

# **IAA STANDARD OF PRACTICE**

## **for actuarial advice provided with respect to**

### **SOCIAL SECURITY SCHEMES**

#### **A- Objective**

Many social security systems, and especially retirement pension schemes, are presently facing major financial challenges in planning for the future due, among other things, to the ageing of populations. Important political decisions are being planned, considered and/or made. In most cases, the main concern is future long-term costs. It is accordingly vital that all demographic and economic analyses carried out by actuaries provide reliable projections of long-term future costs and financial impact on which to base these important decisions.

This standard of Practice aims at ensuring that all actuaries involved in this type of work can be relied upon to provide sound financial advice. Compliance with this standard of practice should enable the users of such advice to have unquestionable confidence in the professionalism, objectivity and scientific rigour of actuarial advisors.

#### **B- Difference between public and private schemes**

Social retirement schemes have most of the attributes of a private pension plan sponsored by an employer for its employees with five main differences:

1. social schemes are generally of a defined-benefit type (as opposed to defined-contribution);
2. they include redistributive (both intra-generational and inter-generational) measures;
3. they are generally financed on a basis (e.g. quasi pay-as-you-go) quite different from the full funding approaches normally applicable to private plans;
4. their financial security rests on the government power to tax; and
5. they are usually administered and evaluated on a fully open-end basis (i.e. new entrants are assumed for the indeterminate future).

#### **C- Scope**

##### **1. Type of scheme**

For purposes of this standard, a Social Security scheme is a government-sponsored program having the following attributes:

- (a) it is prescribed by statute;
- (b) it is almost universally compulsory for a defined population;
- (c) it provides for explicit accountability of benefit payments;
- (d) the benefits provided by the scheme are generally payable in case of, but not restricted to, old age and retirement. Government schemes providing death, disability, sickness, maternity, unemployment and/or work-related accident benefits are also covered by this standard;
- (e) the manner in which the benefits are financed is not material to coverage herein. Benefits may well be financed by general revenues or by contributions/taxes/premiums from employees, employers and/or government. The method used to determine contributions (e.g. pay-as-you-go, actuarial full-funding, partial funding, constant rate, etc.) is equally immaterial to coverage or subject to special treatment herein.

Public schemes covering government employees are not covered herein.

##### **2. Type of actuarial work**

This standard is intended to cover actuarial advice whether:

- (a) it consists of a formal actuarial report on the projected financial status of a Social Security scheme or a proposed variant thereof, or of a statement of opinion, a paper or a public presentation on policy matters (such as the adequacy of contributions and/or benefits) relating to one or more Social Security schemes;
- (b) it is provided to private sector groups (such as actuarial institutes, pressure/lobby groups) or a government (or government agencies).

**D- Principles**

This standard of practice aims at providing guidance to the actuary in producing an actuarial report, paper or presentation with the view that it respects the following principles:

1. **Scientific rigour**, e.g. ensuring that any projection model used for calculations and long-term projections is accurate and that valuation results are accurate, validated, peer reviewed and audited.
2. **Objectivity**, e.g. ensuring that assumptions are selected without undue political or external influences. A statement of opinion might relate to the inadequacy of the benefits or the inappropriateness of the financing approach (e.g. pay-as-you-go versus full funding) of a given scheme. However, a statutory actuarial report on the projected financial status of a scheme should normally avoid discussing policy matters and rather concentrate on presenting long-term cash flow projections of the scheme's financial status consistent with its existing coverage, benefit and financing provisions.
3. **Transparency, explicitness, simplicity and consistency** of the information supplied in the report. The report, paper or presentation must be easily understood by those to whom it is addressed and contain sufficient information to allow another actuary to closely replicate the results presented. The language of actuarial reports should be understood by every social security expert and every decision-maker involved in social policy. Only standard terms of social security financing should be used. A glossary of standard actuarial and technical terms is accordingly provided in Appendix A.
4. **Minimum information** to be included in the report. The differences between public and private schemes generate the need for more information in an actuarial report on a Social Security scheme, in particular detailed valuation results on a long-term cash flow basis.

**E- Compliance**

This standard of practice becomes effective DATE.

All members of the IAA must comply with this standard. However, the IAA does not intend to force/police compliance with this standard. On the other hand, any actuary must bring to the attention of the IAA the nature and extent of non-compliance by another actuary.

While actuaries are responsible for complying with this standard in providing financial advice on a Social Security scheme, they also have to take consistently into account sound actuarial principles, legal requirements and the actuarial standards specifically applicable by virtue of the local actuarial institute to which they belong. Conversely, this standard is not intended to inhibit the development of new and appropriate actuarial practices.

**F- Inclusions in actuarial reports****1. Executive Summary**

- (a) identification of the scheme
- (b) purpose of report
- (c) key assumptions
- (d) main results
- (e) main conclusions

**2. Introduction**

- (a) To whom the report is addressed
- (b) The identification of the scheme
- (c) The purpose of the investigation  
This includes a warning that projections are based on assumptions that are uncertain and therefore subject to discrepancies from actual future experience of the scheme.
- (d) The date at which the investigation is based.
- (e) The span of the projection period starting with the investigation date.
- (f) Reference to any preceding investigation where this was carried out and reported.
- (g) Date of next investigation

### 3. Description of the provisions of the social security scheme under investigation

Outcomes of investigations made into social security schemes depend largely on the provisions of the scheme. Written reports must accordingly include a description of the provisions of the existing scheme that are materially relevant to the valuation, e.g. coverage, financing, benefits.

### 4. Valuation Data

To carry out a rigorous analysis, an actuary is reliant on access, ideally in respect of each year since the scheme implementation date, to reliable and sufficiently complete data materially relevant to the valuation such as:

- the demographic experience of the scheme;
- the economic experience of the scheme such as contributions, benefits, investment earnings and assets if any;
- the number of contributors and beneficiaries of the scheme.

Actuaries are reliant on the accuracy of data and usually will take steps to verify that the information provided is consistent with other information from other sources, particularly any accounting data.

Where data is not available in the form which can best be applied for the investigation which the actuary is undertaking, then it is reasonable for the actuary to allow for this shortfall in the report as the actuary sees fit. The actuary should report on the extent of sufficiency and reliability of the data as part of the report.

Consistent with the requirements on methodology below, the report should indicate the main three areas in which data was used for valuation purposes:

- (a) starting point of the projected results;
- (b) analysis of past experience as a basis for determining the assumptions required in the valuation;
- (c) validation of the projection methodology (this is performed by comparing past experience with results obtained by applying the valuation projection methodology to the years preceding the valuation date).

### 5. Valuation Assumptions

Normally for a social security scheme, assumptions are expected to be determined on:

- (a) a realistic basis (i.e. no margins, but erring on the safe side) as opposed to a conservative or liberal basis because most social security schemes usually have a contingency fund corresponding to at least one year of benefit payments;
- (b) an explicit (as opposed to implicit) basis to the extent possible in order to consistently parallel the validation tests imposed on the valuation methodology. In this context, unemployment and GDP values might be considered implicit values, as they are normally not absolutely required in the valuation process.
- (c) a basis taking into account:
  - internal consistency, i.e. correlation/interrelationship between many of them, e.g. mortality and earnings, mortality improvements and productivity, wage and price increases, yield on assets and price increases, yield on assets and wage increases, disability incidence and unemployment;
  - overall consistency, e.g. the projected real increase in total covered earnings (or possibly the national payroll, which increases reflect economic growth), resulting from the aggregate of properly selected individual economic and demographic assumptions, must make sense compared to long-term experience and the outlook of the economy, and
  - intra-governmental consistency, e.g. total liabilities estimated for statutory actuarial purposes should essentially match those, if any, estimated for Public Accounts purposes because the objective of both underlying exercises is practically the same, i.e. realism for statutory purposes and best estimate for Public Accounts purposes.

As actuarial reports prepared for social security schemes are concerned with the very long-term future, assumptions should reflect expected long-term trends rather than giving undue weight to recent experience. Therefore, assumptions should normally be determined by giving proper weight to the following two main factors: average long-term (e.g. 50 years) past experience and the valuation actuary's long-term outlook of the demographic and economic future. Except in case of major breakthroughs, assumptions should not accordingly be expected to vary appreciably from one periodical actuarial report to the next considering that reports may have to be prepared relatively frequently, e.g. every three years or so). On the other hand, the valuation actuary's view on expected long-term trends should be allowed to change, even abruptly, from one report to the next if, for example, the investigation is done by a different actuary or if new factual

developments (as opposed to recent past experience) and/or valid reasons can justify it. Considering the above, a model framework for the determination and update of key long-term assumptions is presented in Appendix B.

Considering the uncertainty of assumptions, it is desirable that the valuation actuary consult other professionals such as economists, demographers and statisticians in deciding on what assumptions to make about the future.

Where a report is part of a series, and there have been changes in assumptions from the previous report, then the actuary should take steps to explain any material impact changes in assumptions have on the results of the investigation.

## **6. Valuation Methodology**

The methodology employed for the actuarial valuation and the financial projections should be described in a manner that provides another actuary with sufficient details, information and explanation allowing him/her to reproduce and/or replicate the results of the validation. This principle is no doubt quite demanding but the actuary should accordingly take great care in describing as precisely as possible all methods used, including indications of the extent to which they are implicit, approximate, or arbitrary and to what extent they match past experience when applied to historical data.

The annual contribution rate of a private pension plan is generally estimated by using a recognised actuarial cost method such as the entry age method or the projected unit credit method. However, as social security programs are generally financed on a quasi-pay-as-you-go basis, their contribution rate also has to be evaluated on the scheme's financing basis. In any case, however, liabilities should be estimated using a recognised actuarial cost method (ideally the projected cost method). This standard of practice recommends, but does not require, that in any event (e.g. irrespective of the applicable financing approach) the actuarial report include full funding results.

Ideally, the computer model used to simulate the long-term financial projections should include algorithms dealing with the validation of valuation results, which would normally work by setting and arranging the starting date of projections to precede the valuation date. Methodology should be designed in such a manner that its quality/validity is consistent whether it deals with the past or the short, medium or long-term future.

## **7. Valuation results**

Ideally, results should in any case, irrespective of the applicable financing method, be produced and shown on a cash flow basis by individual calendar and/or fiscal year in respect of both the past experience of the scheme and the valuation projection period.

- (a) Population by age groups and sex and in total
- (b) Dependency ratios
- (c) Proportions and numbers of earners (annual employment rate) by age groups and sex
- (d) Proportions and numbers of contributors by age groups and sex
- (e) Employment earnings by age groups and sex, and averages
- (f) Contributory earnings by age groups and sex, and averages
- (g) Pensionable earnings by age groups and sex, and averages
- (h) Benefit eligibility rates
- (i) Proportions electing retirement by age and sex
- (j) Proportions retired (prevalence of retirement) by age and sex
- (k) Disability incidence rates by age and sex
- (l) Disability termination rates by age and sex
- (m) Proportions married in the population
- (n) Proportions married among contributors and retirees
- (o) Proportions married at death
- (p) Contribution rate
- (q) Pay-as-you-go-rate
- (r) Full cost rate (recommended but not required)
- (s) Funding ratio (recommended but not required)
- (t) Unfunded liability (recommended but not required)
- (u) Contribution rate and/or annual contribution required to amortise the unfunded liability over a certain number of years (recommended but not required)
- (v) Contributions

- (w) Investment earnings (if any)
- (x) Other income (if any, e.g. tax transfers)
- (y) Total income (contributions + investment earnings + other)
- (z) Benefits (by type and in aggregate)
- (aa) Administrative expenses
- (bb) Total expenditures (benefits + admin. Expenses)
- (cc) Fund (alternatively identified as account, reserve, etc.), if any
- (dd) Fund/benefit ratio (recommended but not required)

#### **8. Analysis of valuation results**

- (a) Sensitivity analyses e.g. low, medium and high cost estimates, sensitivity studies, statistical variations (possibly determined using stochastic approaches) in main/key/aggregate results, etc.
- (b) Reconciliation of results with those of the previous investigation
- (c) Validating results internally (internal consistency, comparing with the results of a companion micro/macrosimulation model, comparing projected earnings with the ultimate internal rate of return,), externally (audit)
- (d) Providing explanations on the pattern of financial projections over the years (ageing of the population, maturation of the scheme, recent changes in the scheme financing or benefit provisions, etc.)
- (e) Effect, if material, on valuation results of events subsequent to the valuation date
- (f) Assessment of risks

The valuation actuary should provide an assessment of the probability that the designed scheme will not be able to deliver what it promises due to some identified risks such as:

- The state cannot afford to pay all beneficiaries.
- The state cannot find the beneficiaries, or contributors.
- The state cannot collect the required contributions.
- Uncertainty of the economic conditions underlying the very long-term nature of social security programs.
- Administrative errors such as improper investment return allocation.
- Doubtful quality of administrative records leading to inaccurate determination of benefits and contributions.

#### **9. Conclusions**

Actuarial reports prepared for purposes of presenting the financial status of a social security scheme should avoid discussing policy-related matters, even if they would relate exclusively to the financing approach. The design of the financing approach is a policy-related matter. The report should concentrate on pinpointing, irrespective of the scheme financing approach, the demographic and economic factors that jeopardise the scheme's sound financial status in the long-term. In any event, the valuation actuary must pinpoint any flaw in the financing approach that could result in the scheme being financially unable to deliver the promised benefits term, but should avoid making recommendations on how it could be fixed.

#### **10. Attestations**

- sufficiency and reliability of data;
- adequacy and appropriateness of assumptions;
- consistency of methodology with sound actuarial principles, and
- compliance with and departures from the local and the IAA standard of practice.

#### **11. Signature and Date**

## Appendix A

### Glossary of standard actuarial and technical terms

Social security scheme	Private scheme	Assumption
Methodology	Actuarial cost method	Cash flow projection
Economic	Demographic	Actuarial report,
Financial	Projection period	Financial projections
Economic growth	Data	Inflation
Unemployment rate	Financing	Funding
Financing approach	Pay-as-you-go financing	Full funding
Partial funding	Funding ratio	Contributions
Benefits	Investment earnings	Investment yield/return
Internal rate of return	Account, fund, reserve	Liability
Unfunded liability	Fund/benefit ratio	Replacement ratio
Contributory earnings	Pensionable earnings	Contribution rate
Employment earnings	Salaries / wages	Payroll
Average annual participation (in the scheme) rate		
Average annual employment rate		
Employment rate on a given date (instantaneous)		

## Appendix B

### Key Ultimate Assumptions: determining and updating a model framework

<b>MODEL FRAMEWORK</b>	
<b>c=2%</b>	Annual rate of increase in the consumer price index, or inflation increase
<b>s=3%</b>	Annual rate of increase in average covered/contributory/pensionable/insured employment earnings
<b>h=0.5%</b>	Annual rate of increase in population at working ages; the level of this rate depends upon the demographic assumptions, i.e. starting mortality level "q", future mortality declines "d", fertility "f" and net immigration "m"
<b>e=3.515%</b>	Annual rate of increase in total covered/pensionable/contributory/insured earnings, i.e. $(1+s)*(1+h)-1$
<b>p=80%</b>	Participation rate in the scheme, i.e. annualised proportion of population contributing at working ages. This is assumed constant for purposes of the framework but the number of participants and their covered earnings increase each year by virtue of values assumed for "s" and "h".
<b>y=7%</b>	Yield or rate of return on assets

#### 1. Determination of the framework presented in the box above

The set of key ultimate long-term assumptions can generally be set keeping in mind that, although the absolute value of each assumptions must make sense (e.g., for CPI annual increases, % would appear too low and 5% would normally appear too high), their relative value (e.g. real investment return, i.e. difference between the yield on assets and the increase in the CPI, and real earnings increases, i.e. the difference between the increase in average earnings and that in prices) is of utmost importance. Assumptions regarding unemployment and GDP values are not contemplated herein as they are deemed implicit (as opposed to explicit) values not absolutely required in the valuation process.

##### (a) Increase in prices/inflation/CPI (**C**)

The increase in the CPI (re: inflation) is first determined, 2% currently being a realistic level.

##### (b) Increase in average covered employment earnings/salaries (**S**)

The increase in average earnings is then determined by adding 1% to the assumed CPI increase, in line with an assumed "productivity" rate of 1%. This means that the assumed absolute ultimate increase in average earnings is 4.

##### (c) Nominal (versus real) rate of return on assets (**y**)

The nominal (versus real, thus still annual effective) yield "y" (versus "r" for real) is determined by adding to the assumed increase in the CPI the assumed real rate of 3% (suitable for a portfolio exclusively composed of long-term federal government bonds) or of 4% (suitable for a plan with a diversified portfolio). (One must realise that the rigorously scientific measure of the effective rate corresponds to the geometric relationship " $(1+c)*(1+r)-1$ " rather than to the arithmetic relationship " $c+r$ "; however, the arithmetic relationship is used because of its extended usage by the financial/economic/actuarial communities). In any event, the assumed effective yield on assets should normally never be allowed to be less than twice the assumed CPI increase because a sensible investor would not normally accept a negative real return after income taxes (here, a 50% maximum marginal tax rate is presumed).

##### (d) Mortality rate (**Q**) and mortality declines/longevity improvements (**d**)

In accordance with a still not yet substantiated theory, the assumed mortality declines (i.e. longevity improvements) should be determined in such a manner that their long-term (about 100 years) effect on the valuation results match the effect of the "productivity" (real increase in

average earnings) assumption. Under this theory, longevity improvements cannot take place without parallel sustained productivity increase). For the 21st century, the aggregate annual mortality decline matching the assumed "productivity" of 1% is about 0.5%.

(e) **Fertility (f) and net immigration (m)**

Higher fertility and/or net immigration reduce costs for a plan financed on a pay-as-you-go basis but have a minor effect (e.g. children benefits, age distribution of contributors) if financing is on a fully funded basis. Normally, an increase in assumed fertility would reduce pay-as-you-go costs mainly because the resulting increase in population is deemed to participate in the labour force to the same extent as assumed without/before the fertility increase. However, this should not be taken as an automatic presumption because increased (demographic) human capital does not necessarily mean increased (economic) dollar capital and production. For example, by the mid-1990s, the 1945-1965 Canadian baby boomers had all reached the labour force (they were then 30 to 50 years of age) but the increase in total employment earnings in Canada had not been higher than it was before all baby boomers reached working ages. Indeed, earnings have increased by no more than 2% annually after 1990 while they used to be around 8% in the 1980's, 12% in the 1970's and 10% in the 1960's.

Consistent with the not-automatic relationship between human capital and economic capital variations, the annual increase in aggregate covered/insurable/contributory/pensionable employment earnings "e" resulting from the set of key economic and demographic assumptions (and which happens to correspond to the internal rate of return for a stabilised earnings-related plan financed on a pay-as-you-go basis) should be carefully reviewed to ensure that it does not go against the aggregate long term outlook of the economy. Some key assumptions might accordingly need revisions (e.g. "s" might need to be reduced until all baby boomers reach retirement).

Select assumptions (in respect of the period from the valuation date to the year to the year during which assumptions become constant/ultimate) are normally determined by simple interpolation between current experience and ultimate assumptions.

2. **Updating the framework values**

Values in the box above are deemed to provide a reasonable framework for such purposes. However, as time goes by, developing experience requires that key long-term assumptions be reviewed and, if deemed necessary, revised. This process is discussed below.

Due to the extensiveness (e.g. over 75 years) of the valuation period and the usual shortness of the time lag between two valuations (e.g. 3 years), there is a need for much stability from one periodical actuarial report to the next in the selection of key ultimate long-term assumptions. To ensure compliance with such sensible principle, the following simple approach could be used as a general guiding factor:

- (a) The absolute guidance value of a key ultimate assumption is determined as the sum of 2/3 of its most recent actual 50-year average value plus 1/3 of its most recent actual 25-year average value. A weight of 2 (out of 3) is accordingly given to the deemed (50 years) long-term experience, and a weight of 1 (out of 3 still) to the deemed (25 years) medium-term experience. The role of the medium-term experience in the formula is to give some recognition to developing trends. It must be remembered that the result is a guidance value which needs to be fine-tuned in some respects such as rounding, proper weight to be given to changes in the valuation actuary's outlook of the long-term future, absolute values already used in previous actuarial reports, etc. In any event, one of the advantages of this approach is that the readers of the actuarial report may easily develop limited ranges within which assumptions of the next report are expected to fall barring extraordinary developments (e.g. medical breakthroughs such as the contraceptive pill in the mid-1960s).
- (b) The above approach might prove to be especially useful in providing a relative guidance value for the change that a given key ultimate assumption should be subject to for purposes of a given actuarial report in comparison to the value used for that assumption in the previous report. For example, the approach could provide a current guidance value of 0.7% for the assumed real productivity increase while it were providing a value of 0.8% three years earlier in connection with the previous actuarial report. The approach thereby strongly suggests that for the current report the assumed real productivity increase should be that assumed for the previous report (let say 1%) reduced by 0.1%, which would provide a guidance value of 0.9% for the current report.