Annuities: a private solution to longevity risk

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This sigma number deals with the issue of longevity risk, here defined as the widening financing gap that may arise as a result of unprovided-for extended longevity of individuals and of populations as a whole.

In particular, this report focuses on the solutions currently offered by the insurance sector – primarily in the form of annuity products – to help individuals provide for their financial needs in old age. A life annuity provides the policyholder with a series of periodic payouts up to his death, hence offering effective protection against longevity risk.

Throughout this report the expression “annuity market” primarily refers to the insurance-served segment of the individual pensions market, ie to those annuity products offered by insurance companies, which normally belong to the third pillar of modern pension systems. Annuity markets differ significantly from one country to another, with regard to both their size and their product offering; this diversity has its origins in different cultural backgrounds, state pension systems and progress made in reforming them, regulation and taxation regimes.

The volume of assets backing private old-age provisions is impressive. In systems that rely heavily on private solutions (as in the US, UK and Switzerland), these assets already amount to 100–150% of GDP. In the US, pension assets added up to USD 12 trillion in 2005. On a worldwide basis, private pension assets increased by around 10% p.a. over the 2001–2005 period. Countries with less developed pension and annuity markets are also catching up: in the Eurozone, assets backing those businesses grew beyond 20% p.a. over the same 5-year period. The growth potential of annuity markets is significant and largely untapped, especially compared to the possible gap that a withdrawing public and corporate sector will leave behind.

And yet, great opportunities come with great challenges. This publication devotes much space to analysing the risks insurers assume when writing annuity business; the most relevant being the interplay of financial and biometrical risks, which extends over a large number of years. Consideration is also given to how such risks can be mitigated without devoiding the products of their core feature (protection against longevity risk), which is indeed one of the industry’s key competitive advantages over other financial-based solution providers.

Financial risk exposure comes in as the difference between the pricing assumptions and the actual markets conditions experienced with regard to four dimensions: interest rate, stock market returns, inflation and credit spread.

The key instruments for managing these risks appropriately are an integrated approach to asset/liability management and the adoption of financial risk hedging programmes. Recent regulatory developments in Europe clearly provide insurers with an incentive to make broader and more consistent use of both such approaches in the future.
Exposure to biometric risk is the second biggest challenge to annuity writers. Although the industry’s ability to read demographic trends has significantly improved over the last decade and a number of socio-demographic factors have been pinpointed as driving different cohort developments, insurers remain largely exposed to adverse selection, that is the hazard of writing the worst risks only. Any action that has the effect of broadening the annuitants base reduces this risk, albeit it cannot eliminate it completely.

Even more relevant, given the fact that it has been largely ignored so far, is the risk of a systematic increase in life duration for the population as a whole. The systematic (i.e. undiversifiable) nature of this risk devoids traditional risk management techniques of their value and therefore makes it very costly for insurers to manage it. The amount of this longevity risk on the books of insurers (and all pension providers for that matter) is believed to be large and poised to grow further in the future.

Risk transfer to other (relatively underexposed) parties is currently the principal avenue being investigated. Encouraging developments focussing on redistributing longevity risk through capital markets are under way, but the industry is still far from having found a successful and quickly scalable solution. The alternative option of transferring longevity risk to professional reinsurers is also more and more frequently contemplated, as opinions in the marketplace converge and opportunities for commercial transactions gain traction.

Even leaving aside the quantum leap in risk management the industry may make once new hedging and transfer options are fully in place, the industry is already in a position to marginally adjust the design of the annuity products it offers to yield to a more balanced risk exposure and contextually reduce the associated capital costs. This development will be further encouraged by the broader regulatory and rating trend towards risk-adjusted reserving, which renders the cost of financial guarantees and options embedded in annuities more transparent and, consequentially, pricing practices less arbitrary.

Governments have a crucial role to play in nurturing conditions conducive to healthy development of private market solutions to longevity risk. In particular, government actions can take four directions:

- fostering individuals’ financial awareness and education;
- sponsoring the issuance of financial instruments suitable for hedging longevity risk;
- eliminating adverse selection; and
- providing tax incentives to support self-provision.

A healthy and well developed market of private solutions removes the pressure from ailing state pension systems, creates transparency in transfer prices and may lessen the inter-generational wealth redistribution distortions that emerge when the current level of old-age social contributions is projected forward into a scenario of an ageing society.
A longer, happier life – maybe

Demographic trends in many countries are unambiguous: while people are having fewer children, they are living longer than any generation before. The result is irreversible for the foreseeable future: the population of the developed world, particularly in Western Europe and Japan, is ageing at a rapid pace.

This has dramatic social, cultural, and economic consequences. The insurance industry is one of the key players affected by those changes, as the ageing process directly impacts health care, long-term care, and pension provision. This report concentrates on the latter aspect and addresses the question of how the insurance sector can contribute to managing the longevity risk on its books and within a society.

While longevity is a well-understood phenomenon from a demographic and macroeconomic perspective, it has been relatively less investigated within the insurance industry’s risk management framework. Thus, this sigma explicitly adopts this viewpoint to examine the meaning of longevity extension and its repercussions for insurers.

Following a brief introduction to the demographic challenges and financial implications of longevity risk in Chapter 1, a first section of four chapters is dedicated to annuity products, structured as follows:

- Chapter 2 describes common features and different types of annuities;
- Chapter 3 analyses the distinctive elements of annuity markets worldwide;
- Chapter 4 deals with the risks assumed through annuity contracts;
- Chapter 5 addresses how product design affects the profitability of this family of products.

Since Chapters 2 and 3 give the basic framework and vocabulary on which the rest of the sigma builds, they may be skipped by industry experts.

The second part of the report shifts the focus onto the challenges life insurers face when offering annuities. In particular:

- Chapter 6 deals with the challenge of managing the longevity and financial market risk embedded within annuities.
- Chapter 7 provides some ideas on what the state and the insurance sector can do to promote private solutions against longevity risk and to support the development of annuity markets.
Demographic trends

Enormous medical progress, improved hygiene and living standards, generally healthier lifestyles and the absence of global military conflicts and of major pandemic crises are the main reasons why individuals around the world are enjoying rising longevity. Globally, life expectancy at birth increased by 4.5 months per year on average over the second half of the 20th century. In Japan, which has been at the forefront of this development, a newborn female (male) could expect to live 65.5 years (61.6 years) in 1950, while in 2050 this figure will have risen to 92.5 years (84.1 years), according to the 2004 revised UN World Population prospects. Whilst this is partly due to reduced infant mortality, it also reflects improving longevity in general.¹

¹ A more appropriate measure of rising longevity would be life expectancy at age 65, but as projections for this variable are not publicly available, life expectancy at birth is used here as a substitute.

Figure 1
Life expectancy at birth in different regions

At the same time, fertility rates are declining. According to the United Nations’ World Population 2004 database, while in 1950 a European woman gave birth to 2.66 children on average, nowadays the ratio is only 1.4, far below the threshold of around 2.1 necessary to keep the population of a developed country constant (Figure 2). In fact, in many countries low fertility is a more important driver of average population ageing than rising life expectancy.²

The result of higher life expectancy and lower birth rates is unambiguous: the world’s population is ageing. In 2050, 27% of the European population will be older than 65 years (in 2005: 16%) and around 10% will be older than 85 (in 2005: 3.5%). This has important consequences in terms of population mix, as demonstrated by the old-age dependency ratio (Figure 3). While today the ratio is around 25% in a typical developed country, in 2050 it will have risen to 70% in countries such as Japan and Italy.

² While immigration may raise local fertility statistics in the short term, evidence shows that immigrants adapt to their host country’s standards within a few years.
Financial implications of longevity risk

The combination of longer life and low fertility poses a huge challenge to societies and individuals alike as they are exposed to increasing longevity risk.

The same demographic trends that heighten the longevity risk are forcing changes in the income mix of retirees. First, as there are ever fewer wage and salary earners to finance the pensions of a growing number of retirees (see rising old-age dependency ratios in Figure 3), traditional public pay-as-you-go systems become unsustainable. This will most likely induce a relative reduction in state-provided pension income. Second, the marked trend away from defined-benefit corporate pension schemes towards defined-contribution schemes means that employer-related pension benefits could become more uncertain too. Third, the extended mobility of the workforce has broken down traditional family networks, hence impeding or at least reducing in practice the ability of younger members of a family to take care of the older ones. This is further exacerbated by the fact that in some markets (eg the UK, US) the younger generations are facing the risk of a bursting housing bubble and labour market uncertainty.

Hence, individuals will have to become more self-reliant and will want to consider supplementing their sources of income in retirement, assigning greater weight to private solutions. Furthermore, the fact that people are living longer and that the (effective) retirement age is unlikely to be adjusted upward by the same degree makes it necessary for individuals to put aside an even greater proportion of their financial means in order to cover the cost of their extended lifetime.

Figure 3
Old-age dependency ratio* in selected countries


* Ratio of the population aged 65+ to the population aged 15-64.
The role of the insurance sector

Overall, the insurance industry is well placed to aid retirees in addressing their financial needs, both in their asset accumulation and decumulation phases. As Figure 4 highlights, the value proposition of insurers rests on their risk-pooling ability. This skill allows the industry to offer pensioners not only protection but also adequate returns during their asset decumulation phase.

This *sigma* concentrates specifically on those insurance products whose value proposition is to offer individuals protection against longevity risk, i.e., annuities. Under the heading “annuity”, *sigma* includes all products that have the potential to provide regular payments.

By contrast, pure mortality protection products, pure savings products and combinations of the two are not considered. Furthermore, although health is also affected by the demographic challenges, health care products, including long-term care, are not included in the analysis.
Common features and types of annuities

**Common features of annuities**

The main purpose of annuities is to provide a series of periodic payments, financed through an accumulated fund or a lump sum. While annuities are often also an accumulation instrument, this is not a core feature of this product. In the US, for example, 37% of individual annuities are single-premium contracts³, in which the policyholder pays a lump sum up front in exchange for a series of regular payments from the insurer. Usually, an annuity is used to complement a person’s pension income upon retirement. In many markets, annuities contain benefits such as death payments and protection against financial-markets risk. These, however, are ancillary features built on top of the core product, rather than its essential elements. Finally, in many markets there are annuity products which allow the policyholder to choose whether to receive the payouts at the end of the accumulation period in the form of periodic payments, in the form of a lump sum or a mix of the two. Lump-sum options are particularly popular in countries where annuitisation (ie conversion of the accumulated fund into a periodic payout) is not compulsory. However, instruments of this type fail to provide protection against longevity risk and so are not relevant for the purposes of this report. The annuity products covered here are those that provide full or at least partial annuitisation of the accumulated funds.

Annuity products have one or more of the following distinguishing features that render them superior to competing financial alternatives (eg phased withdrawals):

- **Protection against longevity risk**: Through an annuity, individuals buy a life-long stream of income which protects them against the risk of outliving their savings.⁴
- **Embedded guarantees**: Some products offer attractive guarantees that protect the insured against interest and equity market fluctuations: others offer inflation protection for the policyholder or death benefits to the beneficiaries of the policy.
- **Tax advantages**: In certain jurisdictions, annuity products are treated as tax-qualified instruments by governments wishing to give individuals an incentive to save for their retirement and to buy protection against longevity risk.

Product characteristics and structure depend on the context within which they are offered. In particular, there is a big difference between deferred annuities, which are often purchased as savings products, and immediate annuities, which act as complementary private pensions. Such differences also tend to have a geographical connotation. For instance, the US market is dominated by savings-driven annuities, whereas the UK market has a relatively high share of immediate annuities, driven by compulsory annuitisation of pension funds.

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³ Based on data for the USA provided by A. M. Best (2005).
⁴ Therefore, variable annuities without guaranteed minimum withdrawal benefits do not actually transfer longevity risk.
Annuities can be classified according to the following recurrent contract elements (Figure 5):

- **Frequency of premium payments**: the premium the insured (annuitant) has to pay can be either a single, a fixed periodic, or a variable periodic payment.
- **Type of payouts**: similarly to the way premiums are paid in, the annuity’s periodic payout can be fixed or variable in amount. Whilst a fixed (or level) annuity pays out a guaranteed fixed nominal amount, a variable annuity can adopt different forms:
  - Payouts can be inflation-linked, thus providing a guaranteed income in real terms. In practice this guarantee is often restricted to a maximum rate of inflation protection, eg 5%;
  - Payouts can vary according to the performance of an underlying investment portfolio, for instance an equity index (equity-indexed annuity or EIA);
  - Payouts can also participate in mortality risk. In the case of with-profits (or participating) annuities, annuitants share both investment and longevity risk but gain the benefit of risk-pooling;
  - Payouts can contain various forms of additional guarantees⁵, namely:
    - A minimum investment return (accrued annually or over the duration of the policy in the form of a terminal bonus),
    - A minimum death benefit (eg lump sum in case of death, which is reduced with each annuity payment),
    - A minimum accumulation benefit (lump sum at the end of a specified period),
    - A guaranteed minimum withdrawal benefit (option to cash out a pre-defined amount or percentage of accumulated funds) and/or
    - A guaranteed minimum income benefit (minimum level of income is guaranteed).

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⁵ Some of these guarantees are more popular than others (eg the minimum payouts are more common than the minimum death benefits); some of them have proven uneconomical for the provider under certain circumstances (eg minimum accumulation benefit in a low interest rate environment).
Common features and types of annuities

- **Time payouts commence**: the payout period can start immediately after the annuity has been purchased (immediate annuity), or it can begin at some specified future time (deferred annuity), e.g., on the insured’s 65th birthday. While an immediate annuity is provided in exchange for a one-off lump sum, a deferred annuity is usually financed through regular premium payments.

- **Duration of payouts**: benefit payments can continue as long as the annuitant is alive (life annuity), up to a specified date (annuity certain), the earlier of the two (temporary annuity) or the later of the two (guaranteed annuity). The duration of payouts is the most important feature in connection with longevity risk, as will be described later.

- **Number of people covered**: an annuity can cover a single life or can be designed as a joint-and-survivor contract, where benefits are paid as long as any one of two or more people lives – often declining on the death of the main beneficiary.

- **Way the annuity is purchased**: the purchase of an annuity can be effected directly by an individual or can be intermediated as a group contract, usually by an employer. While in the former case the contract is part of an individual’s personal pension provision (3rd pillar of the pension system),⁶ in the latter case the annuity is provided by an employer-sponsored pension scheme (2nd pillar), where the premiums are paid either by the employer alone or by the employee and the employer together.

- **Other features**: further distinctions are possible, for instance according to whether the annuity product qualifies for tax relief or according to the currency in which payouts are denominated. Some annuities are organised in pools founded on the principle of mutuality (participating life annuity). A relatively new class of products, developed in Anglo-Saxon countries, takes into account the shorter life expectancy of people with impaired lives (enhanced and impaired annuities).

**Enhanced and impaired annuities**

In the last decade, a niche market has developed in some countries (the UK, US and Australia, to mention a few) which provides annuities targeted for impaired lives. These instruments can take the form either of an enhanced annuity – an annuity that provides a small payout uplift to smokers without requiring a full underwriting review – or an impaired annuity – which provides a substantial uplift to individuals who can demonstrate a serious medical condition and undergo a full underwriting process.

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⁶ The three-pillar approach refers to the sources from which the pension payouts are funded: the state (1st pillar), the employer (2nd pillar), and personal provision (3rd pillar).
In both cases, the initial mortality is higher than standard; however, survivors’ mortality converges towards conventional rates as time goes by. A portfolio of enhanced annuities is likely to be weighted towards exposure to a handful of impairments, particularly cardio-vascular disease and conditions related to smoking. Advancements in the medical treatment of such conditions may affect future mortality rates and thus increase the longevity risk exposure for this class of contracts. For this reason, enhanced annuities may require a higher return on capital than standard ones, since their profitability is even more dependent on medical progress. Although these policies are intended to expand the market of reference for annuity writers by creating a “new” class of customers, they may in fact have the side effect of increasing adverse selection in standard annuity lines.

**Participating life annuities**

*An example*

To explain how risk reduction is achieved through this contract, let us take the example of a group of five 95-year-old women, who are concerned about the risk of outliving their financial means over the next year. Statistically, there is a 20% chance of death; that is to say, one of them is expected to die in the course of the next year.

To protect against longevity risk, they agree to each contribute USD 100 to a common fund, which will redistribute the capital and investment earned over the year (say 5% yield pa) amongst the survivors. At the end of the year, each of them may get between USD 105 (if no-one dies) and USD 525 (if four out of five die), based on the actual mortality experienced within the group (six outcomes are possible, ranging between no death to five deaths).

What this example highlights is that by pooling mortality risk and ceding bequests, everyone gains. Ex-ante, all fund participants receive some protection against longevity risk over the duration of the agreement. If the agreement between the five old ladies were to be intermediated by an insurance company, involved a large number of people, and lasted for the whole duration of the participants’ lives, it would be called a participating life annuity contract.

Through a participating annuity product with a large investor pool, the funds contributed by those who die earlier than expected on the basis of the mortality rates supplement the pool’s capital market gains and thus offer a larger pension to survivors than could be achieved through individual investments. As the mortality expectation for a large pool of members is relatively stable, actuaries can forecast the mortality yield over the coming year with a high degree of confidence.
The difference between the investment return available on the market and that earned by survivors participating in the pool offers a tangible protection to those surviving to extreme old ages. The yield of a participating life annuity to pool members increases with age: at age 85 and above, it becomes virtually impossible for an investment on financial markets to beat the implied mortality yield of a participating life annuity (see Figure 6).⁷

Conversely, this also means that, from an individual’s point of view, it makes little sense to buy an immediate annuity contract at a young age: the mortality yield will be quite low, the upfront lump sum required quite large, and the relatively high expenses associated with an insurance product will render direct investment in financial market a better financial option.

However, individuals may choose to buy a deferred annuity: this instrument makes it reasonably certain that they will be able to accumulate the financial resources needed to buy the participating annuity at the end of the accumulation period (the certainty comes from the fact that they have to pay the regular premiums). Tax advantages may give an incentive to buy this kind of product instead of other savings instruments, but low flexibility in the accumulation phase scores negatively. The ultimate choice will most likely be dictated by the individual’s financial means relative to his consumption level and risk aversion.

⁷ Obviously, the mortality yield curve cannot grow ad infinitum, since it is dependent on the number of lives participating in the pool and on the structure of the fund (open or closed to new lives).
Limits of participating products

Participating life annuities present some limits, too. Firstly, as in the case of other variable annuity structures, the annuitant in a participating pool does not know in advance what the pool will earn, hence he carries some risk. In particular, participating annuities without guarantees are structured so that individuals share both mortality and investment experience in good and in bad times (or in other words, their risk exposure is symmetric on the upside and on the downside). Secondly, in its simplest form, a participating life annuity does not give a pool member’s heirs access to the principal investment nor to any accumulated fund. This obviously does not cater to those who wish to leave some legacy. Thirdly, buyers of such a product tend to be people who expect to live longer anyway; this gives rise to “anti selection”.⁸ Fourthly and finally, any systematic increase in longevity will reduce the mortality yield, as the number of survivors of a certain age increases compared to past experience.

The advantage of this structure over self-insuring is that the risk exposure is not immediate: it is borne by the pool (not the individual) and it is smoothed out by the insurance company over a long time horizon. Furthermore, investment and mortality risk are largely uncorrelated. This means that the negative return on investments may be partially offset by positive mortality yields. In this sense, the effects of the overall risk exposure are mitigated or postponed at the individual level when filtered through a pooling structure.

Participating annuities from an insurer’s point of view

From an insurer’s perspective, participating life annuities have interesting features, too. Firstly, such a structure enables insurers to significantly reduce the longevity risk to which they are exposed, since this is partly shared with the annuitants. Secondly, if no investment guarantees are offered, financial market risk exposure is also symmetrically distributed between insurers and insureds. Conversely, guarantees, whether explicit (such as Guaranteed Minimum Income Benefits [GMIB]) or implicit (through fixed annuities), result in extra cost, which must be borne either by the annuitant or by the insurer, reducing the benefits to the former and/or the profit for the latter, all else being equal.

⁸ In this context, anti selection refers to the risk the insurer runs that only those individuals with the highest life expectancy actually buy annuities.
An international comparison of annuity markets

This chapter provides insights into annuity markets worldwide. It is organised into two sections: the first offers an overview of selected markets, while the second investigates the determinants behind their development.

Throughout this report the expression “annuity market” refers to the insurance-served segment of the individual pensions market, i.e. to those annuity products offered by insurance companies, which normally belong to the third pillar of modern pension systems.⁹

Overview of annuity markets

Annuity markets differ significantly from one country to another, with regard to both their size and their product offering. As life insurance products are very much determined by national legislation and regulation such as social security and tax systems, international comparisons are not straightforward.

Every annuity market must be seen in the context of an overall pension system, which in most countries consists of the three pillars mentioned earlier. Figure 7 shows how differently actual pension payouts can be funded. While in some countries (e.g. Finland, Spain, Italy, Germany) today’s retirees rely almost entirely on statutory state pensions, others such as the UK, the US and the Netherlands are more focused on privately funded pensions.

Figure 7
Total pension expenditure in % of GDP

- Public
- Private (data was not available for Ireland, New Zealand and Spain)


⁹ Some of the international statistics presented in this chapter refer to the whole of the private pension market, which consists of both 2nd and 3rd-pillar pension products. The resulting approximation error is marginal, however, since countries with a strong employer-sponsored pension pillar tend to have better developed private annuity markets, as well.
The size of annuity markets

In the absence of reliable and consistent data, size can be assessed taking a number of indicators into account. The following analysis builds on sigma’s own estimates, and CEA (Comité Européen des Assurances) and OECD statistics, which compare private pension markets across a selection of countries.

Figure 8 below, combining two size indicators – technical reserves pertaining to annuity business and assets backing the same – suggests significant differences even across the annuity markets of industrialised countries. At around USD 21 141 assets per capita, the UK market is the biggest worldwide, well ahead of Switzerland, the Netherlands and the US.

Notes: (1) Reserves. (2) Assets. (3) Estimated reserves.
Source: Swiss Re Economic Research & Consulting, Limra; CLHIA; ABI; FSA returns; FFSA; GDV; CBS; ICEA; DEXX & R.

Furthermore, the OECD has recently set up a consistent pension statistics database, to be updated and published biannually. In contrast to the above estimates and to the primary focus of this study, however, the OECD statistics cover the overall private pension market, ie aggregating occupational and personal pension provision. Nevertheless the data provide an additional, though approximate, picture of the relative importance of different annuity markets. The general ranking in annuity markets worldwide shown in Figure 8 is largely confirmed by the OECD figures (see Figure 9). Firstly, significant differences between countries remain. Secondly, the rankings confirm Switzerland, the Netherlands, the UK and the US as the four biggest markets, measured by assets per capita. However, the order is different, with Switzerland leading the group of top markets.

Notes:
10 Annuity statistics are scarce and data quality varies considerably: while in well developed annuity markets – such as the US and the UK – detailed and timely data are available, in others they are not.
12 The significant difference in scale between Figure 8 and Figure 9 is to be ascribed to the large volumes of pension business managed by pension funds.
An international overview of annuity markets

New business growth offers useful insights into short-term market development.

Development of new contracts

The CEA publishes yearly market statistics which provide some limited yet useful information on new business contracts specifically in the individual annuity segment in Europe (see Figure 10). The data indicates that, relative to the size of the population, the top markets (not including Switzerland) have also been generating the largest volume of premiums for new individual annuity sales, suggesting that already big markets can still harbour considerable growth potential. In all instances, ongoing pension system reforms can be pinpointed as a major driving force behind continuing annuity sales.

Note: It was not possible to extend the comparison across European countries to group business pertaining to the pension segment, as the CEA statistics do not provide this information.
Historical developments

Overall, total assets held by pension funds (ie excluding assets of life insurers, for which the OECD does not provide a separate time series) increased strongly, by USD 2 123bn or about 16%, in 2004 compared to 2003. Although equity price movements may have played a role, new inflows were an important driver behind this development, especially in countries where the equity holdings backing pension liabilities have historically been limited or have been significantly cut back over the last five years. Between 2001 and 2004, pension fund assets grew at a compound average growth rate (CAGR) of 8.6% in the OECD countries.

Table 1
Total pension fund assets in USD billion

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<td>8 511</td>
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</table>

Source: OECD Global Pension Statistics; Swiss Re Economic Research & Consulting own calculations
While developed annuity markets such as the US, UK and Switzerland expanded relatively modestly, markets with low penetration rates – such as Norway, Poland and the Slovak Republic – grew strongly.

However, it would be misleading to conclude that, in the future, less established pension markets are going to experience higher growth rates simply based on their currently low penetration of private pensions. After all, the expected catch-up process may actually never occur.

**Recent trends: bulk annuity buy-outs**

In certain markets, particularly the UK, the possibility of fully transferring both pension and insurance company liabilities in respect of annuity risk is being explored through the bulk buy-out approach. At present in the UK, over GBP 1bn of pension fund liabilities are transferred to the insurance sector each year, as corporate sponsors seek to fully extricate themselves from pension-related risks; furthermore, in excess of GBP 1bn are now routinely traded between insurance companies in respect of individual blocks of annuity portfolios. Unsurprisingly, 2006 saw the launch of several new insurance companies dedicated to carrying these risks.

**Determinants of market development**

The development of private pension markets appears to be directly correlated with a number of factors, namely:

- the status and degree of reforms of the government pension system
- the competitive pressure from substitute pension providers
- the existence of tax incentives for private pension products

**The status and degree of reform of the government pension system**

Table 2 shows that there are two broad groups among the OECD countries: one where the insurance industry has taken on a cardinal role, and another where most of the onus still remains on the national governments. On the one hand, those countries with a well-established mandatory or quasi-mandatory occupational pension system appear to have the highest pension fund and life insurance penetration; this is especially true of Switzerland, Iceland, Denmark and Australia (see "The Australian experience" textbox). On the other hand, the US, the UK and the Netherlands (which in fact has a quasi-mandatory private system) also stand out amongst the countries with voluntary systems by virtue of their well developed private markets. Therefore, there is no empirical evidence that any given form of pension system is exclusively conducive to a private pension market. International comparability may, however, be distorted by the fact that not all pension systems were enacted at the same time. In a few years from now, the picture presented in Table 2 may look materially different. Countries which have embarked on the road to pension system reform are more likely to experience expanding annuity sales.
Distortions may also arise from the fact that in certain countries government policies allow for universal state pensions, whereas in others eligibility is means-tested. Paradoxically, in means-tested systems, the low- to middle-income population groups may have a disincentive to save and provide for themselves, because they would then be at risk of falling out of the state-provided minimum pension network.

### Table 2
Funded occupational pension systems in OECD countries, 2004

<table>
<thead>
<tr>
<th>Country</th>
<th>Mandatory</th>
<th>Voluntary Coverage</th>
<th>Penetration*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Australia</td>
<td>1992</td>
<td>✓</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>1964/1985</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1956/1985</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>1998</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Iceland</td>
<td>1986</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>2005</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>2006</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>1999</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Slovakia</td>
<td>2005</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>2000</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>1985</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

* Pension funds and life insurer assets in % of GDP

Source: OECD Global Pension Statistics; Swiss Re Economic Research & Consulting’s own calculations
The Australian experience

The Australian annuity market only took off in 1992, as a consequence of the introduction of the mandatory superannuation scheme. This scheme requires workers to accumulate retirement savings that can then be used either for gradual withdrawals or to purchase an annuity. At the time the scheme was launched, employees were required to contribute 2% of their income; that figure now stands at 9%.

The superannuation market grew by 10.1% CAGR between 1994 and 2004 in terms of annuity assets.¹⁴ As of April 2005, it covered 90% of all employed persons.¹⁵ With assets of AUD 800bn under management as of September 2005 (AUD 693 billion as of December 2004)¹⁶ linked to the superannuation scheme, Australia ranks amongst the top countries in the OECD economic indicator statistics. This may also explain why the basic state pension can be viewed as a means-tested welfare payment rather than a universal entitlement (with the associated fiscal burden that comes with it) – a rare example amongst OECD countries.

In 2004, the superannuation segment represented 87% of the Australian life market in terms of assets, of which 26% is held in the form of life policies, a figure that has been declining over time. The Australian experience yields two conclusions: on the one hand, pension system reform is a very powerful tool for fostering the expansion of the retirement market. On the other, this benefits not only insurers. In the Australian instance, pension funds have been the largest beneficiaries of the reform. Incidentally, very little of these pension fund assets has been used to purchase annuity products.

The development of the annuity market seems to be directly correlated with the status and reform of the pension system in each and every country, in that the role the insurance sector can play is limited by two dimensions of competition: between the pillars and within the 3rd pillar.

Competitive pressure from substitute pension providers

With regard to the first issue, statistics suggest that those countries with lower state pension provision tend to have a better developed private pensions market and vice versa.

¹⁵ See Australian Taxation Office, April 2005.
¹⁶ See APRA, Quarterly superannuation performance statistics December 2004.
The correlation between public and private pension is also evident in the replacement rate – meaning the ratio of a retiree’s average pension to his average income during his working life. Recent estimates comparing the income replacement rates in Germany, France, Italy and the Netherlands suggest that the smaller the government-sourced contribution to the retirement income ratio, the higher is the private proportion. More specifically, the retiree’s total replacement rate is about the same (around 80%) in all four countries, regardless of the different government payout levels across the sample.

This means that government, employer-sponsored and personal provision could almost perfectly substitute each other. If, at the personal level, the amount of pension payouts expected from the 1st and the 2nd pillar directly influences the level of private provisions a person is willing to finance, this will ultimately affect the potential size of a country’s annuity market.

Additional competitive pressure comes from products within the 3rd pillar. The ultimate buying behaviour will be influenced by:

- the existence (or often the lack) of a level playing field amongst competing offers (differences in terms of tax treatment, capital and reporting requirements, to mention a few) which can affect the price to the consumer and indirectly steer sales,
- the accessibility of information on the individual’s financial resources to various providers of financial services and
- the individual’s literacy on financial matters and familiarity with distribution channels.

Outsourcing of occupational pension plans to multi-employer foundations in Switzerland

Experience in Switzerland shows how the regulatory background can affect competition within the 2nd pillar of the retirement pension system. In Switzerland, multi-employer foundations (also known as “collective funds”) are organisations that run occupational pension schemes as legally independent institutions. These foundations are supervised by the Federal Social Insurance Office (BSV), unlike the private insurers, which report to the Federal Office of Private Insurance (BPV). The main advantage enjoyed by multi-employer foundations is that the BSV allows them, in justified cases, to post a temporary shortfall (ie the available assets in the fund are lower than actuarially necessary). This enables the multi-employer foundations to pursue a more flexible investment policy and thus to earn higher overall returns. By contrast, insurance companies subject to BPV supervision are forced to invest a major part of their assets in risk-free securities to be protected against shortfalls at any time. Their superior security thus comes at the cost of lower expected returns. Furthermore, a foundation supervised by the BSV is allowed to discount its obligations at a higher technical interest rate, leading to lower calculated liabilities.

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¹⁷ The replacement rate is calculated as pension income as a percentage of average working income. Whilst the gross rate refers to the individual’s total income, the net replacement rate subtracts personal income tax and social security contributions.


Secondly, competition between pillars and within the 3rd pillar determines the growth prospects of annuity sales.
This has led to a considerable part of the occupational pension business governed by the BPV being shifted to the multi-employer foundations in recent years. Prominent examples (e.g. Winterthur, Zurich) show that this was at least in part due to efforts by large insurance companies, which established their own foundations. As a result, the regular premium income of the pension funds rose by 7.1% from 2002 to 2004, according to the Swiss Federal Statistical Office, while premium income from the insurers’ group occupational pensions business dropped by 8.1%.

**Figure 11**

Premiums and contributions from occupational pensions business, 1998–2005

---

**Tax incentives for private pension products**

Tax benefits are a major driving force of worldwide pension and annuity markets, because they give people incentives to save money for their retirement years. Most tax systems provide incentives in one or more of three ways:

- a combination of progressive personal income taxes and deductibility of pension contributions from taxable income;
- a specific preferential tax treatment of pension income; and
- a preferential tax treatment of the investment income and capital growth on assets held within pension funds.

In most countries, tax rates for personal income are progressive, i.e. high incomes are taxed at a higher rate than low incomes. Since gross replacement rates are typically well below 100%\(^{19}\), the tax rate applied to working income is normally higher than that applied to pension income. Assuming that an individual’s pension contribution is deductible from his taxable income, an individual

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\(^{19}\) With a gross replacement rate of about 102 for the average earner, Luxembourg is an exception.
can save taxes by investing part of his income in pension provision, the payout from which will then be taxed at a lower rate at a later point in time. In some jurisdictions, however, such tax incentives are recognised only on funds subject to a minimum compulsory annuitisation percentage.

The government can provide additional incentives by giving preferential tax treatment to pension income. This can be done in three different ways:

- Age-based tax allowance and tax credit, specially for those retirees with modest incomes;
- Partial exemption of state pensions from personal income tax and in some cases preferential tax treatment for modest pensions paid from private-sector schemes;
- Pension income exemption from social security contributions. The latter could, however, be levied on any wage income earned by an officially retired person who continues working.

Table 3 shows that most OECD countries provide at least one form of preferential taxation of personal income or reduced social security contributions for pensioners.

### Table 3

<table>
<thead>
<tr>
<th>Categories of tax incentives for pensioners</th>
<th>Increased tax allowance or tax credit</th>
<th>Relief for pension income</th>
<th>Social security contributions paid by pensioners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>✓</td>
<td></td>
<td>low</td>
</tr>
<tr>
<td>Austria</td>
<td></td>
<td></td>
<td>low</td>
</tr>
<tr>
<td>Belgium</td>
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<td>✓</td>
<td>none</td>
</tr>
<tr>
<td>Canada</td>
<td>✓</td>
<td>✓</td>
<td>none</td>
</tr>
<tr>
<td>Czech Republic</td>
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<td>none</td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td>✓</td>
<td>none</td>
</tr>
<tr>
<td>Finland</td>
<td>✓</td>
<td></td>
<td>low</td>
</tr>
<tr>
<td>France</td>
<td></td>
<td>✓</td>
<td>low</td>
</tr>
<tr>
<td>Germany</td>
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<td>✓</td>
<td>low</td>
</tr>
<tr>
<td>Greece</td>
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<tr>
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<tr>
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<td>✓</td>
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</tr>
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<td>Japan</td>
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</tr>
<tr>
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<td>✓</td>
<td>none</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>✓</td>
<td>none</td>
</tr>
</tbody>
</table>

Note: Level of social security contribution payable by retirees is lower than that payable during working life, or even zero.

Annuities and risk protection

Through annuities, insurers offer their policyholders protection against two broad classes of risk:

- biometric risks, such as longevity and mortality,
- macroeconomic and financial market risks, such as inflation, interest rate, equity market and credit market risk.

The extent to which insurers actually take on risk exposure by offering such protection will depend on their product structure, their understanding of the purpose for which annuities are bought, the scope for diversification benefits within the portfolio of business underwritten, their risk management prowess and the hedging instruments in place.

The predominance of a class of risk and the degree of exposure typically change with the product structure. In the case of immediate annuities, for instance, the most important risks are longevity and interest rate, closely followed by the credit risk on backing assets. In the case of deferred annuities, on the other hand, the predominant risk stems from adverse developments in long-term interest rates – particularly reinvestment rates, followed by longevity and unmatched inflation risk. When comparing immediate and deferred contracts, however, the longevity risk exposure of a deferred annuity is always bigger than that of an equivalent immediate annuity, due to the longer time span over which mortality improvements can take place and the fact that the effect of these improvements is condensed into the annuity-paying years.

The remainder of this chapter analyses in further detail how biometric, macroeconomic and financial risks affect annuities, taking the policyholder’s perspective, unless otherwise specified.

Annuities and longevity risk

The most important annuity feature in connection with longevity risk is the duration of the payouts. Assuming that the amount of the annuity payout equals or exceeds the annuitant’s cost of living, the degree of protection against longevity risk will depend on the duration of the payout stream. In this regard, four product types, whose income streams are illustrated in Figure 12, can be distinguished:

1) Pure life annuity: In a pure life annuity contract, the benefit payments continue as long as the annuitant is alive, thus providing him/her with full and unconditional protection against the risk of outliving his or her savings. This is also the case for participating annuities.

2) Life annuity with refund features: This type of product is constructed as a pure life annuity with an additional refund feature, which is paid to the annuitant’s beneficiaries after his death. With respect to longevity risk, this type of annuity provides the same unconditional protection as does a pure life annuity.

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20 Other insurance-specific risk classes are discussed in more detail in the next chapter.
21 This is because it is the interaction of duration and yield that determines the dominating risk. For most of an annuity life, the price of the protection is more dependent on interest rate assumptions than on those for mortality rate. Only at older ages (75+) does mortality become the predominant factor.
22 Assuming that there are sufficient financial assets to match the liabilities’ duration and currency of denomination, and that in particular corporate bonds are used to back insurance liabilities.
3) Temporary life annuity (or fixed-term annuity): A temporary life annuity provides payouts for a limited, pre-specified period of time. After that time, the payouts terminate and the insurer transfers the residual longevity risk back to the individual. Were the annuitant to die before the specified period ends, the payments would terminate in advance. In other words, the annuitant is only protected against longevity risk conditional to his death occurring before the payments terminate (ex-post).

4) Annuity certain: An annuity certain has similarities to a temporary life annuity. Both contracts promise payouts for a limited period of time. However, while payouts in a temporary life annuity terminate upon expiry of the contractual term or upon the death of the annuitant, whichever is the earlier, an annuity certain continues to pay out benefits until the end of the specified period, irrespective of whether the annuitant is alive or dead. The protection against longevity risk, however, is identical under both contracts: should the policy-holder die before the end of the payout period, he has been effectively protected against outliving his savings. On the other hand, should the annuitant outlive the contract period, he bears the longevity risk himself from that point onwards.

Figure 12 illustrates the longevity risk protection afforded by different types of annuities, based on the duration of the payouts they provide.

Figure 12
Patterns of income stream for different annuity products

1 Pure life annuity:
2 Life annuity, incl. refund feature:
3 Temporary life annuity:
4 Annuity certain:

Inception of payout phase (eg 65) — Annuitant’s death (eg 73) — Refund, eg age 75 (Death benefit)*

- Beginning and end of definitive payout stream
- Possible continuation of payout stream depending on whether the agreed payout period terminates before (case A) or after (case B) the annuitant’s death

* paid as periodic payment in this example

Source: Swiss Re Economic Research & Consulting
Let’s assume that a retiree buys an immediate annuity at age 65 and dies at the age of 73. In the case of a pure life annuity (type 1) and a life annuity with refund features (type 2), the retiree receives a life-long stream of income and thus enjoys unconditional protection against longevity risk. In the cases of a temporary life annuity (type 3) and an annuity certain (type 4) the situation is different, however. Here the retiree’s protection against longevity risk depends on the duration of the payouts. Should the contract’s payout period be 6 years, for instance, the benefits will terminate before the annuitant dies under both contracts (point A in the Figure 12) and the retiree is not fully protected against outliving his or her savings. However, if the contractually-defined payout period is 10 years, the benefits continue at least until the death of the retiree (point B), and in the case of an annuity certain, even beyond this date. Therefore, under contracts 3 and 4, the annuitant is not fully protected against longevity risk.

**Annuities and mortality risk**

Mortality risk protection is not unusual for an annuity contract, although it is not a key feature of this family of products. It normally takes the form of a Guaranteed Minimum Death Benefit (GMDB), which is often offered in conjunction with a deferred variable annuity (in the US market, for instance, this is a very popular combination). The benefit is a pre-determined minimum amount that the beneficiary of the annuity will receive if the policyholder dies before the annuity starts paying out. The benefit may be equal to the higher of the current account value, or the accumulated premium payments less prior withdrawals. The GMDB typically expires either when the annuity enters the payout phase or up to ten years into that phase. In order to extend the mortality coverage, the annuitant can purchase a “term certain option”, which pays a death benefit for a certain period after the contract has been annuitised (as in examples 2 and 4 above). In fact, guarantees are very common in the UK market.

**Annuities and macroeconomic and financial risks**

Whilst macroeconomic factors do not directly affect life expectancy, they are nevertheless relevant in the context of annuity products because they have a compounding effect on the size of the funding required to back longevity risk exposure. This effect can be seen from an insurer’s perspective as the impact of adverse developments in interest and inflation rates relative to the assumptions used at the time of pricing. Conversely, taking the policyholder’s perspective, the level of inflation and interest rates may affect the decision whether or not to buy an annuity at a given time. The following examples help clarify this point further.

As Table 4 below illustrates, the same 3-year increase in life expectancy (from 90 to 93) in a low interest-rate environment (5%) produces a funding gap which is 4 times higher than in a high interest-rate environment (10%) (USD 63,010 vs 14,252).

---

²³ Many variable annuity contracts now offer enhanced death benefits, which also provide for some degree of market appreciation protection by locking in investment gains at specified dates, or paying a minimum stated interest rate on purchase payments.
Example: Impact of interest rate and mortality assumptions on estimated pension liabilities

<table>
<thead>
<tr>
<th>Retirement age</th>
<th>60</th>
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</thead>
<tbody>
<tr>
<td>Annuity payout (USD, pa)</td>
<td>100,000</td>
</tr>
<tr>
<td>Assumed death age</td>
<td>Expected: 90, Best case: 93</td>
</tr>
<tr>
<td>Residual life expectancy at retirement</td>
<td>Expected: 30, Best case: 33</td>
</tr>
<tr>
<td>Increase in life expectancy</td>
<td>10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interest rate assumption</th>
<th>Net present value of pension</th>
<th>Pension fund deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected</td>
<td>Best case</td>
</tr>
<tr>
<td>5%</td>
<td>1 537 245</td>
<td>1 600 255</td>
</tr>
<tr>
<td>10%</td>
<td>942 691</td>
<td>956 943</td>
</tr>
</tbody>
</table>

Source: Swiss Re Economic Research & Consulting

Inflation risk also plays an important role. From a policyholder’s perspective, given the long payout period of annuity liabilities, even small differences in long-term inflation levels can severely eat into the real value of the accumulated funds. A way to overcome this risk (at least partially) is to buy an inflation-indexed annuity, which offers payouts guaranteed in real terms (where available). Symmetrically, an insurer is most exposed to inflation risk in the case of a single-premium deferred annuity with real payouts guaranteed at time of signing. As inflation increases, the upfront premium received by the insurer can quickly prove inadequate to finance the agreed annuity payout.

Another fundamental risk component common to all forms of annuities is the exposure to financial market risks. Financial market risk exposure arises through the investment activity the insurer undertakes on behalf of the policyholders. Products can be structured to allow for a wider or more limited exposure to this class of risks, depending on the risk aversion of the policyholder and the insurer and on the main value proposition of the product being analysed (savings vehicle or complementary pension).

For instance, in the case of a fixed immediate annuity which is bought and sold as a private pension, the investment strategy will typically be based on fixed-income instruments of maturity very similar to the duration of the pension being paid. Matching immediate annuities in payment is relatively straightforward: most annuities have a discounted mean term of less than twenty years, for which similar-duration risk-free instruments exist in most countries. An annuity writer can therefore theoretically manage its reinvestment risk on immediate annuities to zero, provided that he has got his mortality assumptions correct (in practice, some element of reinvestment risk will always remain).²⁴

²⁴ If an actuary has under-estimated future longevity, not only are more funds required than expected, but also the opportunity to take advantage of the extra yield available on corporate bonds is missed, thus further negatively affecting the product’s profitability.

Table 4
Impact of interest rates on estimated funding gap

... and of unsupportive equity and credit markets.

The degree and type of financial market risk exposure changes when comparing fixed vs variable annuities, immediate vs deferred ones.

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Swiss Re, sigma No 3/2007

29
Deferred annuities for which annuitisation is elected are typically exposed, in the order stated, to:

- long-term interest rates: A typical deferred annuity to a forty-five-year-old man may well still be in payment fifty years later. There are no backing assets with this kind of duration, which implies an unmatchable reinvestment risk in the last twenty-odd years at least, if the payments are guaranteed (pure annuity). If mortality trends develop adversely (i.e. longevity extension), the reinvestment risk can grow further over time.²⁵

- longevity risk: Mortality developments have a greater impact on a life office in the case of a deferred annuity, since there is more time for them to emerge and consolidate. This is particularly true in the case of annuities offering a guaranteed annuitisation option (GAO).

- unmatchable inflation risk: This is particularly relevant for contracts with a deferral period of 15 years and over. A deferred annuity may be subject to a yearly capped indexation²⁶ when in payment (in the same way as an immediate annuity is), and to revaluation during the deferred period. When revaluation is also subject to a cap applicable over the entire period of deferral, some “unused” inflation allowances can be carried forward. This exposes the annuity writer to an inflation shock, which has the effect of suddenly raising the value of all deferred annuities. The longer the period of deferral, the larger the inflation risk. This risk cannot be matched: there are no assets which behave exactly like revaluation liabilities do under an inflation shock.²⁷

- inflation-linked expenses: In the case of deferred annuities and long-term contracts in general, the annuity provider is also exposed to the risk of actual administrative costs exceeding their pricing assumptions, due – for instance – to unexpected inflation spikes, which often translate into rising wages.

On the other hand, non-guaranteed deferred variable annuities are more heavily invested in equity instruments, both because the insurer has no obligation to guarantee a level benefit and because a significant proportion of policyholders opt for the lump-sum option at the end of the accumulation period.

To sum up, different annuity structures are plotted below with regard to the degree of protection they offer the policyholder against investment/interest rate and inflation risk.

²⁵ On the other hand, a closed portfolio of deferred annuities may be investment-matched as time goes by.
²⁶ Protection from inflation is provided by Limited Price Indexation (LPI) at the retail price index (RPI) with a 5.0% ceiling. In the UK, LPI applies from 6 April 1997 and includes protected rights benefits from contracted-out final salary pensions as well as personal pensions in respect of Department of Social Security rebates for the 1997/1998 tax year onwards.
Note: Assessment is purely indicative; it does not result from a properly modelled simulation.

Source: Swiss Re Economic Research & Consulting

For ease of comparison, Figure 13 refers to products with immediate payouts only. The deferral of the payout phase has the effect of increasing the insurer’s exposure to both inflation and long-term interest rate risk but does not change the policyholder’s exposure to these factors.
The impact of product design on annuity profitability

Drivers of annuity profitability

Annuities broadly share features common to other insurance products: they allow the policyholder to transfer risk (namely longevity risk but not only) while, in the case of deferred annuities with GAO, helping him to accumulate savings in a tax-advantageous and efficient way.

From an insurer’s perspective, the profitability of the annuity business underwritten will depend on the insurer’s ability both to correctly assess the risks assumed and to pass production costs on to the policyholders. The profitability of annuities is extremely sensitive to changes in the underlying assumptions, for three reasons:

- Firstly, annuities are spread products, ie insurers make money on the difference between various assumptions made at the inception of the policy and the actual experience. Therefore, annuities are geared instruments. This means that even small changes in one or more of the underlying assumptions can produce a leveraged impact (positive or negative) on the products’ return.
- Secondly, through annuities, insurers assume very long-term risks. While underwriters of P&C policies can often revise the terms on an annual basis, a mispriced annuity policy “locks in” the insurer to an unprofitable contract for decades. Symmetrically, a fully priced one locks in profits for decades, if not rebroked.
- Thirdly, being a scale business, minimum volumes need to be maintained in order to achieve desired profitability levels. However, annuity sales are extremely sensitive to changes in factors outside the insurer’s control, such as tax environment, state of the pension system, regulatory intervention and capital requirements, to recall a few influences already mentioned in the chapter on annuity markets. Unanticipated changes in such external factors may depress sales and jeopardise the profitability achieved.

Figure 14 highlights the main risks and costs that affect the profitability of annuities, taking once again the insurer’s point of view. Annuity providers generate profits out of three sources: underwriting activity, investment activity and operating activity. Each component is assessed separately to obtain a technical price for the business being underwritten, as described below; however, it is ultimately the interaction with one another that drives profitability.

Figure 14
Main risks and costs affecting the profitability of annuities

<table>
<thead>
<tr>
<th>Insurance risks</th>
<th>Financial-market risks</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longevity risk</td>
<td>Interest-rate risk/Investment risk/Unhedged inflation risk</td>
<td>Administration costs/Distribution costs/Capital costs</td>
</tr>
<tr>
<td>Persistency risk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Underwriting activity
Investment activity
Operating activity

28 The actual exposure is net of hedge positions. Similarly, investment results refer to risk-adjusted returns from alpha-generating investments.
Underwriting activity

The value proposition of longevity risk insurance is that the insured transfers his individual longevity risk exposure to a professional insurer that, thanks to the diversification effects generated by aggregating and selecting risk, can better cope with it and generate a profit out of this activity. In principle, this represents a win/win situation for policyholders and life companies alike.

When pricing risks, life insurers rely on statistical data for a certain population and, when permissible, they adjust it to reflect potential differences between historical experience and future expected mortality developments and between the population as a whole and the specific group of people they insure. Correct pricing models are critical, as the mispricing risk is high for annuities; four factors may bite into the mortality profit assumption factored in at the inception of the policy:

- uncertainty in the level of current mortality,
- adverse selection,
- unexpected systematic improvements in longevity, and
- persistency risk (for annuities in the accumulation phase only, which provide a guaranteed annuitisation rate).

These four factors are further examined below. To a lesser extent, moral hazard may also come into play if, after signing the contract, a policyholder were to change his lifestyle (e.g. he quits smoking), thus extending his residual life expectancy.

Uncertainty in current mortality tables

One of the biggest risks a life company runs is that of using inadequate mortality assumptions to manage its business. By way of example, the cost of pension annuities can be 29% higher if based on the UK mortality table PM/FA92 with medium cohort for a 65-year-old male compared to the equivalent figures based on the UK mortality table PA (90) –2 years.²⁹

Recent actuarial research suggests that simple uncertainty about current mortality rates can sway a life company’s profit margin if it writes business for older ages, as is often the case in bulk buy-outs or portfolio transfers between companies.³⁰ This is because, according to recent statistics, death age tends to cluster around a narrower range of years than in the past (the so-called rectangularisation effect). What this means is that while the probability of death within the next 12 months is, on average, rather low and stable from one year to the next before age 75 (less than 3%), thereafter it increases substantially (4.5–5.5% for the 75–77 age group; 6.2–7.7% for the 78–80 age group, and 8.5–10.8% for the 81–84 age group, 12–25% between 85–94 and over 28% for those aged 95 and over).³¹

²⁹ See R. Willets (2004), quoted in G. Jones (2004). Figures are for level annuities payable monthly in arrears from age 65, calculated at an interest rate of 2.5% per annum to approximate the net effect of interest at 5% per annum and 2.5% per annum pension escalation.


³¹ Based on official mortality figures produced by the Government Actuary’s Department (GAD) in the UK. See http://www.gad.gov.uk/Life_Tables/Interim_Life_Tables.htm.
Swiss Re, sigma No 3/2007

Source: UK GAD. The graph refers to the probability of a newborn to survive until age x (ratio of number of 
people alive between x and x+1/100 000)

Impact of adverse selection

When writing longevity business, the win/win situation for policyholders and 
insurers alike can be jeopardised if the insurer’s underwriting activity suffers 
from any of three types of distortion:

- the chance of the insured population living longer than the underlying average 
population due to small sample bias (the small-sample risk);
- the chance of the average experienced mortality of the insurers’ client base 
  differing from that of the population as a whole or from that priced at the in-
ception of the policies, due to socio-demographic factors (the cohort risk);
- the chance of mortality improvements in the population as a whole being 
greater than that assumed in pricing, which drives the average age of death 
further up (the systematic longevity risk).

While the first two types of distortion can in theory be eliminated, respectively, 
by underwriting a large enough number of identical policies (hence benefiting 
from the law of large numbers) and by having a client base that reflects the 
structure of the population as a whole (removing the cohort effect), the third 
type of risk – the systematic longevity risk – cannot be mitigated by diversifica-
tion.³²

³² However, it can be transferred either to other (re)insurers or to the capital markets. See the chapter 
“An insurer’s challenge: managing longevity risk” for more details.

Figure 15
Rectangularisation of the mortality 
curve

Adverse selection introduces distortions 
in the risk profile of the annuity portfolio.
The role of socio-economic profiles

Empirical evidence in the UK and Germany indicates that differentials in life expectancy by socio-economic group are long established and appear to have been both pronounced and consistent throughout time.³³

Unsurprisingly, the strongest differentials in mortality are to be ascribed to age. However, gender, lifestyle (a broader definition for socio-demographic differentials not measured exclusively on the basis of occupation statistics), amount of pension entitlement and location (north vs south or east vs west or rural versus metropolitan) are also recognised as playing an important role.

The financial impact of such differentials can be quite material: studies suggest that the annuity factor for a man belonging to the lower lifestyle group, with a small pension a few years away and living in the north of England may be some 33.6% lower than that of a woman belonging to the highest lifestyle group, close to receiving a sizeable pension, and domiciled in the south of England.³⁴

The correct estimation of mortality differentials is critical in pricing and reserving for pension-type annuities. This is particularly true of escalating pensions, such as in defined-benefit pension schemes run by insurance companies as part of their group business, where exposure to longevity risk is higher than with fixed or level pensions. Life insurance companies active in the run-off and bulk annuity businesses must take the mortality differentials between various types of portfolio into account to minimise the information asymmetry typical of this type of transaction.

Systematic longevity improvements

The assumptions companies make about future expected levels of mortality are particularly relevant, especially with regard to the ages 75+. Recent actuarial research in the UK, which has not yet found geographically broader backing, suggests that mortality at age 80 could improve by as much as 50% over the next 20 years (equivalent to a 3.5% improvement per annum); mortality at age 70 could fall by 75% over the next 40 years.³⁵

³³ Patterns for British males are particularly well-defined: they appear to have widened at the extremes (from 2½ years in the early 70s to 4½ years in the late 90s), despite the fact that life expectancy has improved substantially for all socio-economic groups over the thirty-year period. Such socio-economic mortality differentials are most important for writers of group business, since occupational schemes tend to have a more concentrated socio-economic profile.


Forecasting longevity trends

Over the course of the 20th century, global life expectancy at birth has increased on average by 3 months p.a. More recently, this trend has accelerated (4.5 months p.a. since the second half of the 20th century). Unanticipated improvements in life expectancy have a major impact on the funding required to meet pension liabilities. The biggest hurdle to estimating funding needs accurately lies in the fact that there is much uncertainty as to future longevity trends (see Figure 16). The two most common assumptions made when forecasting future mortality trends are either

- a constant rate of mortality improvement as currently experienced;
- a positive but declining rate of mortality improvement (somewhat implying that there is a limit to human life expectancy).³⁶

Initiatives aimed at improving the monitoring and understanding of mortality developments have been flourishing in various countries (eg Continuous Mortality Investigations Bureau (CMIB) in the UK).

Mortality projections must take into account the inherent uncertainty of projecting into the future. In some countries, they also have to take into account mortality patterns by year of birth. The reasons for these patterns are open to interpretation, but a major factor may be changes in smoking behaviour.

In 2002, the CMIB published, for the first time, not just a single projection of future mortality rates but a selection of three: the short-, medium- and long-cohort projections.³⁷

³⁶ The hypothesis of an increasing rate of mortality improvement is disputed, although medical progress may underpin extensive longevity gains.

³⁷ This is part of a deliberate move away from the false certainty of a single projection and a step towards explicit recognition of the uncertainty surrounding the course of future improvements. The impact of this particular source of uncertainty on annuity costs can range from 5.1% to 8.8%, taking a 2.5% interest rate as reference.
Persistency risk
Low persistency is defined as the likelihood of the contract not running its defined term, due to lapsing or churning.³⁸ Low persistency has two opposite effects:

- On the one hand, it prevents the insurer from fully amortising the business acquisition costs incurred upfront and from earning future margins projected at time of pricing.³⁹
- On the other hand, a lapsed contract with embedded annuity rate guarantees frees the insurer of longevity risk, since it is released from its obligation to provide a life-long stream of income to the policyholder.

Obviously, persistency is normally not an issue for immediate annuities, but it can be for those offering savings products with or without annuity rate guarantees. This is because in many markets policyholders are not obliged to purchase an annuity from the insurer with whom they are accumulating their fund. Persistency in deferred annuities is often driven by the differential between the yield earned on the contract and the current market yield. When the latter exceeds the former, policyholders are more likely to switch to other financial/insurance products.

Investment activity

Insurers usually let policyholders share in the investment return generated by investing the policyholders’ premiums on the financial markets. Alternatively or additionally, insurers may earn annual fees on the funds invested as remuneration for the asset management service they provide, especially when the whole of the investment return is accrued to the policyholders.

Insurers’ share of the investment returns tends to be a volatile source of profit, since it is highly correlated to the performance of the financial markets in which the accumulated assets are invested. Furthermore, risks and rewards are asymmetrically distributed between policyholders and shareholders of life companies active in annuity business. This is due to the fact that, while insurers normally decide on the allocation of the assets backing their technical reserves – subject to regulatory limitations –, they also customarily offer guarantees either on the principal invested or on the return they can expect or on the crediting (or bonus) rate.

³⁸ “Lapsing” refers to the termination of an insurance policy due to the policyholder having failed to pay the premium. “Surrender” refers to the termination or cancellation of a life insurance policy by the policyholder before the maturity date. “Churning” refers to the market practice of policyholders (mainly of variable annuities) surrendering or lapsing their existing policy for another at the insurance broker’s suggestion.
³⁹ Recent AM Best statistics indicate an average lapse ratio of 7.5% for the US life industry and renewal premium persistency of 85.1%. See BestWeek, 25 July 2005 for further details.
As a result, insurers retain only that part of the investment return that exceeds the minimum guaranteed return and the crediting rate. How much this is depends primarily on the extent of any guarantees, the terms of any profit-sharing scheme and the asset allocation restrictions and strategy, which in turn are often a function of competition and regulation in each jurisdiction. The extreme equity market volatility that characterised the 2000–2003 period highlighted the sensitivity of annuity earnings to the accuracy of the assumptions used and the hedging strategy adopted in relation to investment activity.⁴⁰

Impact of investment assumptions
Immediate fixed annuities provide policyholders, until their death, with a regular, guaranteed nominal income flow, regardless of the actual investment performance generated on the premiums invested.

Over the policy payout period, insurers are faced with substantial risk if they do not match the expected cash flow of their insurance liabilities with risk-free cash flows of identical duration. The basis risk that arises as a result of unmatched assets and liabilities may be due to:

- unexpected changes in the liability patterns;
- lack of adequate investment instruments on the asset side; or
- an explicit choice by the insurer not to use the hedging instruments (eg inflation and interest rate swaps), available for containing basis risk.

Whatever the reason for the mismatch, every time the current investment yield drops below the assumptions used at the time of pricing, the insurers’ margin effectively thins down. Admittedly, life contracts run for a number of years, and over such a time span insurers have a chance to recoup on lost yield, if markets rebound. However, the picture becomes particularly gloomy if low returns persist for a prolonged time. In an attempt to cope with this reality, life insurers have often resorted to employing a more aggressive investment strategy, for instance by increasing exposure to lower-quality/higher-return bonds, to stocks, to illiquid assets, or by shortening durations in an inverted yield-curve context. While this helps to address the short-term issue of achieving a certain nominal yield and accounting profits, it also means that more risks of a financial nature are brought onto the insurers’ books.⁴¹

Guaranteed annuity conversion rate
In the UK, many deferred annuity policies used to offer an option to convert the accumulated funds into an annuity at a pre-determined rate (also known as guaranteed annuitisation option or GAO). If the guaranteed annuity rates are more beneficial to the policyholder than the prevailing market rates, the insurer has to make up the difference. The risk to the insurer lies in granting such options on the basis of over-generous assumptions of interest rates and longevity.⁴⁰

Deviations from a fully matched asset/liability strategy may be voluntary or inevitable.

Guarantees can prove to be very costly.

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⁴⁰ Especially in the case of variable annuities, insurers have become increasingly aware of the need to handle the combination of financial-market and biometric risks associated with many popular guarantees (eg GMDB, GMIB, GMAB). In particular, hedging of equity risk through derivatives has become widespread practice in the US, after guarantees went “in the money” in 2001 and 2003.

⁴¹ Insurers can choose not to fully match their liabilities and invest in shorter duration or in riskier assets with the aim of achieving better long-term returns. However, this extra risk exposure requires significant additional capital to be put aside. In theory, the extra cost of capital incurred as a result of a riskier investment strategy will offset much of the additional return that can be obtained. See Swiss Re sigma No 3/2005, “Insurers’ cost of capital and economic value creation: principles and practical implications.”
This option becomes particularly attractive when interest rates fall. Given the current protracted low interest rate environment, companies have had to substantially increase their reserves in order to be able to fulfil their promises. While in principle this issue is particularly relevant to non-participating structures, even policies with participating features and a guaranteed annuitisation rate can be cumbersome, as companies are not completely free to adjust the discretionary terminal bonus to the extent necessary to finance such guaranteed terms. The failure of the Equitable Life insurance company was triggered exactly by such inflexibility.

Questioning the assumption of non-correlation between longevity risk and investment returns

The financial management of annuity reserves is founded on the key actuarial assumption of non-correlation between capital-market returns and longevity. However, if there were a correlation and this were negative, investment returns would decrease as longevity increases. This would exacerbate the insurer’s financial position, since the longevity-driven losses on the liabilities side would be accompanied by financial losses on the asset side. Three arguments tend to support the hypothesis of a negative correlation between longevity developments and financial asset returns.

- The macroeconomic argument: the countries most affected by an ageing population also tend to suffer from stalling economic growth, prolonged low interest-rate environment and lower risk spreads on capital markets.
- The domino effect argument: to back their liabilities, annuity insurers invest in listed securities. If the issuers of those securities are downgraded due to high occupational pension deficits on their balance sheets (for which they need to raise fresh capital), the share prices of those companies are quite likely to fall. Insurers holding those securities would be facing a capital loss on their investment while their longevity risk exposure increases.
- Longevity held as an asset on the balance sheet: when longevity risk is indirectly securitised (e.g. through the securitisation of equity release portfolios), it may end up as an asset on the balance sheet of another insurer who writes annuity business.

Investment policies may need to be revised to minimise unwanted correlation. Overall, annuity writers have to treat investment and mortality assumptions holistically.

42 The sustained fall in interest rates has put GAOs “in the money”, but it is increasing longevity expectations that are driving their costs higher still.
43 This is because even discretionary terminal bonuses are subject to market laws and to the expectations of policyholders, whether reasonable or not.
44 Of the arguments presented, only the first postulates a causality relationship between longevity and capital-market returns. The second and the third arguments simply assume some form of longevity exposure both on the liabilities and assets side of the balance sheet.
Operating activity (distribution and administrative expenses)

When pricing an annuity, an insurer needs to make assumptions as to the cost it will incur throughout the duration of the policy. These costs are factored into the pricing as “loadings” and reflect:
- business acquisition commission paid to the distribution network (alpha loading),
- retention and/or business renewal commissions (beta loading),
- administrative expenses and the fixed cost incurred in maintaining the infrastructure required to back the business for several years (gamma loading).

Whilst upfront acquisition costs and business retention and renewal costs are usually known with certainty, the gamma loadings can be more flexibly defined. As a result, if the insurer has lower expenses than originally factored into the pricing of the contract (for instance due to subsequent improvements in administrative efficiency), it may earn an “expense profit”. Expense profits may be an indirect way for insurers to improve the profitability of the business underwritten in highly transparent, competitive or regulated markets.

Cost loadings are usually expressed as a percentage of premiums; in reality, though, administrative costs tend to be, to a certain extent, fixed. As a result, the bigger the book of business underwritten, the higher will be the economies of scale and the potential expense profit to be reaped. However, this source of profit tends to disappear as markets become more and more competitive and concentrated.

The role of capital in defining annuity profitability

Annuity writers hold capital to absorb the risks embedded in the business they write. For example, in the EU, solvency regulations currently oblige insurers to hold a minimum solvency margin of 4%⁴⁵ of the mathematical reserves for an annuity portfolio. In some cases local regulators specify a higher solvency margin (e.g. 5% or 6%), and individual companies may hold additional explicit reserves to take account of uncertainty about future mortality improvements or to demonstrate financial strength.

Both longevity and investment risks can be systematic and represent the major driver behind the capital cost associated with this family of products.⁴⁶ In the case of longevity, uncertain cash flows arise due to statistical variations in experienced mortality and also to trend swings. Further uncertainty arises from the difficulty of finding accurately matching assets for long-duration longevity risks, in particular for the deferred annuities which come from defined-benefit pension schemes.⁴⁷

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An insurer’s cost structure, coupled with critical mass, contributes to achieving better profitability.

Annuiites’ capital costs are affected by the systematic nature of the risks assumed.

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⁴⁶ Although annuity capital costs are not as high as those of protection products if expressed as a percentage of the premium, given the effective longer duration of annuities vis-a-vis other products with higher lapse ratios, capital cost may be quite material when taken over the life of the contract.

⁴⁷ By reducing the level of uncertainty within the cash flows, the insurer should be able to reduce the capital requirements underpinning an annuity contract. Uncertainty may be reduced through reinsurance or by portfolio hedging. These aspects are fully investigated in the chapter “An insurer’s challenge: managing longevity risk.”
The example in Table 5 summarises the features discussed up to this point and may help explain how different structures can impact the profitability of the product:

- small differences between mortality assumptions and actual experience can have a large impact on the technical profitability of the business;
- investment returns will not necessarily be there to make up for the underwriting variance, especially in the case of products with minimum guaranteed returns to policyholders;
- whenever insurers can reach critical mass in the annuity business underwritten, they may be able to extract some marginal profit from active management of their operating costs.

**The importance of product design in defining the profitability of annuities**

Keeping customers satisfied while improving risk management and profitability is indeed the toughest challenge facing today’s annuity writers. A consultant identifies five dimensions which need to be assessed in a holistic way when developing a new product (Figure 17). Longer terms, wider risk coverage, stronger guarantees all come at the expense of potential excess returns to the policyholder and at a higher policy cost. Once customers come to appreciate the trade-off between protection and the potential returns they are being offered, they will be in a better position to choose between different alternatives.

### Table 5

**Annuity sensitivity to parameter changes**

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Contract 1</th>
<th>Contract 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure risk (% premium)</td>
<td>3.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Alpha loading (% premium)</td>
<td>3.5%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Beta loading (% premium)</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Gamma loading (% premium)</td>
<td>1.0%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Risk-free rate</td>
<td>3.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Equity risk premium</td>
<td>4.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Credit risk premium</td>
<td>1.3%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Investment mix:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– government bonds</td>
<td>70.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>– corporate bonds</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>– stocks</td>
<td>20.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Expected average investment return</td>
<td>3.9%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Minimum guaranteed return</td>
<td>1.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Crediting rate</td>
<td>70.0%</td>
<td>90.0%</td>
</tr>
<tr>
<td>Average solvency capital (% of premiums)</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Capital backing the business</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Up-front single premium (USD)</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Contract 1</th>
<th>Contract 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mortality profitability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk charges</td>
<td>3.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Actual experience</td>
<td>2.5%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Mortality profit to shareholders</td>
<td>0.5%</td>
<td>–0.5%</td>
</tr>
<tr>
<td>Mortality ROE</td>
<td>5%</td>
<td>–5%</td>
</tr>
<tr>
<td><strong>Investment profitability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment return</td>
<td>3.9%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Minimum guaranteed return</td>
<td>1.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Bonus (base on crediting rate)</td>
<td>2.0%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Investment profit to the shareholders</td>
<td>0.9%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Investment ROE</td>
<td>9%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Expense loading profitability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquisition cost</td>
<td>3.5%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Management cost</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Admin cost</td>
<td>1.0%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Total expenses charged to policyholder</td>
<td>6.0%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Actual admin cost</td>
<td>0.9%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Expenses profit to shareholders</td>
<td>0.15%</td>
<td>0%</td>
</tr>
<tr>
<td>Expense ROE</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Total shareholders return</td>
<td>15%</td>
<td>–2%</td>
</tr>
</tbody>
</table>

Source: Swiss Re Economic Research & Consulting
On the other hand, understanding the relative value to the customer of the five components of product design given in Figure 17 will help insurers meet their clients’ expectations in a cost-effective way. Last but not least, leveraging on the right marketing strategy will ensure that the value of the product on offer is correctly and fully appreciated by the customer.

Insurers worldwide are well aware of these challenges and have responded creatively by developing new products or innovative add-on features with the ultimate aim of rebalancing the risks and rewards between shareholders and policyholders. Some examples include:

- Abolishing the ratchet (or cliquet) option⁴⁸, for instance, which allowed Italian insurers to improve their profitability and lower their cost of capital while still offering some form of minimum guaranteed return on traditional life business. New products no longer give policyholders the option to incorporate previous years’ bonuses into the guaranteed return; the latter is only applicable at maturity⁴⁹ and on average, although bonuses in excess of minimum threshold still need to be shared according to the 85/15 rule (i.e., the policyholder receives 85% of the excess return generated under the policy).

Recent examples of product innovation aimed at coping with a tougher macroeconomic environment

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⁴⁸ Under the cliquet rule, a company is forced to credit at least the minimum guaranteed rate every year. The application of this option to the accumulated bonus pool had the effect of growing the policyholder segregated account compounded at the minimum guaranteed rate. If the yield on the segregated account fell below the guaranteed minimum, the shortfall would have to be funded by the shareholders. As a matter of fact, the return to the policyholder implicitly exceeded the guaranteed minimum. Furthermore, the rigidity in liabilities introduced with the cliquet necessitated a higher proportion of investment in bonds and severely limited asset/liability management options.

⁴⁹ This means that excess returns in one year can be used to offset shortfalls in another. Bonuses may therefore disappear altogether and are not compounded at the minimum guaranteed rate. Only when the yield exceeds the guaranteed minimum is the excess credited to the policyholders’ account, in the same way as under the cliquet option. Given the added flexibility in the build-up of liabilities, a more aggressive investment strategy can be adopted in the early years of the contract.
Allianz’s revision of terms for its US fixed annuities in July 2003, comprising lowering of minimum guarantees to 1%–1.6% and reducing commissions by 23% in order to achieve a 15% ROE on new business in the current low interest-rate environment. Allianz indicated that it might introduce performance-enhancing features, such as linking part of the excess returns to some stock market index, but it would not raise minimum guaranteed returns.

AXA Belgium’s decision to suspend offering a minimum guaranteed return for the whole duration of the contract on traditional policies. Instead, the company is willing to offer a lower guarantee of 2.75% for about 8 years with no application to future recurring premium contributions.

Winterthur decided, among other actions, to adapt its own mortality tables to reflect improved life expectancy for application to non-mandatory group life business in Switzerland. It was soon followed by a number of insurers active in the same business.

The above examples show that there are ways of designing products that are still attractive for policyholders while carrying lower costs for insurers. The anecdotal evidence in a number of countries suggests that it is normally the market leader that introduces changes to product design, soon followed by other players. One plausible reason for this trend is the fact that economies of scale manifest themselves also in the R&D process.

A survey on causes of bankruptcy amongst annuity writers

From an historical perspective based on US experience (the largest annuity market in the world), it appears that most annuity providers that encountered financial problems were actively selling two types of annuities in particular: the Single Premium Deferred Annuities (SPDA) and the Guaranteed Investment Contracts (GIC). They also often had mismatched assets and liabilities, where even short-dated liabilities were matched with illiquid or higher-risk asset classes, such as commercial mortgage loans, real estate, private placements, or below-investment-grade bonds. Even today, illiquid assets and liability optionality continue to represent a potentially lethal combination that needs to be monitored closely.


In return for an initial lump sum investment, the insurance company promises to pay the policyholder the principal invested plus the interest accrued on the same up to the maturity date of the annuity (ie when the contract value becomes due). The policyholder can often choose to have the interest rate fixed for the life of the contract (guaranteed rate) or reset it at set time intervals (adjustable rate). SPDAs have been designed as a tax-effective saving instrument, in that taxes on the interest earned during the accumulation period are deferred until the annuity reaches its payout phase.

GIC is a contract that guarantees repayment of principal and a fixed or floating interest rate for a predetermined period of time. GICs are typically issued by life insurance companies and marketed to institutions qualified for favourable tax status under the Internal Revenue Code (for example, 401(k) plans). A GIC is used primarily as a vehicle that yields a higher return than a savings account or U.S. Treasury securities. GICs are sometimes referred to as funding agreements, although this term is often reserved for contracts sold to non-qualified institutions.
Looking forward, the importance of risks affiliated with the payout phase will rise, as companies’ liabilities become more concentrated in payout products, especially if more optionality is added to these products. In particular, the risks tied to the following two guarantees will become more prominent in the coming years: Embedded Equity Guarantee (EEG) and Aggressive Payout Annuity Guarantee (APAG).

**Embedded Equity Guarantee:** consumers approaching retirement seek equity market exposure with some form of downside protection. Insurers have responded with innovative product features that are meant to meet this demand. The most popular form of equity guarantee embedded in US annuity offerings is guaranteed minimum income benefit (GMIB) and variable annuity with an investment floor.

**Aggressive Payout Annuity Guarantee:** too aggressive assumptions for mortality, interest rates, equity market returns, lapses and surrenders may lead to material losses for the insurers when the annuity enters its payout phase. The magnitude of these losses can be compounded, the earlier the insurer locks in the terms of the contract (e.g. mortality and investment return assumption).

Although mis-pricing will not lead to bankruptcy, it is likely to weaken the insurer’s capital position and reduce its overall financial strength, if a prolonged period of operating losses occurs. The reputation damage, on the other hand, will last much longer than the pure financial impact on the insurer’s accounts.

### Impact of guarantees on capital requirement and on cost of capital

As the examples above illustrate, guarantees can be offered to protect against both biometric risks and the investment risk. Although secondary guarantees can generate additional fee revenues for the insurer, they are normally priced to break even rather than to boost margins. Because of the risk transfer they entail, they can have a material impact on reserving and capital requirements, and on the cost of capital for the business underwritten.

In theory, more capital needs to be put aside if a guarantee is offered: this is because shareholders will incur a risk if the guarantee is called upon. Which form of capital should shoulder the risk embedded in such guarantees? Actuarial practice suggests either reinforcing technical reserves or putting aside additional shareholders’ funds, or both. Either way, it is ultimately the shareholders that provide that capital. It is worth noting that, on a statutory basis, if the options are “in the money”, companies need to put aside additional capital to back them, whether they are exercised or not.

Shareholders will reasonably expect to earn an extra return on the additional risk capital they have to provide to back guaranteed terms of the contracts. It therefore follows that contracts offering guarantees should be costlier than equivalent contracts without guarantees. When guarantees are not correctly...

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A guarantee may be priced, the cost will be shouldered by other policyholders (e.g., cross-subsidising of unprofitable old business by new business⁵⁴), by shareholders and ultimately, by the public at large, should the insurance company fail to meet its obligations.

Ways to limit the cost of guarantees

As touched upon in the paragraphs above, two simple approaches are available for containing the cost of guarantees: developing products with participating features and limiting the duration/scopes of the guarantees offered.

**Participating features**

In the first instance, policyholders share in the risks of the pool they belong to; hence, the cost of guarantees can be effectively reduced, whilst policyholders can still enjoy protection against the insured risks at much more attractive terms than if they were to provide for such risks by themselves. Participating policies allow risks to be shared between shareholders and policyholders via a bonus or a dividend mechanism (in the UK, the regular profit share credits are known as reversionary bonuses and the lump sum on termination of the participating policy is known as a final bonus). Companies adjust the bonuses paid to policyholders to reflect the current financial market environment and competitive pressure.

Profit-sharing arrangements on group risk products also act as a buffer against poor experience and potentially give access to higher rebates if experience is favourable.

The alternative way to mitigate the cost of guarantees is to design products with limited guaranteed duration. It has been estimated that a shift from terms guaranteed on an annual basis to terms guaranteed on average, and even better only by the end of the contract, can have a dramatic impact on the cost of the guarantee (see Figure 18).

**Limiting the duration of guarantees on investment return**

![Figure 18 Cost impact of various guarantee structures](image_url)

- **Type A**: Annual guarantee, annual crediting of excess returns
- **Type B**: Annual guarantee, excess returns credited as terminal bonus
- **Type C**: Terminal value guarantee, excess returns credited as terminal bonus

Source: Mercer Oliver Wyman

⁵⁴ The principle of equitable treatment of customers discourages life companies from pursuing this route. As a result, insurers are unable to charge more on new contracts to cover the loss-making terms of old business.
Managing longevity risk

Longevity risk is largely systematic in nature; this renders the traditional approach of portfolio diversification less useful as a risk mitigation tool. However, even if the aggregated longevity risk cannot be reduced further, individual exposures to the risk can be managed. From an insurers’ perspective, there are two risk management alternatives:

- reduce the longevity risk on one’s balance sheet by transferring it to another counterpart; or
- hedge the risk while retaining it.

The choice between these two options will depend on whether there are counterparts who are willing to take on the risk (and on what terms) in the former case and on the availability of suitable hedging instruments in the latter. These alternatives can be combined to facilitate a risk re-distribution that is acceptable to all parties involved. The following sections discuss in detail the risk-transfer and the risk-hedging options from an insurer’s point of view.

Risk transfer

Risk transfer reduces one party’s risk by ceding it to a counterpart. Up to now, the most obvious counterparts have been professional risk managers, such as other (re)insurers. However, (re)insurers’ appetite for this kind of risk is limited; the reasons (technical and strategic) for such reluctance are various:

- Bearing systematic risk is a capital-intensive business. Especially at times of limited capacity, this increases the opportunity cost of investing in other alternatives.
- As investors’ awareness of longevity risk grows, so do their concerns about the ultimate magnitude of the risk. This generates negative market sentiment towards those companies that assume large shares of this risk in proportion to their total liabilities, even when they do so at profitable terms.
- Closer investor scrutiny of the insurance business coupled with enhanced accounting transparency are limiting possibilities for cross-subsidising across various lines/products. This gives rise to a conflict between the short-term questions asked by the investor community and the long-term answers that the insurance business requires to be able to tackle longevity risk exposure.
- Product innovation in well-developed annuity markets often comes in the form of enhanced risk protection for the insured. Some of these “bells and whistles” may have exacerbated the risk of adverse selection, and reduced the appetite for this form of risk.

The role of reinsurance

Capacity for longevity risk in the reinsurance sector has historically been limited; however, as actuarial opinion converges between reinsurers, life insurers and employment benefit consultants, opportunities for commercial transaction may arise.

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Risk transfer to insurers

Longevity risk can be managed through risk transfer and risk hedging.

The role of reinsurance

Risk transfer

Capacity for longevity risk in the reinsurance sector has historically been limited; however, as actuarial opinion converges between reinsurers, life insurers and employment benefit consultants, opportunities for commercial transaction may arise.

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55 Examples are inflation-indexed annuities, guaranteed paid-in capital, guaranteed minimum payout/return, disability benefits, transferability to survivors, to mention just a few.
One possibility is to enlarge the list of risk takers to include new counterparts\textsuperscript{56}. The reasoning is that the more parties participate, the less the risk is concentrated and the easier it becomes to manage it. For this solution to be workable, there needs to be a reference price for longevity risk. This also means that a non-financial risk has to be transformed into a financial asset, as explained in the following section (the financial market solution).

In theory, governments and individuals themselves, who are already exposed to longevity risk, could also take a larger share. This is equivalent to higher retentions in traditional insurance contract terms. In the context of this study, this is referred to as the “social solution”, the practical limits of which are further analysed on the next page.

The financial-market solution

For there to be a market for longevity risk, there needs to be a reference price for that risk; the pricing process can be referred to as “financialisation” of the risk. Recently, mortality indices have been published, which could be used as a benchmark for pricing risk-transfer deals.\textsuperscript{57} The obvious advantage of such an approach is the increased transparency; the technical problem is that the risk profile of specific portfolios may differ substantially from that of the index. This is due to:

- difference between the average age of the population used to construct the index and that of the actual scheme membership;
- socio-demographic factors other than age heavily affecting the life expectancy of various populations (gender, lifestyle, marital status and income, to mention a few).

Since such a mortality index should be constructed to eliminate idiosyncrasies embedded in specific portfolios/populations, it should be as vast as possible (in terms of geographic and socio-demographic factors) in order to assure that only the un-diversifiable core of longevity risk remains; and yet, as close as possible to the portfolios that reference it, so as to minimise the basis risk (for instance, by being built on a country basis). Such an index could then become the ideal market benchmark for fair-value specific transactions/block transfers, whose price, in most cases, cannot be lower than that of the benchmark.\textsuperscript{58} In line with past experience with the introduction of other new asset classes, it can be reasonably expected that sub-indices will evolve in the course of time, which will allow a reduction in the hedge basis risk.

So far, very few have embarked on the securitisation of mortality risk, apart from longevity risk. Swiss Re issued a mortality bond in December 2003 (Vita Capital) and in April 2005 (Vita Capital II), aimed at de-risking its own exposure to rare catastrophic events which may affect mortality (e.g. a flu epidemic or

\textsuperscript{56} Ideally, a new class of real money investors, rather than risk brokers or opportunistic investors in well-out-of-the-money risk.

\textsuperscript{57} In the US CSFB publishes an index, whereas the UK has used population data to achieve the same purpose.

\textsuperscript{58} Exceptions to the rule include, for instance, the case of a benchmark referring to the US population and a transaction relating to blue-collar workers employed in an asbestos factory in Louisiana. The mortality price of the index will certainly be higher than that of the portfolio in this instance.
nuclear attack). BNP Paribas also planned to launch a survivor bond in November 2004, the first real attempt at securitising longevity risk. With a credit enhancement of AAA from EIB and excess loss risk underwritten by Partner Re, the bond was offered to the pension fund industry but has not so far made it to the market.

The social solution
Governments have been mentioned as the ideal issuer of longevity bonds. While this is the case as far as bondholders are concerned (from a credit quality perspective), it is not necessarily true for the governments themselves. Most European governments are already highly exposed to longevity risk, both directly through state pension schemes – including those for their own staff – and indirectly through top-up state benefits for the elderly with insufficient income. Sustainability of pension systems is only one item on governments’ agenda which competes with other welfare policy issues (eg education, health). As a result, governments cannot focus exclusively on elderly welfare.

Individuals could take some longevity risk back. However, self-provisioning requires life-long discipline in saving and investing, with associated issues in terms of financial understanding and changes to established consumption patterns. For an individual to undertake this alone is expensive – but to share the systematic longevity risk in a collective through mutuality, say, should not be that costly.

Risk hedging

Theoretically, the whole or the un-transferred part of the longevity risk exposure could be hedged. The principle of hedging is that expected liability cash flows can be matched with similar cash flows (in terms of duration and convexity) generated by backing assets and/or interest rate swaps. In this case the position is immunised. This can be achieved – fully or partially – in various ways:

- through interest rate and inflation swaps – at least for the (large) financial-market risk embedded in annuity products;
- by writing insurance business with exactly opposite mortality dynamics;
- by investing in stocks of companies with opposite mortality dynamics;
- by holding a longevity bond;
- through a "synthetic proxy hedge".

Whilst the first three strategies can already be pursued today, the last two are still in the development phase and, in practice, cannot be implemented in the very short term, due to the effective lack of the reference asset classes.

Risk hedging through interest rate/inflation swaps
As already discussed, annuity writers are exposed to inflation and interest rate risk for long periods. A simple yet imperfect hedging instrument is a risk-free asset with identical duration to the pension/annuity liabilities. By investing in long-term government bonds, insurers can hedge against interest rate risks.

59 By way of example, see an intervention by the Governor of the Bank of England in December 2004.
Additionally, insurance companies face a similar problem when trying to hedge the inflation risk within inflation-guaranteed annuity products. One hedging strategy is to invest in inflation-linked government bonds (ILBs).

However, a prerequisite of both these strategies is the availability of sufficiently long-dated bonds and/or of inflation-linked bonds. The markets for both these assets are currently rather underdeveloped, especially when compared to the actual demand for them; it will take a couple of years before those markets reach a critical size.

As a second-best solution, many insurers have been actively buying long-dated interest rate/inflation swaps to back their long-dated liabilities. Besides the mostly plain-vanilla instruments, more structured products – specially targeted to address the unique combination of insurance and financial risk faced by life insurers – are currently being developed.

Risk hedging by writing insurance business with opposite mortality dynamics
A theoretically perfect hedge for annuitant longevity would be a whole-of-life contract written to the same lives with premiums equal to the annuity payments and no lapses; the extra profits on the one would cancel out the extra losses on the other. Unfortunately, this hedging strategy is very difficult to implement in practice, due to the lack of mortality business on lives over 65, and is likely to remain so, since consumers usually need protection against either mortality or longevity – but not both. Some imperfect hedges are still possible, though. By way of example, consider two products, one a conventional level annuity and one a whole-life assurance to the value of the cost of the conventional annuity. The variation in cost of the two products by rate of future improvement is shown in Table 6 below.

<table>
<thead>
<tr>
<th>Mortality improvement rate</th>
<th>Conventional annuity</th>
<th>Whole-of-life assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>+3.2%</td>
<td>–1.0%</td>
</tr>
<tr>
<td>2%</td>
<td>+6.6%</td>
<td>–2.6%</td>
</tr>
</tbody>
</table>


By getting the right mix of mortality and longevity business, an insurer could reap significant benefits in terms of business diversification, although this is still far from achieving a perfect hedge.

Risk hedging by investing in companies with opposite mortality dynamics
Pharmaceutical companies, residential care homes, housing associations, bio-tech companies all benefit from extended longevity. In practice, what is suggested is that the party exposed to longevity risk takes a long position in stocks of these industries: sales of medication or services for the elderly are likely to

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80 The exact structure of the contract would determine whether the risk being hedged was the statistical variation, the implicit risk in a one-year contract, or the longevity improvement risk, which would dominate in a long-term contract.
become a growing business. The profits earned by industries that benefit from an increase in longevity can be used to offset the losses of those businesses that suffer from that demographic trend. This is defined in the present context as a “natural hedge”.

The major issue with such a hedging strategy is its inefficiency: as an insurer goes through, say, the pharmaceutical company “vehicle” to hedge its longevity risk exposure, it also takes on a lot of diversifiable company risk (credit, business etc) on the way.

Risk hedging via longevity bonds
From the corporates’ point of view, longevity bonds represent an attractive solution to the problem of potentially under-funded occupational pension schemes.⁶¹ Even companies or pension funds that are not under-funded can hold these bonds as assets on their balance sheet in order to match their pension liabilities. In this way, they can achieve two important results:

- reduce their longevity risk exposure (offsetting of liabilities cash flows against assets cash flows)
- retain their commitment to their past, present and future employees. This enhances the companies’ attractiveness as an employer.

The limitations of this solution rest on the fact that there is not a sufficiently large market for longevity bonds at the moment and the mortality experience of any given bond may differ from that of the pension scheme. Furthermore, this construct means that, by holding longevity bonds issued by another entity, companies would be replacing longevity risk with credit risk. This may not always be desirable.⁶²

Risk hedging via “synthetic proxy hedges”
Some structured finance solution (namely cash flow swaps) may be envisaged in a few years from now, which can help overcome the limits of the natural hedge strategy mentioned above. For instance, securitised pharmaceutical cash flows could be bought by insurers to offset their longevity-exposed liabilities. These hybrid securities would be traded on the market similarly to Asset Backed Securities (ABS), Mortgage Backed Securities (MBS) and other structured credit instruments. Buyers could be insurers but also pension funds, governments and all companies with some exposure to longevity risk.

The limits to this solution lie in the fact that most companies and/or managers of pension funds are unfamiliar with this type of instrument. Given the steepness of the learning curve, it is likely to take a few years for these transactions to become widespread.

⁶¹ See Swiss Re, sigma 7/2006 “Securitization – New opportunities for insurers and investors” for a general overview of the application of securitisation technology to insurance risks. See D. Blake, A.J.G. Cairne and K. Dowd, “Living with mortality: longevity bonds and other mortality-linked securities” for an actuarial view of this type of instrument.

⁶² Obviously, government bonds would present a low credit risk profile, and may fare better.
Outlook: what needs to be done?

The next steps

Though already experiencing relatively high growth rates, the market for private annuities still has a lot of untapped potential. A number of measures are on the table to foster private solutions for managing longevity risk. The following ideas summarise best practice in different countries or companies. They are divided according to the two main addressees: the state and the insurer.

What the state can do

When governments decide that it is opportune to scale down their role in pension provision, the insurance industry can “fill in the gap” by providing private solutions to longevity risk. However, experience in some countries that have transitioned from a state-based to a privatised pension system suggests that this can best be achieved by putting certain favourable conditions in place:

- Improve transparency of longevity issues by enhancing mortality tables
- Improve transparency of longevity issues by heightening people’s awareness of their extended life expectancy
- Facilitate the availability of information on people’s financial position in retirement
- Sponsor individuals’ financial awareness and education
- Provide financial instruments for hedging activities
- Help develop business volume by making personal provision compulsory or strongly desirable to eliminate adverse selection
- Set a regulatory framework for insurers and other pension providers
- Provide incentives and harmonise taxation

Improve transparency of longevity issues by enhancing mortality tables

In order to price annuity products correctly, it is essential for insurers to have a clear picture about future longevity trends. Given the fundamental difficulty of forecasting life expectancy over the full period of an annuity contract, it is even more important to gain information about the current and future life expectancy of a specific cohort population. In some countries, however, mortality tables are either hardly available at all or only with a considerable delay. By providing timely and accurate mortality tables, the state would help insurers to assess future mortality trends more reliably. While it remains in the insurance company’s own interest and responsibility to understand the mortality risk to which it is exposed, greater transparency would reduce the risk premium added to account for the uncertainty of mortality trends.

Improve transparency of longevity issues by heightening people’s awareness of their extended life expectancy

Making people aware of their own improved life expectancy may lead to a significant increase in the take-up of private pension solutions. Recent actuarial research in the UK indicates that subjective life expectations underestimate actuarial expectancies by approximately 5 years on average.
The same study also suggests that expectations about longevity significantly affect people’s decisions about buying private pensions. In particular, for every additional year of life people become aware of, the proportion of those willing to buy a complementary pension (ie a third-pillar instrument) rose by about 0.15%. If the average 5-year under-estimation error in life expectancy were to be fully corrected, voluntary pension take-up could rise to 2.25% from the current 1.5% level, a healthy 50% increase.⁶³

Facilitate information on people’s financial position in retirement
Greater transparency about people’s financial situation at retirement age would immediately reveal whether they run a risk of being under- or possibly over-funded relative to their expectations and needs. A benchmark model in this regard is the Swedish “Personalregister”. This Inland Revenue-sponsored interface, available online through restricted access, allows the future retiree to calculate his pension entitlements, taking into account all his various sources of income.

Sponsor individuals’ financial awareness and education
Private pension provision is going to become more important in most countries. By offering financial education programs, the state could encourage people to accumulate retirement savings according to their needs. The state can and should play a pioneering and supporting role in providing financial literacy⁶⁴; however, financial education programs can also be offered by employers, insurance companies and other financial institutions. In the US, for instance, company-sponsored 401(k) training for employees increased both the number of individuals participating in 401(k) occupational pension schemes and the average amount saved in such accounts.

Provide financial instruments for hedging activities
As discussed in the previous chapter, the short supply of sufficiently long-dated government bonds (30+ years) currently renders the markets for such instruments small, even more so when compared to the size of the pension assets they are meant to back (see Table 7). So far, this has been supplemented with interest rate swaps.

While many industrialised countries have started issuing 30-year government bonds, market volumes remain scarce. In the emerging world, so far only Mexico, Brazil and Colombia have issued government bonds with a maturity of 30 years. In the 50-year-maturity segment, supply is even more limited. Though issuing such long-dated bonds is under discussion in various countries, only the UK, Japan, and France have brought them into the market so far. By issuing more long-dated bonds, governments would mitigate supply shortages and support the development of private pension markets.

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A similar situation applies to inflation-linked government bonds (ILBs), an ideal solution to insurers’ inflation-hedging needs. Again, such instruments either do not exist at all or are under-supplied relative to the total pension fund assets of many markets. According to OECD data, 80% of the insurance companies in the UK already hold 80% of ILBs issues outstanding, indicating the huge demand for such products.⁶⁵

A larger ILB market would clearly improve hedging opportunities for annuity providers and would support the development of private annuity markets. This is already being discussed in the UK, Canada, Australia, Sweden, France, and Italy.

Help develop business volume by eliminating adverse selection

Longevity insurance is normally bought by those who expect to live longer anyway (adverse-selection effect). Insurers know this and reflect it in their pricing. This can make longevity insurance too expensive for the broader population to buy at current rates. As a result, demand for private pension solutions is lower than it otherwise would be, if adverse-selection were not taking place.

If longevity insurance were made compulsory for individuals (by and large as a substitute for public pensions), insurers would have a broader population to insure, and this should be reflected in lower risk pricing thanks to the pooling effect. A mandatory private pension would also lower the risk of people running out of money when governments cut public pension benefits. While occupational pensions are already mandatory in many countries (eg Switzerland and for certain groups in France and Australia), compulsion is less common for personal pensions. Australia and the Slovak Republic are the only OECD countries that had such systems implemented as of 2004.

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⁶⁵ As already mentioned, insurers have the alternative of using the inflation swap market to protect against inflation risk.
While eliminating the problem of adverse selection, making provision mandatory might introduce “cream skimming” incentives for insurers (i.e., insurers will endeavour to sell policies only to those with a favourable risk profile) when adopting a system of uniform premiums based on average life expectancy. To counteract this distortion, risk adjustment schemes are normally introduced, which lead to tight regulation, often an undesirable outcome.

On the other hand, making risk-adjusted premiums compulsory leads to a similar problem. This is because, if it were indeed possible to assess fair premiums, then there would be no adverse selection. However, this does not seem to be the case. That is why incentives that make individuals or employers buy annuities on a voluntary basis are the preferred route in many countries.

Set a regulatory framework for insurers and pension providers
Prudential supervision and regulation of pension providers is essential for the sustainable development of private pension markets. On the one hand, regulatory standards should help protect pension beneficiaries against default by their provider. On the other hand, regulation should be kept to a minimum so as not to stifle market efficiency.

In 2004, the OECD set up recommendations on “Core Principles for the Regulation of Occupational Pensions”.⁶⁶ Their primary aim is to assure the stability of the occupational pension pillar. As a result, OECD recommendations are not readily applicable to 3rd-pillar pension providers.

Provide appropriate tax incentives
While the citizens of the EU member countries have witnessed increasing freedom of movement over the last half century, the portability of pension rights within the EU still has a long way to go: different cultural approaches to pension policies are compounded by most continental countries traditionally seeing pensions primarily as a government responsibility. By contrast, the UK puts more emphasis on the second pillar of the pension system. Changes are, however, approaching fast, mostly taking the route through the European Court of Justice.⁶⁷ Since 2000, the Commission has embraced a Pan-European pension system reformation project aimed at improving sustainability of pension systems while increasing portability of pension rights.⁶⁸

Creating the right tax incentives (for instance establishing a level playing field between occupational pension contributions and private pension contributions so that the latter also follow the EET principle⁶⁹) should facilitate the sale of annuities, which “naturally” would expand the annuitant base.

⁶⁶ See http://www.oecd.org/dataoecd/14/46/33619987.pdf
⁶⁷ Following the European Community communication of 19 April 2001 on the elimination of tax obstacles to the cross-border provision of occupational pensions, the European Court of Justice has ruled on two cases concerning the tax deduction of contributions paid to foreign funds – the Danner case (Case C-136/00) on 3 October 2002, and the Skandia/Ramstedt case (Case C-422/01) on 26 June 2003.
⁶⁹ EET stands for “exempted, exempted, taxed”, indicating that pensions are exempted from taxation at the time of contribution and capital growth, to be then taxed at the time they are actually paid out. Italy provides an example of recent pension reform that goes in this direction.
However, it is reasonable to expect that part of the additional market volume generated by more savings for retirement, income and lifestyle protection would be absorbed by other savings providers (eg banks, mutual funds, other pension funds) whose core product range would not generally extend to longevity protection.

What insurers can do

Longevity gives the insurance industry an opportunity to enhance the role it plays in helping to manage society’s risks. Given that differences across countries stemming from diverse cultural, fiscal and occupational benefit environments are not going to disappear in the near future, there cannot be a “one size fits all” approach to product design.

The degree of success of any private solution will be measured by its ability to meet the policyholder’s needs and expectations in a sustainable manner. In addition to actively pursuing the hedging activity previously mentioned, this can be achieved if some preconditions are met in three core areas:

Firstly, volume of business is crucial to overcoming adverse-selection issues and to achieving the economies of scale that are so critical for the business.

Secondly, as for any product, pricing should reflect the risks assumed and should be done on an economically viable and market-consistent basis.

Thirdly, prudent risk selection implies that insurers should carefully ponder the financial implications of assuming longevity risk, especially in combination with long-tail exposure to financial-market risk.

The last two aspects are analysed below in more detail.

Product pricing

Annuity offerings have to meet the needs of the people and have to fit into the framework of social security and tax systems. Product design and pricing will remain a major challenge.

In general, to make annuities appealing, they should present a light cost structure. The most likely route to take will be via cost efficiency within smart product diversification, ensuring that consumers get exactly what they want without jeopardising the economies of scale that are so crucial for the industry. This can be achieved by:

- improving the pricing of pure longevity risk by refining actuarial techniques
- minimising administrative and distribution costs for annuities.
- excluding supplementary financial features from the basic product. This has the double advantage of keeping capital cost under control and reducing moral hazard. Extra financial benefits can still be offered as add-ons, with well-specified separate pricing (eg replicable options).
Risk selection and business model implications

Insurers may have to rethink their business model and be prepared to slice and dice risk to ensure they retain only the amount and mix they find desirable and transfer the rest to other parties. Similarly to the development of credit risk transfer techniques, opportunities for transferring and hedging longevity risk may emerge a few years from now.

When marketing combined protection against longevity risk and financial-market risks, appropriate design is essential. Life insurers find themselves squeezed between the imperative of addressing the need for protection (e.g., annuities with guaranteed features) and the financial constraints of operating in an unsupportive financial-market environment, which would dictate the abolition of any guaranteed terms. Indiscriminate de-risking of insurance products would undermine one of the core competitive advantages of insurers; however, the size of the retirement market requires insurers to ponder the potential hazard of accumulating large longevity risk exposures. A few suggestions follow on how insurers can improve their ability to meet their promises in long-tail business:

- Restricting policyholders’ investment options and removing non-risk-neutral situations can reduce the volatility of insurers’ returns;
- Improving distribution channels and consumer understanding of product features can facilitate take-up and avoid product mis-selling;
- Using capital management and hedging instruments, including traditional reinsurance and alternative financial solutions;
- Improving understanding of value creation at product level, by testing the profitability and risk exposure of each structure under a broad set of assumptions. Interactions between product lines (portfolio approach) also help in assessing the likely net impact of future scenarios on the company’s financial strength.

In principle, product development should be customer-centric. Furthermore, clearly marketing the benefits and limits of the coverage offered helps policyholders understand what they are paying for (hence enhancing comparability across offers) and helps prevent both product mis-selling (endowment policies in the UK and equity-indexed annuities in the USA are cases in point) and the build-up of unreasonable expectations based on out-of-date past experience (as in the case of with-profit products featuring discretionary bonuses, again in the UK, see the Equitable Life debacle).

Outlook: what needs to be done?

Thirdly, prudential risk analysis and selection are crucial, especially with regard to the interplay of longevity and financial market risks.

How can insurers make good on promises to pay lifelong annuities

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70 A recent strategic study highlighted that the highest value-creating segments in the personal financial assets market are risk protection and asset growth. Insurers are the market leaders in the risk protection segment. Although larger in size and less capital-intensive than risk protection, the individual asset growth segment is also the most contestable. See Mercer Oliver Wyman, “Going on the offensive”, June 2004.

Field research\textsuperscript{72} shows that easy-to-understand advice and safer investment products are needed to simplify the task of investing for retirement. The table below summarises items often found on the “wish lists” of buyers and sellers of annuities. When product design succeeds in taking both sides of the table into account, insurers are one step closer to getting a successful solution.

<table>
<thead>
<tr>
<th>What customers want</th>
<th>What insurers need to consider</th>
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<tbody>
<tr>
<td>Transparency</td>
<td>Flexibility is needed to adjust premiums to systematic changes in longevity trends</td>
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<td>More transparency and better reporting</td>
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<tr>
<td>are likely to improve investment performance</td>
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<tr>
<td>(as this reduces the scope for suboptimal allocations) and keep cost in check</td>
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<tr>
<td>Easy-to-understand product features</td>
<td>No guaranteed annuity rate from the beginning of an annuity contract, but only when the policy approaches the payout period</td>
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<td>Product modularity and flexibility (freedom to choose features and change them in the course of the contract)</td>
<td>Certain guarantees are capital-cost-intensive and need to be revised Eg: favourable conditions for lapsing policies</td>
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<td>Age-related strategy (flexible annuitisation rate)</td>
<td>ALM and CM have to reflect the systematic nature of longevity risk</td>
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<td>- Which assets class to invest in to offset long-term liabilities?</td>
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<tr>
<td>- How much and which type of capital should back this business?</td>
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<tr>
<td>Inflation protection</td>
<td>Reduction of moral hazard and adverse selection is needed</td>
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<tr>
<td>Bequest motive</td>
<td>Regulations which prescribe cross-subsidisation should be avoided</td>
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<tr>
<td>Eg: cash-back option for death within 10 years of purchase; accompanying life insurance cover to offset some of longevity risk at the cost of annuity payout</td>
<td>Eg: EU regulation on equal premiums for men and women</td>
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Source: Swiss Re, Economic Research & Consulting

\textsuperscript{72} AXA Retirement Scope, May 2005. The report can be found on www.retirement-scope.axa.com
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