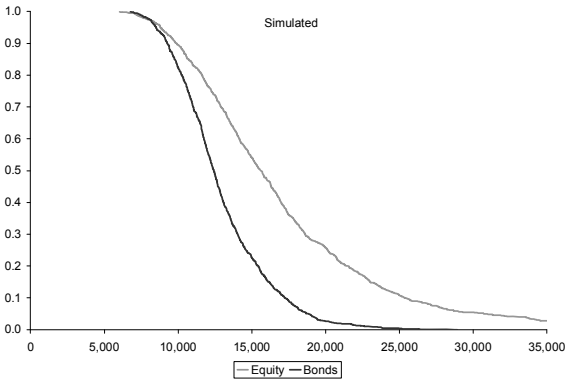
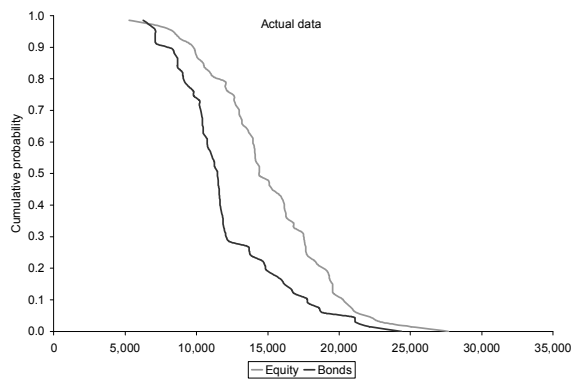
40-year investment horizon (€)



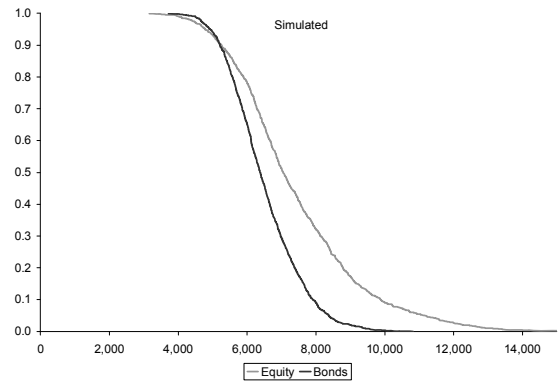
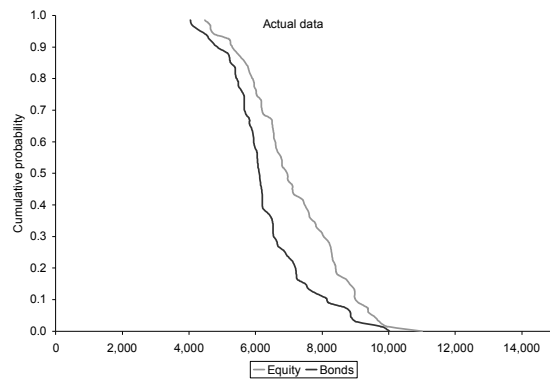
20-year investment horizon (€)



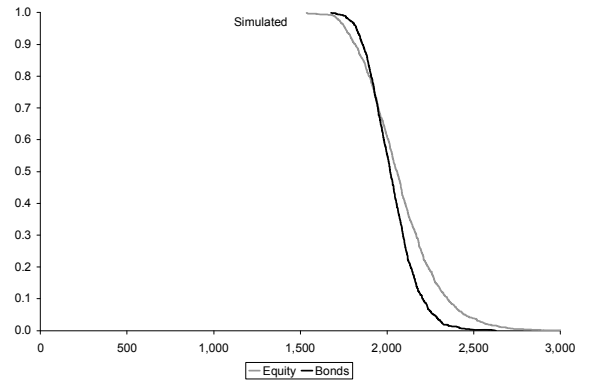
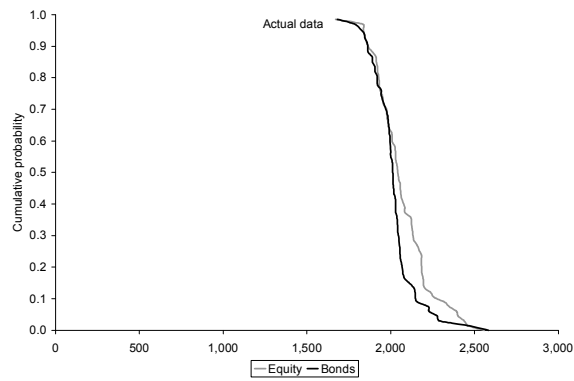
10-year investment horizon (€)



5-year investment horizon (€)



1-year investment horizon (€)



Source: Oxera modelling.

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