International Social Security Association

Seminar on financial and actuarial bases of pension schemes

Santiago, Chile, 21-22 November 2002

The role of the actuary in the context of reformed pension schemes

Christopher D. Daykin
Government Actuary
Government Actuary's Department
United Kingdom

ISSA/ACT/SANTIAGO/02/3(a)

The role of the actuary in the context of reformed pension schemes

Christopher D. Daykin
Government Actuary
Government Actuary's Department
United Kingdom

Actuaries are best-known for their expertise in quantifying contingent risk and for the provision of advice to assist the managers and other stakeholders of financial institutions to understand and to manage their risk. Actuaries are also often experts in the design of financial security systems and in many countries their work is often as much to do with the design and management of pension schemes as with the purely financial aspects. Another key area of expertise of actuaries is in investment, particularly in relation to strategic decision-making regarding investment allocation, although some actuaries also work in active fund management roles where they are making the day-to-day investment decisions whether to buy, sell or hold particular stocks.

Pay-as-you-go defined benefit schemes

In defined benefit social security schemes one of the main roles of the actuary is to estimate the future cost of providing the benefits in accordance with the scheme rules and regulations and to advise on the different ways in which these liabilities might be financed. Where the benefits are financed primarily on a pay-as-you-go basis, actuarial projections should be seen as a vital part of the decision-making process, since promising a certain level of benefits in the law, or in scheme rules, implies a certain level of obligations in future which are more or less inescapable. Actuaries cannot predict the future, but modelling possible futures on the basis of reasonable assumptions throws light on the challenges faced by social security schemes.

Inevitability of future obligations does not necessarily imply that the amount of the liabilities is known in advance, since the eventual benefit obligation will usually depend on economic factors such as wage or price inflation and on the circumstances of individual beneficiaries, such as how long they remain in the workforce, their personal salary level, what contingent events might result in them leaving the workforce, how long they live thereafter, their family circumstances and so on. Actuarial models are used to estimate the impact of such factors, not for each individual but collectively, using a wide variety of assumptions regarding the probability of particular contingent events and distributions of relevant factors, or perhaps, in order to simplify the calculations, average values which may represent either a best estimate or possibly an estimate with a prudent margin, according to the purpose of the estimate.

For a pay-as-you-go scheme it will then often be necessary to estimate the yield of contribution income from collecting the current contribution rates, or the already legislated

future contribution rates, from the projected working and contributing population. This involves making further assumptions about the future demographic developments, activity rates for the population of working age, unemployment rates, salary distributions and so on.

For a scheme which is strictly pay-as-you-go, in the sense that there is virtually no fund at all, except perhaps a working balance to cover slight mismatches of the timing of income and expenditure, the actuary's role is to make projections of income and expenditure and to estimate the excess or shortfall, or to calculate the contribution rates which will be necessary if the income and expenditure is to be kept in balance year by year.

Many social security schemes maintain a small buffer fund, in order to avoid having to change contributions too frequently, or sometimes explicitly to level out the contributions over a period, such as with the general average premium method. A number of countries are doing something similar, not necessarily under the specific methodology of general average premium, in order to build up a demographic buffer fund from which they will be able to draw down in future years, so as to avoid the contributions rising as high as they otherwise would have had to during the period of most demographic pressure, i.e. when the ratio of numbers of pensioners to numbers of contributors reaches a maximum.

The social security legislation in many countries requires there to be an actuarial review from time to time, often every three years or every five years. Such reports represent a check on the progress of financing the scheme and enable decision-makers to consider whether to make changes to the future levels of contribution rates, or even whether to amend the fundamental benefit structure in order to keep the future expected cost at an acceptable level (Daykin, 2001a).

Actuarial reports may be prepared purely for the government of the country in question or they may be presented to the parliament or published for the benefit of a wider audience. The International Actuarial Association has recently approved a set of practice guidelines for social security actuaries which provide recommendations as to how an actuary engaged on this sort of assignment should carry out the work and present their report and conclusions (IAA, 2002). These guidelines are not mandatory; an actuary not following them precisely should not be subject to discipline by their professional body. However, it is expected that they will be seen as good practice. Actuaries will be able to insist to their social security clients that they should report in the way set out in the guidelines, and social security institutions should come to expect that persons carrying out actuarial work for them should comply with the practice guidelines and should ask for the reasons why not if an actuary does not follow them.

Actuarial involvement is essential in the design stage of a pension reform, both in relation to the structure of the ongoing pay-as-you-go social security scheme and the construction of the funded part of the arrangement. Actuarial work on the reformed first pillar is an extension to the normal actuarial work on the long term financing of the social security scheme, with the actuary being required to model the financial impact of alternative benefit structures. An important consideration may be some capability of modelling the impact of the changes on the economy, both in relation to the impact of changed contribution and financing structures for the first pillar and the potential impact of the development of a funded scheme on the economy. Econometric modelling of the transition is still at a relatively primitive stage, but actuaries should pay attention to this aspect or their work may be dismissed by economists as narrowly concerned only with the financing of the social security scheme, whereas social security reform usually has an economy wide focus.

Pay-as-you-go "notional" defined contribution schemes

There have, for many years, been some pay-as-you-go social security schemes which were structured as defined contribution schemes rather than defined benefit schemes. The best known were the French *régimes complémentaires*, which operated by allocating pension points according to the amount of contributions paid by the employee and his or her employer, with the pension point having a defined "price" at any particular time. Individuals collected pension points in their accounts until reaching retirement age, at which point they could exchange pension points for pension, again at a conversion rate specified at that time. Other schemes operating on this basis included the main contributory social security scheme in Mauritius and some schemes in French-speaking Africa.

These social security schemes operating according to *répartition par points* needed strong actuarial control, since in principle they have fewer degrees of freedom than a pay-as-you-go defined benefit scheme, where it would usually be considered possible to increase the contributions for the future or even, if necessary, to make changes to the benefits promised, given that there is generally no very close link between the contributions and the benefits. With *répartition par points* the scheme is designed to give a clear link between contributions paid in and benefits to be received, so that increasing the level of contributions will have a direct impact on the future benefit liability, since it will enable more pension points to be purchased. In practice these schemes are managed by adopting a flexible approach to the revaluation of the cost of a pension point and the value of points in terms of purchase of pension, and there may also be special designated contributions which are designed to keep the system in balance but do not give rise to the accrual of further pension points. The actuary needs to carry out projections in order to identify actions which may be necessary to keep the system in financial balance over time.

A new type of notional defined contribution scheme has recently emerged, forming the centrepiece of the pension reforms in Sweden, Italy, Poland and Latvia. Under this form of notional defined contribution, an individual account is maintained for each member in terms of real monetary amounts. Conceptually, therefore, it is more transparent, appearing to be just like a savings account, or a traditional insured money purchase pension. All contributions by the member, or by the employer on the member's behalf, are credited to the member's individual account. This is purely a book-keeping exercise, since no assets are physically held to back these accounts. The amounts in the account are accumulated each year by the percentage change in the index of average income, the percentage change in the national wage mass or some similar economic index.

Contribution income is largely used to pay benefit outgo, as under a defined benefit social security scheme operating on a pay-as-you-go basis. However, a demographic buffer fund needs to be maintained, in order to ensure that the system can be kept in balance as the population ages. Under the Swedish approach, it is necessary to carry out annual valuations of the accrued pension liabilities, as compared to the value of the future contributions, together with the assets held in the demographic buffer fund. The contribution asset is valued as the current amount of the contributions multiplied by a factor called the expected turnover duration, which is an average of the periods for which contributions are held in the individual accounts between being paid in and being used to pay benefits. The pension liabilities at a point of time consist of the total balances of the individual accounts of those who have not yet started to draw their pension, together with the present value of the future pension payments for those who are already drawing pension.

The ratio of the assets (the contribution asset plus the assets in the buffer fund) to the pension liabilities is called the balance ratio. If this factor is less than 1, the system is in a state of financial imbalance and so the automatic balance mechanism is activated. This implies that the individual accounts are revalued, not by the index of average income, as is the case when the balance ratio is more than 1, but by the index multiplied by the balance ratio, in other words the extent of revaluation is reduced in order to restore the system to financial balance (Settergren, 2001). Given that the benefit entitlements in a defined contribution scheme build up inexorably from the accumulated amount of contributions paid in, some such mechanism is needed to keep the system in financial balance. Future contributions cannot just be adjusted to meet the benefit expenditure, as under the normal pay-as-you-go financing system for a defined benefit scheme, since a change in the contributions will affect the accruing future benefits.

This is a rather different sort of actuarial valuation from that normally envisaged either for a pay-as-you-go defined benefit scheme or for a funded scheme. The methodology proposed by Settergren does not require forward projections on the basis of a large number of assumptions, but it does still require an actuarial-type assessment to be carried out on a regular basis. A fuller actuarial valuation would be all the more necessary for other such schemes which do not have such strong stabilization mechanisms as the Swedish version.

Funded defined benefit schemes

In a traditional funded defined benefit pension scheme, the role of the actuary is fundamental, as complex actuarial calculations are required to estimate the appropriate level of contributions needed to pay for the benefits. The level of contributions, and the adequacy of the assets held to meet the future costs of the accrued benefit rights, need to be kept under regular review (Faculty and Institute of Actuaries, 2001).

Defined benefit occupational pension schemes have made use of actuaries from their earliest manifestation, which is usually dated to 1743, when the Scottish Ministers' Widows' Fund was established. In the United Kingdom there was little regulation of such private pension schemes for many years, because it was felt reasonable to rely on the role of the actuary in advising the trustees, to ensure that the financial condition of the fund was monitored and that proper advice was given on the necessary level of contributions.

Apart from the test of adequacy of resources for schemes which had opted out of the State earnings-related pension scheme (contracted-out schemes), there was no general solvency or minimum funding requirement for occupational pension schemes in the United Kingdom. However, in effect a *régime* of 'freedom with publicity' operated, with the trustees of occupational pension schemes receiving regular actuarial valuation reports. This process was endorsed first through disclosure regulations, which required the trustees to make available to individual members and to recognized trade unions the report on the actuarial valuation. Later a minimum funding requirement was introduced, with the disclosure also covering the report by the actuary on compliance with the minimum funding requirement. The report on the actuarial valuation has to comply with the profession's practice standard GN9 (Faculty and Institute of Actuaries, 1997) and the calculation of the minimum funding requirement has to be in accordance with the profession's practice standard GN27 (Faculty and Institute of Actuaries, 2002).

Other countries introduced more formal requirements for actuarial valuations of defined benefit pension schemes on a regular basis, some even requiring such valuations to be carried out on an annual basis. Others permitted three or five-yearly intervals between

valuations. Solvency requirements vary considerably between countries, with some leaving a great deal of discretion to the actuary and others laying down quite prescriptive valuation methodology and assumptions and in some cases also a requirement for a solvency margin or similar, i.e. a requirement for the assets to exceed the accrued liabilities by a prescribed amount.

Actuaries advising defined benefit pension schemes have to model the probable emergence of future liabilities under the various forms of benefit payable from the scheme. Typically this is done using a multistate or multidecrement model, which enables probabilities to be assessed for different contingent events for each current member of the scheme, or for groups of members having the same age and perhaps other characteristics. These probabilities are then combined with a simplified model to estimate the future salary of the individuals which will count towards the calculation of benefit rights, resulting in an estimate of the future benefit payments. In many cases these will be continuing payments throughout the future lifetime of the individual, and there may be derivative benefits such as payments to a surviving spouse or other family members after the death of the member.

This results in a projection of the aggregate expenditure payments in each future year, which can then be discounted to provide a present value of the liabilities. This can then be compared with the value of the assets held by the scheme currently and the contingent asset of the present value of future contributions, assessed by discounting a corresponding stream of future cash-flow deriving from mandated contributions by employers and employees. In many such schemes the employer in effect pays for the balance of cost, once the employees' contributions have been taken into account, so the valuation process can be used to determine the likely necessary future contributions from the employer. In other cases the employer's contribution is made up of two parts – a standard contribution, which together with the employees' contribution is estimated to be the amount necessary to fund the benefits on some central set of assumptions, and then additional contributions or rebates arising from the state of the fund and whether some catching-up is required or the fund is already greater than was intended for this point of time.

Actuaries use a variety of different funding methods for such defined benefit schemes, with traditions varying between countries. Currently there is a general trend towards methods which are more closely based on current market conditions, as opposed to methods which were designed to create long-term smoothing and effectively ignored the current market value of the assets (Head *et al.*, 2000; Chapman *et al.*, 2001). This trend is being accelerated by developments in accounting standards, such as IAS19 (revised 1998) issued by the International Accounting Standards Committee (now the International Accounting Standards Board) and the new standard FRS17 of the United Kingdom.

Actuaries advising funded defined benefit schemes have a variety of other responsibilities, such as determining fair amounts to be transferred from one scheme to another when an individual transfers membership. The role of the actuary is also critical in cases of bulk transfers of accrued rights from one pension scheme to another, such transfers being common in relation to mergers and acquisitions, privatizations, and transfers between bodies in the public sector. There may also be calculations required in relation to options for individuals to select alternative benefits or pay additional contributions for additional benefits.

In some jurisdictions defined benefit occupational pension schemes are required to appoint a Scheme Actuary (Daykin, 1999). Among the tasks assigned to the Scheme Actuary, apart from the actuarial valuation, might be regular monitoring of the scheme's compliance with the funding requirements, advising the trustees on the appropriate level of contributions and

recommending transfer values, both for individual and group transfers. The Scheme Actuary would normally be accountable to the trustees and therefore required to keep in balance the interests of all participants in the trust, including beneficiaries and deferred beneficiaries, as well as employees and the employer. Scheme Actuaries might have a professional duty to "blow the whistle" if the pension scheme is running into financial difficulties or if the trustees or employer are failing in some material way to administer the scheme correctly according to the scheme rules and the general regulatory requirements.

Funded defined contribution schemes

With a pension reform involving funded defined contribution pension scheme it is sometimes suggested that little actuarial involvement is required, since the benefits will be what they will be. However, in order to set an appropriate level of contributions which is likely to generate a target level of benefits, a similar type of actuarial calculation is needed to that for determining contribution levels in a defined benefit scheme, albeit in some cases with a much simpler structure of benefits arising on the occurrence of different contingencies.

Design

Most privately managed pension schemes arising from pension reforms are in the defined contribution format and the majority are in contractual form. Under the contractual form, the members of the pension scheme enter into a contractual relationship with a pensions management company. The management company receives premiums or contributions from the members (often described as affiliates) and invests them in a pool of assets which is legally separate from the management company's own funds. The pool of assets usually has no separate legal personality of its own, but is managed by the management company. The management company has legal ownership of the assets of the fund, but the affiliates are the beneficial owners.

The management company is usually a proprietary for-profit company, making its profit out of the commissions or expense deductions which it is permitted to take from the contributions or premiums, or from the assets of the pension fund. The charges which it is permitted to take are normally laid down in the contract with the affiliates, although there may be some discretion to modify the charges. There is usually regulatory oversight of the management companies, including sometimes control of the nature and amount of the charges.

This structure is less vulnerable to insolvency than a corporate structure through an insurance company, since the fund corresponding to the interests of the affiliates in principle cannot become insolvent and does not demand additional capital requirements. However, the management company can become insolvent and actuarial management is required to ensure that the financing of the management company is adequate through the expense deductions and that unaffordable guarantees are not entered into or dangerous interest rate risks undertaken.

Individual projections

Once a defined contribution scheme is in place, individual members of a pension fund should ideally have access to regular actuarial calculations of their own projected benefits, with a view to determining whether additional voluntary contributions, or other forms of saving for retirement, would be needed in order to give a reasonable probability of achieving

the level of pension they desire. Most public mandatory defined contribution systems set the compulsory level of contributions at quite a modest level, so that additional contributions by individuals should be regarded as part of the design and advice should be available to individuals in order to be able to assess their need for additional contributions (Camfield, 2000; Stockley *et al.*, 1999).

Expenses

Actuarial evaluations are required to test the viability of proposed expense structures at the design stage, and to assess the necessary level of provisions each year. In the typical contractual structure, as implemented in the Latin American pension reforms, expenses are incurred at the level of the pension fund administration and management company, but deductions can usually be made from the members' contributions, and sometimes also as a percentage levy on the funds under management (annually or more frequently), as well as sometimes in other ways. Proper accounting for the contractual liabilities of the pension fund administration company requires a provision to be established for the administrative and investment expenses of maintaining the contracts for as long as they could remain in force. Generally this will be up to retirement age, although it could extend beyond that point if the pension fund may continue to manage the affiliates' investments under programmed withdrawal, depending on what the charging arrangements are for that. The provision should be net of deductions which the company is entitled to make towards expenses over that period (Daykin, 1998). Where an annuity is to be purchased from a separate financial institution it is usually reasonable to assume that the costs of the annuity payout period will be covered by charges within the annuity rate.

The effect of this will usually be that, where there is a continuing charge, or expense deduction, based on the amount of the fund, it is less likely that an accounting provision will be required, since the regular deductions can be expected to cover ongoing costs (unless the regular deduction is fixed in monetary terms, whilst the actual costs incurred are likely to rise with inflation). However, where the main or only source of income to cover expenses is at the start, when the contributions are made (this could be an initial commission charge, a bid-offer spread or a part of the contribution not allocated to units in the fund), then a proportion of those deductions should be held as a provision for future expenses, rather than being released to profit or used to cover current expenditure other than in respect of the affiliates from whose contributions the amounts have been deducted. The management of these expense provisions and general oversight of the adequacy of deductions to cover the expenses actually being and likely to be incurred, should be considered to be actuarial tasks.

Guarantees

Depending on the contractual structure, there may also be a need for provisions in respect of embedded options in the contract. These can arise where there is an interest rate guarantee, a guaranteed rate of annuity or some other form of guaranteed rate of return to the affiliate. A critical factor will be where responsibility for making good the guarantee falls. In a typical insured pension contract, payments under any guarantees are met out of the life insurance business fund, so provisions have to be established for the future cost of any guarantees as part of the technical provisions (which insurers often call technical reserves or just reserves). In many of the contractual forms of pension contract, responsibility for making good the guarantee rests with the pension management company or pension administrator, and the liability of the pension fund itself is limited to the value of the assets held in the fund. In this case the assessment of the cost of guarantees becomes an issue for capital adequacy and

financial management of the pension management company or pension administrator. In either situation it is clearly a task which should be under the control of an actuary.

Investment management

One of the most important functions in a defined contribution pension scheme, no matter what the legal structure, is the management of the investments. Strategic investment decisions should be made on the basis of a thorough understanding of the trade-offs of risk and return and in the light of clear investment objectives for the fund, including a clear understanding of the risk profile. Individual funds may have different risk profiles, particularly in jurisdictions where pension funds are allowed or encouraged to offer a choice of funds, in order to satisfy different risk appetites of affiliates or to enable them to tailor their pension investments to the duration profile of their employment and retirement prospects (life-style funds). Actuaries should typically have a part to play in strategic investment decision-making, bringing to bear skills in asset-liability modelling and stochastic modelling of investment portfolios in order to inform the decision-making process.

Performance measurement

In many countries actuaries have led the way in the development of sophisticated tools for measuring and monitoring the performance of investment managers. Performance measurement services should be independent of the fund managers, so that they can be seen to be fully objective. They also benefit from being able to track the performance of a significant number of the investment managers within a market, in order to make comparisons. Regular performance measurement reports should be made available to the managers of a pension fund and to the trustees or directors who have accountability for the fund under the respective corporate governance structure. These should then be used as a major part of the process of holding the investment managers to account and making decisions on choice of investment manager.

Annuities

Annuities are a form of insurance product, offering in effect insurance against living too long. The purchase of an annuity is a way of transforming accumulated savings into a regular pension, which will also provide a guarantee of continued payment throughout the remaining lifetime of the individual. Annuities can take many different forms, including being written on more than one life, in order to provide continuation during the life of the longer-living member of a partnership, or may offer guarantees of number of years of payment, total amount paid out, or increases in the regular amount to offset the impact of inflation.

An actuary must be responsible for the pricing of annuities at retirement age or at any other point at which an annuity can be purchased. Pricing annuities requires assumptions to be made about future levels of mortality rates for the group of individuals who have purchased annuities. This is a difficult call, since the mortality experience of annuitants is usually significantly lighter than for the general population (in other words annuitants on average tend to live longer than the average for the population), and also because in most parts of the world mortality rates at each age are reducing steadily (in other words on average people are living longer, with each birth cohort having a higher expectation of life than the previous one). In many countries there are no satisfactory statistics of the mortality experience of current pensioners or holders of annuitants (most markets are still very immature in terms of the numbers of such pensioners or annuitants). Methodologies for

projecting future mortality rates are also quite undeveloped. Standard tables of mortality used in some more sophisticated markets with well-developed pensions annuity business (such as in the United Kingdom and the United States) usually incorporate allowance for future mortality improvement, but experience has shown that the allowance for future improvement has usually not been sufficient. The Continuous Mortality Investigation Bureau of the Faculty and Institute of Actuaries in the United Kingdom has just published an important study into the application of spline smoothing methods to a mortality rate surface, in order to make projections of future mortality improvement which allow explicitly for cohort effects (Continuous Mortality Investigation Bureau, 2002).

Another area of uncertainty and difficulty for the actuary recommending annuity rates is the appropriate rate of interest to use. In principle an annuity portfolio should be backed by investments with appropriate duration characteristics, that is with a spread of maturities extending as long as the expected duration of annuity payments. Unfortunately in many countries there are no bonds available of the longer durations, which means that the annuity provider has to invest in a portfolio of assets of much shorter duration than would be preferable, and will in due course have to reinvest the proceeds of bonds on maturity, at rates of interest which will be applicable in the future and which are impossible to predict at present.

The expenses of paying out annuities must also be taken into account in pricing the contracts. So it is clear that, although an annuity is in principle a relatively simple insurance product, the proper pricing of annuities is a skilled task and one which can really only be carried out by actuaries (Daykin, 2001).

The subsequent reserving requirements of the annuity portfolio should also be under the control of the actuary, together with all aspects of the financial management of the pension annuity company, including the assessment of appropriate levels of capital and surplus or solvency margins and the ongoing process of asset/liability management. Pension annuity companies should be required to have their actuary carry out regular dynamic financial analysis (cash-flow projections of future liability payments and asset proceeds on a variety of different assumptions) in order to test the ability of the company to withstand a variety of adverse scenarios and to inform the Board of the company as part of its risk management strategy.

Draw-down (programmed withdrawal)

Although draw-down (or programmed withdrawal), as an alternative to purchase of an annuity, appears to require less actuarial involvement, since there is no new contractual commitment, in fact the individuals concerned ought to be provided with regular actuarial advice. Under draw-down the individuals maintain more control of their own investment portfolios, but have to bear their own longevity risk. With an annuity, the savings from not having to continue paying annuities to those who die early are in effect recycled to those who remain alive, so that survivors benefit from an enhanced level of return. This advantage is not available under draw-down and, although the possibility usually remains of taking out an annuity at a later date, this prospect tends to appear more and more expensive as time goes on, unless exceptionally good returns are obtained on the affiliates' remaining invested funds.

In order for individuals to be able to manage their affairs intelligently, they need to be provided with regular projections of their future financial position, on different assumptions about investment returns and their own longevity, and with projections of the options

available to them to close out their risk sooner or later through the purchase of an annuity in respect of all or part of their remaining funds.

Life and disability cover

In many reformed pension systems there are separate arrangements for continuing group life insurance and disability cover. Whether this is handled in ordinary life insurance companies or through some other mechanism, an actuary should be involved in setting the risk premiums for life and disability cover and in monitoring all aspects of the experience in order to update the technical assumptions. This type of business should be subject to the same requirements for actuarial management, reserving, capital adequacy monitoring and financial condition reporting as for any insurance company.

Regulation and supervision

Privately managed pension systems require extensive regulation and supervision by a publicly accountable body (Daykin, 1995). Regulators should also have access to actuarial advice, in order to be properly equipped to monitor and understand the financial condition of the pension fund companies and annuity companies.

Conclusion

It is clear that all types of social security and pension scheme require active input from actuaries. This is certainly true for pay-as-you-go social security schemes, whether they are constructed as defined benefit schemes or as notional defined contribution schemes. Privately managed funded pension arrangements are generally in even more urgent need of actuarial advice. This is unquestioned in respect of defined benefit schemes and most jurisdictions require extensive involvement by actuaries. For defined contribution schemes the picture is more variable, with some countries using actuaries almost as much as for defined benefit schemes and others apparently ignoring the need for actuaries, on the grounds that such pension funds are seen as pure investment accumulation vehicles.

However, notwithstanding the apparently simple structure of defined contribution schemes, there are still many aspects which require careful monitoring and control, from the perspectives both of the affiliate and the managing company, as well, of course, as the regulator. Actuarial involvement should be seen as essential in respect of the management of any guarantees and also in respect of monitoring and providing for expenses. Annuity business, which is normally associated with defined contribution schemes as at least one of the mechanisms for withdrawing payments during retirement, should be subject to full actuarial management and control, as would be the case for any life insurance company. Programmed withdrawal (draw-down) exposes the individual to potential risks relative to annuity purchase and should be accompanied by regular monitoring and actuarial projections if it is to be optimal for the individuals concerned.

An important aspect of the involvement of actuaries, both from the perspective of management, and for the comfort of the regulators, is that they operate as members of a profession. Considerable emphasis is placed on this at the international level, in discussions between the International Actuarial Association (IAA) and the International Association of Insurance Supervisors (IAIS), the International Network of Pension Regulators and Supervisors (INPRS) and the International Accounting Standards Board (IASB). The IAA is keen to see the development of actuarial associations in every country with significant

insurance and/or pensions activity. Such actuarial associations should aspire to be full members of the IAA, which means having in place a code of conduct that meets minimum requirements, an appropriate process for investigating complaints against members and disciplining them if necessary, and an actuarial education system which meets the syllabus guidelines of the IAA. This will enable the profession to move forward at a global level to be able to assure regulators and other stakeholders of the technical competence, quality and professionalism of actuaries who are qualified members of IAA full member associations.

References

Camfield, J. 2000. *An opportunity for actuaries to give advice in the context of defined contribution pension plans*, Transactions of IACA, Vol. 1, pp. 63-92.

Chapman, R.J.; Gordon, T.J. and Speed, C.A. 2001. "Pensions, funding and risk", *British Actuarial Journal*, No. 7, pp. 605-686.

Continuous Mortality Investigation Bureau of the Faculty and Institute of Actuaries. 2002. "A proposed interim basis for adjusting the "92" Series mortality projections for cohort effects", paper presented to the Birmingham Life Convention, 3-5 November.

Daykin, C.D. 1995. "Financial management and control of supplementary pension schemes", *International Social Security Review*, No. 3-4/95, pp. 75-89.

—. 1998. "Una perspectiva actuarial de los regímenes de pensiones de cotizaciones definidas", *Estudios de la Seguridad Social*, No. 84, pp. 67-104.

—. 1999. "The regulatory role of the actuary", *British Actuarial Journal*, No. 5, pp. 529-574.

—. 2001. "Reserving for annuities", background report presented to the ISSA Seminar for Actuaries and Statisticians, Montevideo, November.

—. 2001a. "The role of the Government Actuary's Department in social security in the United Kingdom", *British Actuarial Journal*, No. 7, pp. 765-790.

Faculty and Institute of Actuaries. 1997. *GN9: Retirement benefit schemes – actuarial reports*, version 6.0.

—. 2001. *The role of your actuary in your pension scheme.*

—. 2002. *Retirement benefit schemes – minimum requirement*, version 2.0.

Head, S.J.; Adkins, D.R.; Cairns, A.J.G. *et al.* 2000. "Pension fund valuations and market values", *British Actuarial Journal*, No. 6, pp. 55-142.

International Actuarial Association. 2002. IAA Guidelines of actuarial practice for social security programs.

Settergren, O. 2001. "The automatic balance mechanism of the Swedish Pension System", article originally published in *Wirtschaftspolitische Blätter*, No. 2001/4.

Stocker, M.A.; Dudley, S.D.; Finlay, G.E. *et al.* 1999. "The role and responsibilities of actuaries in the defined contribution environment in the United Kingdom", *British Actuarial Journal*, No. 5, pp. 763-800.