

# Expert Actuarial Evidence

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## **Introduction**

This chapter outlines the areas in which actuaries may provide expert evidence in court cases. As with many types of experts, actuaries will often provide expert opinion or evidence by way of a written report. The provision of this report may suffice but in some circumstances actuaries may be called to court to give evidence.

### **Actuarial skills and work**

Relevant skills attributable to actuaries are

- knowledge and use of probability and statistics
- time value of money, allowing for inflation and investment return
- conversion of an uncertain stream of payments into an equivalent lump sum
- classification of risks

Traditionally, actuaries work in areas such as

- Superannuation and pensions
- Life Insurance
- General Insurance
- Health Insurance
- Investments and Funds Management

Actuaries may be required to give specialised evidence in cases dealing with these areas, for example in commercial disputes. However these areas form a relatively small part of work done by actuaries when providing expert evidence. Evidence in such cases will be guided by the actuarial principles and practices in these areas, which are beyond the scope of this chapter.

This chapter is then concerned with areas in which actuaries more frequently provide expert evidence. These generally relate to the following areas

- Loss of income
- Loss of superannuation
- Family law
- Cost of future expenditure
- Cost of funds management
- Valuation of life interests

## **Codes and guidelines**

### **Institute of Actuaries of Australia**

In Australia, actuaries are represented by the Institute of Actuaries of Australia. A Fellow of the Institute of Actuaries of Australia (FIAA) must have either completed the Institute's education program, or have been accredited by an equivalent overseas actuarial association. Some roles can only be performed by a Fellow with a minimum of 5 years of relevant experience; such as being an Appointed Actuary under the *Life Insurance Act 1995* and *Insurance Act 1973*.

An Associate of the Institute of Actuaries of Australia (AIAA) has completed two of the three parts of the Institute's education program. A change proposed by the Institute would enable Associates to be considered "actuaries"; this change would also involve some strengthening of the requirements to become an Associate. At the time of writing this designation is confined to Fellows.

Expert actuarial evidence has usually been provided by Fellows. However, outside of specialised evidence in traditional actuarial areas, this is not a formal requirement.

### **Code of Professional Conduct**

In addition to the Expert Witness Code of Conduct that applies to all expert witness matters, the Institute of Actuaries of Australia has a Code of Professional Conduct to which all members are required to adhere when giving actuarial advice.

The Code's requirements correspond closely to those of the Expert Witness Code of Conduct as shown in the table below.

<b>Institute of Actuaries of Australia Code of Conduct</b>	
<b>Guidelines for Expert Witness</b>	<b>Institute of Actuaries of Australia</b>
General duty to the Court	Requirement of impartiality (§5.3.1)
Qualification of expert	Relevant experience (§5.2)
Statement of issue	Terms of reference (§6.2.1)
Assumptions of fact	Disclosure of material information relied upon (§6.2.3)
Justification of opinions	Sufficient information to allow evaluation of recommendations (§6.2.2)
Qualified or not concluded opinion	Relevant experience (§5.2) and adequate addressing of uncertainties (§6.2.4)
No omission of materiality	Judgement on all material matters (§6.2.3) and qualification of constraints in assumptions (§6.2.4)
Change of expert opinion	Revisions (§6.4.3) and replacement (§6.5.2) to actuarial reports

## Professional Standards

In some circumstances, actuaries are bound by Standards. These may be Professional Standards issued by the Institute of Actuaries (available at [www.actuaries.asn.au](http://www.actuaries.asn.au)), or Prudential Standards issued by the Australian Prudential Regulatory Authority (available at [www.apra.gov.au](http://www.apra.gov.au)). These outline the mandatory practices and requirements for regulatory actuarial advice including investment performance measurement, superannuation investigations and insurance liability valuations.

Actuaries may also be guided by Institute Guidance Notes which clarify best practices with regard to methodology, assumption setting and uncertainties.

## Past loss of income

### Introduction

*Past loss of income* is the difference between the past net income that would have occurred had it not been for a particular incident and the earnings that have actually occurred.

A few examples of where losses of past income calculations may be required are:

- An individual sustaining an injury which impaired their past work capacity
- A business suffering loss of profits due to an insurance event
- A retrospective correction to employee benefits

### Method

In assessing the loss of income it is necessary to compare two streams of income. The loss is the difference between the

- “But-for” incident income stream (i.e. the stream estimated if the incident or injury had not occurred); and the
- “Despite” incident income stream (i.e. the stream estimated with the incident or injury having occurred)

Both “but-for” and “despite” incident earnings are assessed net of applicable income tax. Loss of past income is then determined as the difference between the two. A separate allowance for interest may be made in addition to the loss of past income.

### Restitutio in integrum

The fundamental principal of loss calculations is known as *restitutio in integrum* (restitution to the original position) whereby plaintiffs should be awarded sums of money as will restore them to their position had there been no wrong committed. In this respect it is critical that “but-for” scenarios be realistic, feasible and consistent with the individual’s circumstances.

To accomplish this, income streams are often projected with reference to objective data such as relevant substitutes (comparable employees, businesses or Awards/Agreements), earnings statistics (average earnings for the population, or for a particular occupation) and inflation indicators.

## **Taxation and other adjustments**

Several adjustments to gross earnings (“but-for” or “despite” incident) may be needed to arrive at a realistic quantification of an individual’s net benefit. These include:

- Addition of non-salary income (i.e. allowances, overtime, fringe benefits)
- Addition of business earnings attributable to the individual’s efforts, regardless of their form [*Husher v Husher* (1999) HCA 47]
- Deduction of any income to be repaid (i.e. social security benefits, workers’ compensation benefits).
- Deduction of expenditure necessarily incurred in realising the assumed income (i.e. transport expenses, education)

After adjustments are made, taxation at historical rates is applied, with allowance for offsets or rebates receivable, to give an accurate and realistic indication of past net income streams.

## **Increases**

Unlike losses of future income, past income streams include an explicit allowance for increases in income due to general inflation, contractual indexation or promotion. These increases are often estimated with respect to the individual’s circumstances but can be supplemented or supported by relevant earnings data and statistics.

## **Tax on Workers’ Compensation payments**

In some cases, injured workers receive payments of weekly income replacement benefits. Workers receive these payments net of income tax. However should the injured worker then receive a lump sum settlement of losses, they must fully refund the weekly compensation gross of taxation. The difference, that is the tax paid on weekly compensation, then represents an additional loss. This amount is often referred to as a *Fox v. Wood* component [*Fox v Wood* (1981) 138 CLR 438].

## **Penalty interest**

Separate allowance for interest may be calculated as compensation for the delayed receipt of income by the individual. Depending on the type of action (for example, breach of contract, loss of income) and the jurisdiction, these calculations may be performed on a number of different bases:

- Using rates legislated by each jurisdiction (i.e. penalty interest rates legislated by state Supreme Courts) or commercial fixed interest rates relevant to the circumstances
- Commencing at the date of initial proceedings (i.e. Victoria) or the date of detriment
- Simple interest basis (i.e. losses arises from injury) or compound interest basis

## **Future loss of income**

### **Introduction**

*Future loss of income* is the difference between the future net income that would have occurred had it not been for a particular incident and the future net income that will now occur.

A few examples of where losses of future income calculations may be required are:

- An individual sustaining an injury which is expected to impair their work capacity
- An income protection policy pay out

## **Method**

Future income streams, both “but-for” and “despite” the incident, are assessed net of taxation and other adjustments. A discounted cash flow method is applied to each income stream where each future period of income is discounted to present value by an appropriate multiplier. This multiplier incorporates the duration and frequency of the income, the effects of discounting and possibly mortality.

Loss of future income is then determined as the difference between these two discounted values, with further deductions for vicissitudes then made to allow for contingencies not explicitly incorporated.

## **Similarities to past losses**

As for past losses, income scenarios must be feasible and make realistic adjustments for gross earnings adjustments and taxation. A common technique that greatly aids internal consistency (and one that is mandated for future losses due to injury) is to express future income in current dollar values and apply a “real”, as opposed to a nominal, discount rate. The “real” rate is an appropriate rate net of inflation. By using a real discount rate, we avoid the need for a projection of inflated cash flows, which would then be discounted by a nominal (gross of inflation) rate.

If taxation or other adjustments are to be made, they must be applied to future income directly and not the discounted sums. This can be accomplished most easily if income is expressed in current dollar values, making any other adjustments as necessary and then applying known taxation rates.

## Prescribed discount rates

In the calculation of economic loss arising due to injury, statutory discount rates must be used. These discount rates are intended to incorporate the effects of inflation, wage growth and tax arising on sums awarded. Application of these discount rates therefore requires future income (including any explicit promotions or career progression) to be expressed in current values.

### Statutory discount rates as at August 2008

Jurisdiction	Workers' compensation	Transport accidents	Professional and public liability
New South Wales	5% <sup>1</sup>	5% <sup>2</sup>	5% <sup>3</sup>
Northern Territory	n.a	5% <sup>4</sup>	5% <sup>5</sup>
Queensland	5% <sup>6</sup>	5% <sup>7</sup>	5% <sup>8</sup>
South Australia	3% <sup>9</sup>	5% <sup>10</sup>	5% <sup>10</sup>
Tasmania	7% <sup>11</sup>	7% <sup>11</sup>	5% or 7% <sup>11</sup>
Victoria	3%, n.a or 6% <sup>12</sup>	6% <sup>13</sup>	5% <sup>14</sup>
Western Australia	6% <sup>15</sup>	6% <sup>15</sup>	6% <sup>15</sup>

- Workers Compensation Act 1987, s151J applies to damages on or after 1 February 1990
- Motor Accidents Act 1988, s71 applies to accidents occurring between 1 July 1987 and 8 July 1999  
Motor Accidents Compensation Act 1999, s127 applies to accidents occurring from 8 July 1999
- Health Care Liability Act 2001, s11(2) applied to cases commenced between 1 July 2001 and 20 March 2002  
Civil Liability Act 2002, s14(2)(b) applies to cases commenced from 20 March 2002
- Motor Accidents (Compensation) Act, s4(1) applies only to injuries to non-residents of the Territory
- Personal Injuries (Liabilities and Damages) Act 2002, s22 applies to damages from 1 May 2003
- Supreme Court Act 1995, s16(1) applies to damages from 13 November 1981
- Motor Accident Insurance Act 1994, s55B applies to damages between 1 October 2000 and 9 April 2003  
Civil Liability Act 2003, s57 applies to damages from 9 April 2003
- Personal Injuries Proceedings Act 2002, s52 applies to damages between 18 June 2002 and 9 April 2003  
Civil Liability Act 2003, s57 applies to damages from 9 April 2003
- Workers Rehabilitation and Compensation (General) Regulations 1999, s13(1) applies to all damages from 1 December 1999 but only for redemption of liabilities by agreement. South Australia does not have common law settlements for workers compensation
- Civil Liability Act 2003, s55 applies to accidents occurring from 8 February 1987
- Common Law (Miscellaneous Actions) Act 1986, s4(1) applies to causes of action from 18 December 1986  
Civil Liability Act 2002, s28A applies to causes of actions from 15 December 2005
- Accident Compensation Act 1985, s135A(14) & 135C apply to employment before 12 November 1997  
Accident Compensation Act 1985, s134A(1) applies to employment between 12 November 1997 and 20 October 1999  
Accident Compensation Act 1985, s134AB(32) applies to employment from 20 October 1999
- Transport Accident Act 1986, s173 applies to damages payable before 1 January 1987  
Transport Accident Act 1986, s93(13) applies to accidents from 1 January 1987
- Wrongs Acts 1958, s281(2) applies to damages from 23 October 2002, excluding dust and tobacco related awards
- Law Reform (Miscellaneous Provisions) Act 1941, s5(1) applies to damages from 18 August 1986

Economic loss calculations that predate the effect of the applicable legislation often require the use of a 3% discount rate [*Todorovic v Waller* (1981) 150 CLR 402].



## **Non-prescribed discount rates**

In circumstances where the discount rate is not prescribed it is usually determined by the actuary. Such circumstances include: life interest cases; breach of contract; TAC recovery from an employer. The general principle is to set the discount rate at the pre-tax, market return of assets that would otherwise be necessary to fund the future losses in question.

## **Mortality**

Deductions for mortality can be incorporated directly into the multiplier applied to future income. "Prospective" life tables (which provide for future improvements in life expectancy) are preferred as the best available evidence of future mortality [*Golden Eagle International Trading Pty Ltd v Zhang* (2007) HCA 15] with adjustments made accordingly depending on the claimant's assessed health.

In practice, Australian mortality rates are low prior to usual retirement ages, but begin to climb significantly from ages in the sixties. Consequently, mortality before retirement is minimal and is often ignored in the multiplier. Instead, it is included as a deduction from final discounted sums. This approach is required for the calculation of loss arising from injury in many Australian jurisdictions and is becoming common practice in others.

## **Vicissitudes**

When making awards for loss of future income, deductions must be made for the risk that income would have been disrupted by vicissitudes such as unemployment, disability and strikes. Deductions for vicissitudes are most commonly applied by Australian courts as a deduction from the final discounted sum, with little, if any, actuarial involvement. Alternatively, it would be possible to allow for such vicissitudes in the multiplier itself.

## **Loss of superannuation**

### **Background**

Since 1992 employer funded superannuation has been compulsory for most Australian employees. In most cases where there has been a loss of earnings, superannuation is then likely to represent an additional head of damage.

### **Accumulation funds**

In an accumulation fund, an employer makes superannuation contributions on an individual's behalf. The balance in the fund then accumulates with investment earnings, and is subject to fees. The Superannuation Guarantee Act specifies the minimum level of employer contribution (which since 1 July 2002 has been 9%) and which components of remuneration attract contributions.

Employer contributions, net of expenses, are presently subject to 15% tax. Prior to 1 July 2007 lump sum benefits on retirement were also taxed. However for most accumulation funds, the lump sum benefit is now tax-free.

## **Defined benefit funds**

In a defined benefit fund, the member's final benefit is not an accumulation of contributions made through-out a working life. Rather, it is calculated using a defined formula. This formula is often in the form of a percentage of final salary multiplied by years of service. Many defined benefit funds also require contributions from the member.

The benefit formula varies depending on the fund, the level of member contributions, the date of commencement and the total duration of membership. Valuation of the loss of superannuation entitlements in a defined benefit fund therefore requires a tailored application of the scheme's rules to compare the difference in final benefits and the level of member contributions that would have eventuated but-for the injury. Most defined benefit funds are now closed to new members.

## **Method of valuation - RTA v Cremona**

It appears that there is no uniformly accepted method for calculating loss of superannuation. [see section 5.3.6 of *Assessment of Damages for Personal Injury and Death*, 4<sup>th</sup> edition - 2002, Harold Luntz, Butterworths]. However in RTA v Cremona [2001] NSWCA 338, the NSW Supreme Court and Court of Appeal accepted the following method of calculating superannuation loss in an accumulation fund:

- allow for annual contributions at the current rate, without explicit allowance for future inflation in relation to the level of contributions.
- use a future crediting rate of 11%, which was the average return over the previous 10 years, at the time of judgement, according to a survey by InTech
- the gross lump sum at retirement is then discounted to present values using the common law rate of 3%
- the present value of the gross superannuation lump sum is then taxed using the current tax thresholds and rates.

Since 1 July 2007 most superannuation benefits arising from accumulation funds are not subject to tax. Accordingly, the last point is now largely not relevant.

In applying this framework it would now be necessary to use a statutory discount rate, rather than the original 3% common law rate, to discount amounts at retirement to present values. The future crediting rate may be determined by reference to an appropriate long term rate.

## **Method of valuation - NSW Civil Liability Act 2002 and Queensland Civil Liability Act 2003**

The NSW Civil Liability Act 2002 and Queensland Civil Liability Act 2003 prescribe a method of calculating superannuation loss. Under these Acts, superannuation loss is calculated by multiplying gross earnings loss by the minimum percentage required by law to be paid as employer superannuation contributions. Currently, then, under these Acts superannuation loss would be 9% of gross earnings loss.

### **Salary sacrifice superannuation contributions**

A further superannuation benefit may arise when an employee elected to make personal "salary sacrifice" contributions out of pre-tax salary. There are tax advantages in making such contributions. Luntz indicates that the "loss of these tax advantages must be recognised; the plaintiff would be under-compensated if the amount sacrificed were included in the plaintiff's pre-injury earnings and full tax on the gross amount were deducted". (p 326)

It is not clear how such salary sacrifice superannuation contributions would be treated under the NSW Civil Liability Act 2002 and the Queensland Civil Liability Act 2003, since they explicitly discuss only employer superannuation contributions.

### **Family law superannuation**

#### **Background**

The treatment of superannuation for family law purposes, though now much simpler than in the past, remains a complex area. Only a brief overview of the actuarial issues related to the valuation of superannuation for family law purposes can then be offered here. Other issues, such as how a superannuation split is managed by a superannuation fund, will not be addressed.

Under amendments to the Family Law Act 1975 effective from 28 December 2002:

- i. Superannuation is treated as property for family law purposes.
- ii. All superannuation assets are considered, not only those accumulated during the period of marriage.
- iii. Superannuation assets can be split.

#### **Method of valuation**

The Family Law (Superannuation) Regulations 2001 prescribe methods of valuing superannuation for family law purposes. The regulations set down different methods, depending on the nature of the fund and situation of the member. For example different methods may apply depending on whether the fund is an accumulation fund or defined benefit fund, and on whether the superannuation interest is currently accumulating or being paid. The regulations also specify the actuarial factors which are to be used in the calculation.

In addition, some funds have valuation methods prescribed which are specific to the fund. This is particularly true of defined benefit funds. These fund-specific methods and factors are detailed in the Family Law (Superannuation) (Methods and Factors for Valuing Particular Superannuation Interests) Approval 2003.

The methods and valuation factors in the Regulations are required to be used only when the Court makes a splitting order. In the case of an agreement between the parties, the valuation can be done either in accordance with the Regulations, or on some other basis.

The methods and factors provide the gross value of the superannuation interest, from which tax and superannuation surcharge should be deducted.

**Information**

The valuation methods use information about the superannuation interest which, under the Act, must be provided by the superannuation fund. This can be obtained from the fund by an "eligible person". For the purpose of the Act, an eligible person is either: the member; the spouse of the member; their legal representative if either are deceased; or an individual who intends to enter into a "superannuation agreement", such as a pre-nuptial agreement, with the member.

**Issues - deduction for cash**

It has been suggested that once a superannuation interest has been valued in accordance with the Act and Regulations, a further discount should apply because the superannuation interest is "locked away". The methods and factors detailed in the Regulations provide the discounted present value of these assets. The value of superannuation assets can then be directly compared with other assets in the settlement. From an actuarial perspective then, any further discounting would seem to be inappropriate.

If however one party is willing to forego some financial benefit in exchange for the convenience and flexibility of having the money now, that would be a decision for the parties concerned and may warrant negotiation of a nominal deduction for cash. It should be emphasised though that this is in addition to the discounting that is already present. Also, since this is not the issue of establishing the current value of a future payment, reference to statutory or common law discount rates would be inappropriate.

## **Future costs of expenditure**

### **Introduction**

*Future costs of expenditure* are the additional future costs that will be incurred in light of a particular incident.

A few examples of where costs of expenditure calculations may be required are:

- Recurring medical or equipment costs for an injured claimant
- Costs of raising children
- Valuation of gratuitous care services [*Griffiths v Kerkemeyer* (1977) HCA 45]

### **Method**

Future expenditure is assessed (usually by a professional such as an occupational therapist, physiotherapist, or speech pathologist). A discounted cash flow method is applied to each item of expenditure where unit costs are discounted to present value by an appropriate multiplier. This multiplier incorporates the duration and frequency of the expenditure, the effects of discounting and possibly mortality.

### **Discount rates**

For future expenditure arising due to injury, the discount rate is prescribed by the relevant legislation. In other circumstances the discount rate is generally set at the pre-tax, market return on the assets that would fund the future expenditure.

### **Frequency**

Multipliers applied to expenditure unit costs should match the frequency of expenditure. Simplification of unit costs to weekly equivalents has the capacity to misstate costs by as much as  $\pm 25\%$  in the case of expenditure occurring as infrequently as 10-yearly.

### **Mortality**

Unlike future loss of income, which is calculated to retirement age only, future expenditure is often calculated for the whole of life. As such, mortality can be quite significant, particularly where the life is considered to be impaired as a result of injury. In such cases, medical opinion may quantify the individual's mortality.

There are two broad methods to incorporate mortality into multipliers:

- Life expectancy method – a life expectancy is determined based on probabilities of survival. Payments are then assumed to occur up to this expectation of life, but not thereafter. The multiplier is then the sum of all the 'certain' discounted cash flows.
- Life annuity method – a probability of survival is attributed to each future payment by reference to life tables. Allowance is thereby made for the possibility of death before or after the individual's life expectancy. The multiplier is then the sum of all the probabilistic future discounted cash flows; or

The life annuity method is more accurate, but as many jurisdictions (i.e. NSW, Queensland, Western Australia and Tasmania) do not allow for explicit mortality in earnings calculations, a life expectancy method may be considered more consistent and easier to justify.

## **Cost of fund management**

### **Introduction**

*Cost of fund management* is the additional cost incurred on a lump sum that will be placed under management.

A few examples of where cost of fund management calculations may be required are:

- An individual sustaining a catastrophic injury and requiring management of funds for the remainder of their life
- Determination of prudent fee structures and drawings levels for individuals and fund managers

### **Method**

There is no prescribed basis for valuing costs of fund management although some precedents are present in the cases of *Rottenbury by his tutor Wren v Rottenbury* (2007) NSWSC 215 and *Willett v Fletcher* (2005) HCA 47.

One method which is consistent with actuarial and legal principals is to project a fund balance that:

- reduces to zero over the expected investment timeframe, usually the individual's life expectancy
- allows for regular and continuous drawings that remain constant in real dollar values
- assumes net fund earnings that matches the discount rate

Investment management fees can then be determined from the fund projections and discounted at the appropriate discount rate. If necessary, the method can be iterated to also incorporate fees charged on the additional amount awarded.

### **Discount rate**

For consistency with the above method, the discount rate must be a real return, net of taxation. In the case of fund management arising due to injury, a prescribed discount rate must be used. In other circumstances, a commercial rate achievable on the assets under management would be appropriate.

### **Fees on fees**

Fund management fees are self-referential in that fees will also be incurred on the additional amount awarded. The current legal position of whether costs of fund management should include these "fees on fees" is unclear

## **Life interest valuation**

### **Background**

An interest in an asset is an entitlement to the income or capital proceeds of the asset. The most common interests are life and remainder interests:

- A life interest is an entitlement to an asset for the term of the beneficiary's life. The life beneficiary may, for example, have an entitlement to live in a property, or derive income from an investment portfolio, for life. Life interests may be shared amongst multiple beneficiaries.
- A remainder interest is an entitlement to an asset upon the death of all the life beneficiaries.

There are a number of situations where it may be necessary to value an interest in an asset:

- To apportion the value of an asset in lieu of future entitlements (when winding up a trust or an estate)
- In divorce proceedings, if one spouse has a life or remainder interest, such an interest may be deemed to be relevant in the distribution of assets.

### **Method**

An interest in an asset can be valued using a discounted cash flow model, based on the asset's yield (net of costs incurred in maintaining or managing the asset but gross of taxation) to discount to present values. The valuation of a life interest must allow for the life beneficiary's chance of survival.

The valuation principle is intended to be fair to the life beneficiary and remaindermen. Were the same valuation principal to be used to estimate the present value of the interests of these reversioners, the result together with the value of the life beneficiary's interest would equal the assumed present market value of the assets subject to the life interest.

### **Issues - Tax on income/capital gains**

If the life interest were to continue its course, the benefits due to both the life beneficiary and remainderman may be subject to tax. The point of this calculation is to apportion the value of an asset between the income and capital beneficiaries, were it not for the apportionment. The recipient of any tax would of course be the Australian Tax Office, however there is no real question of introducing the ATO as a party to the apportionment. And if no payment were actually made to the ATO, then the problem arises how to treat that tax. There is no reason that allowing for tax potentially payable by one beneficiary should simply benefit another beneficiary.

In addition, since both life and remainder beneficiaries may be subject to tax, there is little reason to expect that any party would obtain any relative benefit by incorporating tax in the valuation of interests. There is also the practical problem of reasonably estimating the tax that would be payable over the time periods involved in such interests. In our experience, tax is ignored when doing such calculations.