

DAMAGES: PERSONAL INJURY AWARDS

A discussion paper by an Actuarial Working Group.

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ABSTRACT

This discussion paper brings together actuarial views on the determination of damages awards in UK personal injury cases. The Working Party was convened under the auspices of the Wider Fields Board of the Faculty and Institute of Actuaries following the judgment of the Court of Appeal in the landmark damages cases of *Wells, Thomas, Page* (October 1996).

It is not the purpose of the Working Party to imply that awards currently, or at any other time, are too high or too low. Our aim is to bring together technical actuarial assessment of an area which, as the discussion in the *Wells* judgment shows, has caused considerable problems. The paper does not represent the official view of the actuarial profession or the view of any particular organisation or individual.

The paper considers the historic background to actuarial evidence and calculations for personal injury awards. The perspective is presented from both the point of view of the **plaintiff** and the **defendant**. Actuaries have been involved in personal injury awards in the provision of expert witness evidence. Actuaries are significantly involved in the technical management (e.g. premium rating and reserving) of general insurers and **re-insurers** (which are often the defendants). Actuaries working for life assurance companies have been less involved except to the extent that an annuity has been purchased with the damages award or a **structured settlement** has been sanctioned.

The paper considers the historic and factual background to the subject, addresses the key debate of the **discount rate** and looks at the necessarily actuarial aspects of allowance for mortality and other **contingencies**.

Finally the paper briefly considers structured settlements, different international approaches and provides a radical view on lump sum awards and the crucial issues surrounding the provision of care costs.

A glossary of terms is provided in Appendix 1 and the words included are highlighted on the first occasion they are used. Appendix 2 also provides a basic introduction to the approach of the Courts to the main constituent elements of a major damages claim.

KEY WORDS

Discount rate, risk, return, mortality and contingencies.

1. BACKGROUND

The principle underlying compensation for personal injury is "restitutio in integrum", which means putting the plaintiff back in the position that he or she would have been, were it not for the accident. Compensation is currently only available from court action by the award of lump sum compensation although if both parties agree to the award being paid in a different format, a structured settlement, the Court may sanction it. It is understood that the Court does not have the power to direct such arrangements. We return to the form of compensation

later in the paper, questioning whether the lump sum approach is appropriate in all situations, particularly with regard to care costs.

Damages for future **pecuniary loss** are normally assessed by reference to two key elements - a "multiplier" and a "multiplicand". In simple terms these elements represent:

- (1) the capital value of £1 pa compensation; and
- (2) the annual amount of the loss respectively.

The multiplicand is generally assessed by the court on the basis of expert evidence provided by appropriate specialists. It may be considered that there is no actuarial aspect to this part of the compensation. This is generally true as long as the future increase in such costs is dealt with in the multiplier. Assessing such multipliers, or annuity values in actuarial terms, is a basic actuarial function. Actuarial management forms the basic financial and prudential management of many financial services companies, recognised by government in the formal monitoring of long-term insurance company and pension fund adequacy.

The multiplier depends on financial and statistical assumptions, in particular

- the discount rate,
- increases in the amount expected to be paid out each year,
- the probability that a future payment will be required in compensation (i.e. allowance for mortality and for other contingencies such as unemployment and sickness).

Actuarial tables for personal injury awards are already published by The Stationery Office (previously HMSO) (the Ogden Tables). These cover a range of interest or discount rates.

A leading legal authority on the appropriate discount rate is provided by the 1970 case of *Mallet v McMonagle*. Lord Diplock considered the use of multipliers based on an interest rate of 4- 5%. In the case of *Auty v National Coal Board* (1984), Lord Oliver referred to the input of actuarial evidence in somewhat derogatory terms. The input was misinterpreted as a "prediction". The case highlights the importance of communication of the technical aspects of actuarial work and the potential difficulties of mis-understanding the underlying assumptions and consequent application.

In 1973 the Law Commission proposed the introduction of legislation requiring the Courts to have regard to actuarial evidence. This was coupled with the suggestion that the Lord Chancellor might approve a set of standard actuarial tables which would then be admissible in evidence. Such a step would of course still be welcome to ease the court process, reduce costs and avoid any apparent conflict of actuarial evidence.

Legislation was not enacted, but in 1982 a Joint Working Party of actuaries and lawyers, under the Chairmanship of Sir Michael Ogden, was set up to consider the production of a set of standard tables. The Ogden Tables were duly published in 1984 together with explanatory notes. These notes included the recommendation that the interest rate to be adopted should be the rate of interest available on index linked government stock (**index linked gilts**). At the time inflation had reduced from the very high levels of the 1970s but inflation protection was a major issue for all investors. The future guaranteed interest payments and the capital repayment from index linked gilts increases in line with the Retail Price Index (RPI) and they were therefore felt to provide a better match for the plaintiff's future expenditure, and with less risk. It is also pertinent to note that, at the time, multipliers were considered by plaintiffs and their advisers to be too low. The application of lower interest rates (3% for example) to these valuations would have significantly increased damages awards.

The Law Commission Report No. 224 published in 1994 strongly endorsed the actuarial approach to damages and recommended the use of the Ogden Tables and the introduction of legislation requiring the Courts to have regard to the rates of return from index linked gilts.

The Law Commission Report No. 225 reported the results of a large scale survey of damages victims who received awards. This demonstrated that damages were generally invested in a very conservative manner. It also identified some of the problems of lump sum settlements in personal injury actions.

The second edition of the Ogden Tables was published in 1994. This included expanded explanatory notes and dealt with the allowance for other contingencies (e.g. unemployment and sickness to which the individuals would be subject). This additional allowance was based on research by Professor Steven Haberman of the Actuarial Science Department of City University.

Clause 10 of the Civil Evidence Act 1995 provides for the admissibility of the Ogden Tables. This has not yet been brought into effect. The Damages Act 1996 provides for the Lord Chancellor to prescribe the rate of interest to be adopted by the Courts. He has chosen not to do so. This delay is generally recognised as reflecting the Lord Chancellor's consideration of the key Court of Appeal cases (*Wells, Thomas and Page*). These cases are currently being appealed to the House of Lords and further delay can therefore be expected.

The appeals of *Wells, Thomas and Page* were heard jointly and judgment was given in October 1996. This judgment by the Court of Appeal reversed the earlier court awards which were based on the lower discounting basis of index linked gilt yields. The appeals reaffirmed the use of 4- 5% as the appropriate rate of interest for discounting and thus produced much lower awards - from £1.2m to £0.70 for Wells. The basis of the successful argument was that plaintiffs should be treated as "ordinary investors": to do otherwise would place the plaintiff in a preferential position. Unfortunately, the term "ordinary investor" was not defined further. The arguments of risk and return underlying these legal precedents are considered further in the next section of this paper.

In an appendix to the October 1996 judgment, Lord Justice Thorpe, a Family Division Judge, suggested that with suitable modifications the **Duxbury Tables** (used by family lawyers) could be applied to personal injury cases. The Family Division currently uses a rate of interest of 4.25% for such calculations. This rate is net of investment expenses but before tax on investment income. Index linked gilts currently yield approximately 3.2% before tax. The complications of taxation are considered separately later in this paper.

Finally although structured settlements guarantee certain levels of income, these are not as yet widely used in this country. Unfortunately the crucial aspect of mortality and investment risk addressed by this type of compensation has not dominated consideration of this compensation route. We consider alternative arrangements in section 3.

2. ACTUARIAL ASPECTS OF PERSONAL INJURY CLAIMS

Despite the sometimes scathing remarks made by the judiciary on the role of actuaries in valuing personal injury claims, we believe that the Courts have in effect attempted to use actuarial practice in making their own assessment of damages. Actuaries do not claim to predict the future but we do aim to place current values on future uncertain events, especially those with a financial outcome, in a sound and scientific manner. Our aim in this paper is to outline the way in which actuaries approach such problems and to build on the Court's practice to ensure that actuarial principles are applied consistently and appropriately.

The key actuarial aspects which we believe need to be considered are:

- The discount rate
 - real rates of return
 - investment management expenses
 - investor risk aversion/risk bearing ability
 - inflation
 - taxation
 - market values and levels
- Mortality
- Other contingencies affecting the valuation
- Implementation.

These aspects are addressed in the following section.

2.1 Discount Rate

In the past, we believe that the (implicit) practice of the Courts has been to set the discount rate on the basis of what is thought "reasonable", and to work on the broad assumption that high inflation equates with high investment returns. As actuaries, we view the discount rate as a consequence of underlying elements and believe that the reasonable rate can only be established by considering these interlinked elements.

The three Court of Appeal cases (Wells etc) hinged on the underlying discount rate. The fundamental point at issue was whether the discount rate was that available on "risk free" index linked gilts or whether an **equity** approach was appropriate. The equity view in turn reflected an "ordinary investor", not an ordinary investing institution.

2.1.1 Real Rates of Return

Historical returns on investments are well documented and analysed and it is taken as accepted that over the longer term, differentials exist between the returns achieved on the various investment classes. We reproduce the historical data for UK equity investments and conventional **gilts** in Appendix 3. These figures show that by accepting the lower guarantees of equity investment, higher returns have been achieved by equities than by gilts. This applies whether viewed on a real (i.e. after inflation) basis or not. Equity investments have returned approximately 6% pa (real) over a long period. In contrast gilts returned approximately 2% pa (real) over the last 25 years after a long period of negative returns.

Index linked gilts are normally priced to achieve a real rate of return of 3 - 4% and, have, by and large, achieved this. In the early days of these stocks, the market did not know how to value such investments, and, until an accepted market practice evolved, they were priced to achieve a lower return of around 2 - 2½% p.a. (real).

If the returns are viewed graphically, then it can be seen that there is significant volatility in the return achieved from equities from year to year and the consistent real returns only show through in the long term.

SPACE FOR GRAPH

2.1.2 Investment Management Expenses

The investment returns described above make no allowance for the expenses of management which are incurred. An argument has been proposed that these costs should be ignored since if the ordinary investor uses professional managers, even better returns should be achieved and so the costs of management will be offset by the extra returns. This argument is a little spurious since ordinary investors do not by and large make up a significant part of the investment market. Market returns are driven by the effects of institutional or professional investors and it seems unlikely that the ordinary investor could achieve these returns consistently without professional help. Even if the individual was able to manage the investment of large sums of money, the injury received may prevent the individual from doing so.

For all but the largest of funds, the costs of investment management will be of the order of 0.75% p.a. of the fund value which is taken as a direct reduction from the gross earned returns. These expenses are typical for an individual investor with a mixed portfolio biased towards equities and, we believe, are a necessary expense to achieve consistently the returns required. Gilts, both conventional and index linked, can be bought or sold very cheaply, or even free and so a lower allowance would apply in this regard.

2.1.3 Risk Aversion and Risk Bearing Ability

The key factors here are that in any portfolio of investments, there is a much better chance of providing a greater investment return *in the long term* by investing in equities, as long as the investor is able to bear the risks of market volatility. Under the Financial Services Act 1986, the key consideration for a financial adviser is to establish whether the investor can afford and is willing to take the additional risk in pursuit of the higher return. A typical investor would probably mix a portfolio in such a way that both equities and gilts were held so that an optimal position would be developed for *that* investor both with regard to the expected future rate of return and the risk which the individual is able to bear.

In respect of this latter aspect, the individual would consider the size of the fund available for investment so that the stock risk may be diversified since the wider the stock selection, the lower the inherent risk. This would also be influenced by income from other assets which the individual had available or from employment. However, the individual would also have to consider the future liabilities which the future investment returns would be required to cover particularly the timing of the cash flow. For most cases arising out of large Personal Injury Claims, these liabilities are the normal living costs and probably care costs. These costs are naturally linked to inflation and are unavoidable for the individual. In terms of cash flows, there is usually a requirement for a high level of regular income to match the care costs. Most individuals will be of relatively modest means and will, by and large, be wholly dependent on generating the required income from the damages award. We believe that the aim should not be to create a preferential situation for plaintiffs in personal injury claims, but to reflect what an "ordinary investor" in *similar circumstances* would view as an appropriate investment profile.

An investing institution, e.g. a pension fund, will view its investment profile applying the same considerations but will do so knowing that the investment pool is much larger (and can be more widely diversified) and that the value of many of its liabilities will depend, at least in part, on future economic conditions. This will be difficult for a lay individual to replicate. The institution will also have the luxury of an expectation of further fresh funds by way of premium or contributions from participants in the fund and will be subject to professional management. The mix between equities and gilts is most unlikely to be the same as for an individual.

Long-term insurance companies are required to demonstrate that the assets which are held are appropriately **matched** by nature and term to the liabilities covered. As part of this process, such insurance companies typically hold sufficient fixed interest assets to cover directly their fixed annuity payment liabilities, irrespective of the investment mix which is held for other liabilities (e.g. with profit policies). Pension funds now have a similar constraint imposed by the Pensions Act 1995 to have regard to a minimum funding rate (**MFR**) based on equity and gilt yields. In particular, a fund with a high proportion of pensioners must utilise a discount rate based more on gilts than on equity returns. A notable feature of pension fund investment strategy is however the matching of final salary liabilities by equity investment.

A financial adviser who recommended an assets distribution which did not reflect the reliance of the individual on the lump sum for future financial well being would fall foul of the Financial Services Act.

Therefore, we do not believe that the appropriate asset distribution should reflect the "ordinary investor" without qualification. Nor do we accept arguments based on asset distributions used by institutions. Investment strategy should reflect the particular circumstances of personal injury claimants. The asset distribution will also vary with each head of claim - care costs being different to compensation for loss of earnings etc.

Index linked gilts are low risk investments since the future guaranteed interest and capital payments increase in line with the RPI and are underwritten by the State. They are also widely available over a wide range of terms and can be dealt in at low cost. However, they do not remove all of the risk for the claimant. It is impossible to match every cost required by the individual and, as described below, it may not be possible to meet the inflationary demands. Index linked gilts at any point reflect the stock markets assessment of risk free investment and as such the real yield provides the benchmark or starting point for the valuation of damages awards.

For all elements of claims we believe that it is inappropriate to base the calculation of lump sum damages on a discount rate which relies heavily on equity investment returns in all circumstances. We believe that the real rate of return used must reflect the lower ability to bear risk in the case of injured plaintiffs and should be considered separately for each head of claim. The appropriate overall mix is one which reduces the risk and volatility for the individual but balances it with an optimum return. For care costs this implies a greater reliance on returns on index linked gilts. This necessary reliance will reduce for other elements of the award, for example the compensation for loss of earnings where a matching argument would suggest higher equity exposure.

It is necessary to differentiate between care costs and other elements of the overall damages settlement and to assess the lump sum value of each part accordingly. We believe that this builds on the Court's current practice of setting the award by reference to sub-heads of claim. Later we question whether lump sums are an appropriate form of award for every element of claim.

2.1.4 Inflation

The use of index linked gilts assumes implicitly that RPI inflation should be allowed for in valuing future losses. The use of a fixed 4 - 5% p.a. discount rate makes no explicit allowance for inflation. The elements of the loss are unlikely to be subject to RPI inflation. Part of the damages claim will be in respect of future lost earnings and it is well known that earnings inflation has typically run at a level of 2% p.a. greater than RPI. Actual NAE and RPI statistics are shown below, averaged over 5 years. The 2% gap should be recognised as an average - from which it might be assumed that some of the population will experience above average earnings growth and the rest, below average earnings grow. It might be assumed that younger white collar workers would tend to be in the former category and older blue collar workers in the latter, but we believe that the Courts should continue to assess this promotional aspect on an individual basis. The important point, however, is that the average position is one where earnings can be expected to grow at 2% p.a. in excess of prices.

Rolling 10 year periods, NAE, RPI and the difference.

Lesley's Graph

For both investment returns and NAE it is worth mentioning a macro economic point, namely the division of **GDP** between capital and labour. In basic political terms this is the fight between the owners and the workers in UK plc. The return to owners could be argued to have been high over recent years, reversing the trend of the 1970s. A change of government and the influence of the **EU** may influence the coming years' distribution. We make no predictions and mention this purely because of the geared effect this may have on the position of the plaintiff - suffering poorer equity investment returns than expected and missing out on higher earnings than expected.

Similarly care costs and other medical costs have typically increased at a rate rather more than RPI inflation. Unfortunately there are no well founded figures to support this in respect of personal injury claimants and research would need to be undertaken to identify the relationships of RPI to care cost inflation. Staff costs are the most significant element of expense in care costs and these are likely to increase in line with NAE inflation rather than RPI inflation.

It is necessary to understand that these different rates of inflation have an impact on the award either by increasing the future amounts to be met or, in setting the lump sum, by reducing the effective discount rate, (e.g. use of NAE would reduce the effective discount rate by 2% p.a.)

Finally we mention the increases in basic (and earnings related) state pensions. Since the early 1980s pensions have been increased in line with prices (RPI), rather than earnings (NAE). There may be an argument that compensation for personal injury victims should follow this approach.

2.1.5 Taxation

Taxation is a difficult area. The traditional discount rate of 4.5% may be considered to make implicit allowance for tax, providing a return after or net of tax. It should be noted that the current fixed Duxbury rate of 4.25% is gross, or before tax.

We believe the principle of “restitutio in integrum” should apply, comparing the position of the plaintiff before and after the accident, after tax. Taxation however is addressed under two headings, corresponding to the two taxes involved - income tax and capital gains tax. Income tax is the more significant tax as capital gains tax is applied only on real gains (i.e. gains after allowing for inflation). In calculating both taxes there may be a need to allow for an initial tranche of tax free income or capital gain each tax year in the hands of the injured party.

Allowance for tax in the way it is currently applied in the Duxbury projection is the appropriate approach, i.e. to start with an appropriate gross investment and recognise the impact of tax arising on the expected income and gains. This is particularly important, since income tax is likely to play a greater part in this valuation in the early years after award as the amount of income is at its greatest then.

The current tax regime produces an anomaly in that structured settlements are tax free. This in turn influences the circumstances when this approach is utilised.

2.1.6 Market Values & Levels

Court awards using 4-5% interest rates do not involve adjustment to the main multipliers to take account of market conditions at the date of calculation or award. The consequence of this approach is that identical plaintiffs would be able to purchase different income streams on different dates depending on market conditions. It is worth recalling the varying investment conditions in October 1987 and 1997! This is a flaw in the general approach to compensation. A proper actuarial and investment approach would include a "market value adjustment" to, for example, take account of interest rates at date of settlement. Many pension fund calculations are required by statute to take account of market conditions.

The use of current market yields would address the problem. In mentioning such yields at this point we make no judgment on which investments are appropriate. Opinions vary as to the extent to which low dividend yields reflect an expensive market.

The prospective yields on index linked government stocks provide the starting point or benchmark for any assessment of investment returns. Other investments will be priced so as to achieve this risk free yield plus an additional “risk premium” (% p.a.) reflecting the market perception of the risk of alternative investments. From these higher yields the difficult question is what market value adjustment is required to reflect whether the market is expensive (or relatively expensive!)

The proponents of the “market efficiency view” would consider that the fluctuations in the yield on index linked gilts provides the only acceptable benchmark for the likely real return from equities at any point in time. Investment advisers may take the view that the market is “wrong” and will advise their clients accordingly. Pension scheme practitioners will be familiar with market value adjustments set by reference to dividend yields and there is some historical evidence to suggest that such yields are predictive of an overvalued or undervalued market. Whether or not the past is a guide to the future in this respect is a matter of considerable debate on which there is no general agreement.

The consideration of market conditions only increase awareness of the importance of the timing of investments and the need for professional investment advice. This is not a new or unique actuarial problem. The situation was fully covered in the Law Commission Paper # 125.

2.2 Mortality

The mortality experience underlying the Ogden Tables is drawn from the English Life Tables (ELT) which record mortality rates experienced in England and Wales. The original Ogden Tables were based on ELT No. 13 but have been updated as new ELT results have become available. A revision of the Ogden Tables is expected based on ELT 15 which was published June 1997.

The English Life Tables measure population mortality, i.e. they reflect the probability of death occurring in England and Wales at any given age. This was thought to provide a fair reflection of the population group for plaintiffs. A fuller description of these tables and the way in which they may be used is contained in Appendix 4.

The advantages of the English Life Tables are -

- They are recognised as *authoritative* (broadly based data),
- The use of mortality rates from these tables for the calculation of multipliers in damages cases is accepted by "both sides",
- The rates are "smoothed" to remove statistical variations from year to year and age to age.

The disadvantages are -

- The tables are produced some years after the census,
- The tables are only produced every 10 years. The mortality rates could therefore be criticised as out of date,
- No allowance is included for projected changes in mortality, e.g in the period 1980 to 1990 the life expectancy (at birth) increased by about two years.

The disadvantages are not insurmountable. The effects of assuming different rates of mortality, allowing both for the general and materially significant improvement in population mortality and for the specific impairment suffered by the individual, can be accommodated easily in the computation, if necessary. These are both illustrated below.

We recommend that consideration be given to including automatically allowance for improving mortality. The projection of future improvements is a well established practice (for population projections and setting annuity rates for example) and only reflects the mortality which the plaintiff will actually experience, or would have experienced but for the accident. It seems entirely consistent with the basic concept of restitutio in integrum for such an allowance to be made.

When assessing costs based on **impaired life** expectancy, population mortality is not appropriate and needs to be adjusted to reflect the injury or impairment. There are very few mortality tables for impaired lives. This reflects the low number of such individuals and the practical difficulties of measuring the experience of these individuals. Further work would be required for an accurate assessment of impaired life mortality rates if these are to be switched from the current approach of Courts considering appropriate adjustments to population mortality.

A common adjustment is to consider the mortality experience to reflect that of an unimpaired person with the same life expectancy eg 5 or 10 years older. Below we examine two potential adjustments to the mortality rates for the plaintiff, the effect of a fixed addition to the risk of death each year arising from the danger of infection and a 50% increase in the chance of death each year. The following table demonstrates the effects.

Expectation of Life Years ELT 15				
Male Age	Unadjusted/ Standard	Allowing for Improvements	Extra mortality of 50% of rate (1)	Extra mortality of 0.1% p.a. (2)
20	54.5	59.00	50.2	41.4
60	17.9	19.30	14.7	15.9

- (1) Probability of death = 1.5 x the Standard ELT mortality rate for each year of life.
- (2) Probability of death = the Standard ELT mortality rate +.001 rate for each year of life.

It can be seen that the effects of impairment (if calculated at the levels illustrated) are likely to be more marked than allowances for mortality improvement. Medical evidence will be necessary to ensure a fair assessment of the real effect of the injury on the loss of expectation of life.

It has to be stressed that the effects of such detailed changes in the level of mortality do not have the same impact on the values computed to be used as multipliers. Using 4½% p.a. as a discount rate the above mortality assumptions produce the following annuity values (multipliers).

Expectation of Life Years ELT 15

Male Age	Unadjusted/ Standard	Allowing for Improvements	Extra mortality of 50% of rate (1)	Extra mortality of 0.1% p.a. (2)
20	20.20	20.60	19.71	17.15
60	11.56	12.14	10.10	10.58

Thus a 50% increase in the experience mortality decreases the expectation of life by 4.3 years or 7.9% for a 20 year old but decreases the multiplier by 2.4%. The corresponding numbers for a 60 year old are 3.2, 17.6% and 12.6% respectively.

The approach outlined above relies on a correct actuarial approach to valuing future income. The Family Division uses a pragmatic approach, by using the Duxbury Tables, which assume that each individual achieves exactly the future expectation of life (for the age at which the claim is made). The valuation then proceeds by assuming income will be required certainly for that period of time and will only be subject to discounting. In actuarial terms, this is referred to as an annuity certain. It is noted that this is an approximation but there is no obvious advantage in using it when there is cheap computing power available. It is shown graphically below (for a 45 year old). Apart from this aspect however the Duxbury methodology is the correct way to value damages awards.

JLMcK GRAPH

2.3 Contingencies

Adjustments to allow for contingencies other than mortality need to be considered since the aim is to restore the plaintiff to the same position which would have applied had it not been for the accident. The main contingencies which would impact on the future earnings of the individuals are ill-health and unemployment which vary with geographic location and occupation. The Ogden Table set out certain adjustments to allow for such contingencies. These adjustments were included as a result of research by Professor Steven Haberman of City University. The main factors cover loss of earnings and loss of pension. The contingency deductions are small and swamped by the element of greater financial significance, specifically the discount rate.

The Association of British Insurers (ABI) represents a large proportion of those who insure the defendants in personal injury cases. They have questioned the contingencies built into the Ogden Tables. They believe that the discussion on Professor Haberman's research paper at the Institute of Actuaries shows that the approach adopted was not necessarily wholly accepted by the actuarial profession and that there were other ideas put forward which were not pursued. The ABI believe that the Ogden Tables make inadequate allowance for contingencies and that new research is required.

The allowance for contingencies has not generally been accepted, although we doubt the extent to which the research remit and constraints of presentation are fully understood. We suggest this reflects the general difficulties of communication and understanding outlined

above. We however believe they should be properly considered with further research and greater explanation and communication of the results.

At present the contingencies allowed for may be subject to other general adjustment by the Court, taking account of the case presented. This may introduce an element of inconsistency in the way the contingencies interact and the impact which these have on the multiplier. In addition, it should be noted that there is, in the current approach, a margin in the inflation rate (RPI rather than NAE) which arises out of employment contingencies. Although we do not believe that it is appropriate to make this comparison, since it is not obvious if this adjustment would be reasonable, it could be argued that the 2% p.a. difference (NAE-RPI) already makes allowance for future employment contingencies. Employment contingencies are obviously not appropriate for care costs, emphasising the need to consider separately each head of claim.

Indeed by identifying the elements of the basis to be used for valuing damages claims it is essential that the other contingencies adjustments are separately noted.

2.4 Implementation

The timing of any change to the current 4 - 5% discount rate will inevitably involve inequities. If the change was made in one step there would be inequities between injured parties whose awards were set immediately before and after the change. There would also be a large retrospective impact on general insurance companies who would have to meet much higher claims than had been envisaged when relevant premium rates covering the risk were set. Furthermore, this retrospective impact would not fall equally within the general insurance industry as certain reinsurance companies specialising in excess of loss business would be disproportionately hard hit. On the other hand if there is not retrospection then some injured parties would receive lower awards than others settled at the same time. Some degree of phasing in of a new valuation method may be possible to prevent discontinuities. However, any approach which adopts phasing will inevitably produce inconsistencies between individual claim settlements.

The final decision on the timing and balance of any change is clearly one for society/government.

3. ALTERNATIVE APPROACH

The Working Group is drawn from a cross section of UK actuaries, some working in consultancy, some in insurance. Clients include plaintiffs and defendants. Throughout the preparation of this paper one area of compensation dominated consideration - that of care costs. This head of claim is often the largest, it is also different from other elements of compensation. Not surprisingly it is the most important concern for the plaintiff and his/her family.

We initially considered whether structured settlements would be the best alternative to lump sum awards. We concluded they were a side issue because the courts do not have the power to order them. Structured settlements are usually used as investment vehicles once a lump sum award has been assessed. They do however enable plaintiffs and defendants to compare the traditional multiplier approach with the actuarial approach implicit in the pricing of structured settlements, and exploit anomalies. Structured settlements do offer the plaintiff the opportunity to offload the mortality risks and the investment risks to a life insurance company (if the price is right) but, in our experience, they are considered primarily for their tax advantage.

We went back to basics and concluded that a lump sum will broadly over compensate half the victims and under compensate the other half. The problem stems from the lump sum anticipating a certain life expectancy, people die before or after this actuarial watershed, either way the lump sum in compensation fails. This situation was recently highlighted by a Health Authority claiming back an award when the victim died 6 weeks after the award was granted.

We therefore question whether a lump sum settlement regime is appropriate and suggest returning to the principle of indemnity - by the provision of the necessary care requirements each year on an ongoing basis. This indemnity could either be defined in monetary terms, e.g. £20,000 p.a. increasing each year in line with NAE, or defined in terms of care needs, e.g. providing support for 10/10 “**normal daily needs**”. We believe the latter item is capable of precise definition by reference to the (settled) medical condition reports. We would call this an “income or care settlement”. Insurers already provide contracts for income settlements.

A similar approach is possible for income replacement with a lump sum adjustment for reduced life expectancy or an adjustment to annual income.

Furthermore we would suggest the overall equity of personal injury awards would be significantly increased for both parties if future changes in the plaintiff's medical condition were catered for. On one side this could cover partial recovery, on the other hand it could include new forms of care and treatment. The claim is assessed assuming there will be no “miracle cure”, similarly insurers will assume they will not be liable for the cost of a \$6m bionic body. An income commitment will however leave an important incentive for insurers to consider medical developments which will help the plaintiff and potentially reduce the defendant's long term liability. Such a regime already functions in the US for care costs.

Separating out care costs in the overall settlement and the provision of ongoing support via income or care commitment would be a radical step. We recognise the psychological impact on plaintiffs of such a change and recognise the perceived comfort of financial security from money in the bank. Given this financial security may however only be temporary and that the state is underwriting the ultimate provision of care, we feel fully justified in suggesting the scrapping of lump sum compensation for this head of claim. Plaintiffs will hopefully be happier in the long-term with the guarantee of future care (whatever their needs) than with the difficulties of investing a lump sum, managing a lump sum and the impossible task of controlling the mortality risks on an individual basis.

For defendants a lump sum settlement regime provides a clean break and an opportunity to close the case. Our suggestion would obviously leave open the commitment. Given the range and type of defendants we question whether this is that much of a problem. We would cite claims arising from asbestosis and Gulf War syndrome many years after the event as indicating that if risk is your business (insurers) or responsibility (Government) then life will go on with continuing commitments. We suggest appropriate compensation for personal injury victims is more important than perceived tidiness of lump sum settlement.

This approach has the obvious advantage that the liability is exactly matched, the insurer does not overpay and the plaintiff is largely in a risk free position. Damages assessed would then be exactly that; compensation for discomfort etc and perhaps loss of expectation of life.

We believe that deflecting the argument away from the calculation of a considerable lump sum and onto the key elements of the award is also a worthwhile change.

Government will clearly wish to ensure any such continuing care commitments are properly provided or reserved for. Insurance companies could be required to extend their reserves to fund for such care commitments. In current practice, the insurance company will reserve the amount expected to be paid as a lump sum in damages prior to award. In our approach, this reserve less any immediate awards would become the reserves for the future care and income commitments identifying the plaintiff.

It would seem reasonable for the supervisory authority to require an actuary to calculate the appropriate provisions for future income/care cost payments. This would be a new departure for general insurance companies in the UK, although Lloyds syndicates will have to supply actuarial opinions on all their technical provisions from the end of 1997.

Such reserves could either be internal on a company by company reserve basis, or could conceivably be arranged via a central fund visibly invested and managed for this particular commitment. This would provide an opportunity for

- the pooling of investment risk,
- professional investment management and
- greater efficiency in investment costs.

Government already supervises billions of pounds of insurance company reserves for future income and care commitments. Any claims not falling on insurers or Government would require security. An indemnity bond (e.g. from a clearing bank) may suffice. If this was not available a lump sum may be used in these rare circumstances.

We recognise that we have put forward a radical alternative approach. However we believe that there has been some movement in this direction in recent years recognising the above advantages:

- Structured settlements are an example of an “income settlement”. However, because courts do not have the power to order structured settlements, they are inevitably used as a tool to exploit the anomalies in the existing system.
- The Treasury encourages Health Authorities to use self funded structured settlements whenever possible. Apart from the cash flow advantage of the pay-as-you-go annuity, the Treasury is alert to the financial advantage of Health Authorities being able to assess their internal reserves using discount rates much higher than those on index-linked gilts.
- The Clinical Negligence Scheme for Trusts set up by the Department of Health 3-4 years ago was designed to give NHS Trusts the benefit of pooling the cost of clinical negligence claims on a pay as you go basis through a central pool.
- We believe the concept of “income or care settlements” had not gone unnoticed within the NHS as a vehicle which could lead to savings for the NHS since it should normally be possible to provide care within the NHS more cheaply than equivalent care the plaintiff could purchase in the private sector.

We would encourage public debate on this approach.

In this short discussion paper we have not attempted to provide a comparison of international approaches to the topic. The approach of some countries, specifically the USA, Germany and Austria and Greece, is one of indemnity income. As this reflects our alternative approach we feel the practice of these countries merits further examination. We also understand that some countries, e.g. Switzerland and Norway employ actuarial tables or individual actuarial calculations in the settlement process. With the development of the EU and the pan European legal jurisdiction the approach of continental Europe will be difficult to ignore.

4. CONCLUSIONS

We present our conclusions in the form of a series of questions and answers

1. Should awards be assessed by reference to an "ordinary investor"?

No. There is no such thing as an ordinary investor. Each investor has his/her own risk and return profile suited to his/her own circumstances. The circumstances of personal injury victims are unique and call for special consideration.

2. How should the discount rate be considered?

Consideration of the discount rate employed in awards should start with reference to the yield on index linked government stocks. A balance of risk and return is involved. For the key element of awards, the care costs, we see a need to minimise risks. For other elements, we believe that there is an argument for using a higher discount rate (higher than index linked government stock) based on other investment types.

Consideration should then focus on adjusting to reflect tax, expenses and earnings increases above RPI (normally 2% p.a.).

3. Are current awards too low?

We do not seek to answer this question. There is something more important which we address - understanding how the awards are assessed and calculated.

Personal injury awards are set on the basis of the underlying assumptions. Currently, some of these assumptions are only implicit and are not necessarily well founded.

The elements of the awards and the parameters used to value these elements should be considered separately and consistently. The current approach is rather "hit or miss". Getting the correct approach is the important issue.

4. Should any change in damages awards be immediate?

Society / government / the Courts should decide the extent of any retrospection in any change to current awards. Any change in practice will either leave current claimants subject to the risks which we have highlighted or defendants (usually insurers) may find that substantial amounts have to be funded due to retrospective action on the insurance cover purchased.

5. What is the way forward for calculations?

The framework of agreed Ogden Tables incorporating population mortality projections is appropriate together with the Courts adoption of the Duxbury methodology of separate consideration of the constituent elements of the underlying basis.

6. Is there an alternative to the current lump sum awards?

Yes. A radical solution to the current difficulties of the care costs could be achieved by legislation directing an "income settlement". This would involve the payment of such costs on an annual basis by the defendant. This could benefit the plaintiff and the defendant.

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APPENDIX 1 - GLOSSARY OF TERMS

Contingencies	-	possible future events e.g. sickness or unemployment, which may affect the assessment of damages.
Defendant	-	defender, person or organisation to whom the damages claim is directed. Usually an insurer or public or government body.
Discount rate	-	the rate of interest used in actuarial calculation to take account of the changing value of money over time.
Duxbury Tables	-	table of factors used in family law cases, name derived from first case involved Duxbury v Duxbury.
Equity	-	stockmarket share, part ownership of a company rather than a loan.
EU	-	European Union.
GDP	-	Gross Domestic Product (wealth of the country generated each year).
Gilts	-	fixed interest government debt or borrowing.
Impaired Life	-	someone who will suffer reduced life expectancy, for example as a result of serious injury.
Index Linked Gilts	-	government borrowing, with interest and capital payments linked to the increase in the Retail Price Index (RPI).
Matched	-	arrangement of pairing an asset or future cash flow with a liability of similar type and term.
Mean	-	average.
Median	-	mid point, e.g. score of 5th placed person out of 10.
MFR	-	minimum funding requirement, provision of the Pensions Act 1995 S56-61, requiring private sector funded pension schemes to maintain a certain level of funds under a statutory test of adequacy (not solvency).
Normal daily needs	-	a method of assessing the degree of injury e.g. ability to dress, eat, cook, wash.
Pecuniary Loss	-	monetary loss.

- Plaintiff - pursuer, person raising the court action, the injured person.
- Re-insurers - insurers of risk placed by insurance companies to further spread their risk.
- Structured settlement - mutually agreed settlement of a damages whereby an annuity is purchased by the defendant to provide lifetime income for the plaintiff.

APPENDIX 2

1. The measure of damages was defined by Lord Blackburn in *Livingstone v Rawyards Coal Co* [1880] 5 AC 25, 39, as:

“that sum of money which will put the party who has been injured ... in the same position as he would have been if he had not sustained the wrong for which he is now getting his compensation.”

2. Lord Reid stated the principle underlying the assessment of quantum in *British Transport Commission v Gourley* [1956] AC 185 as:

“Such a sum as will, so far as possible, make good to (the plaintiff) the financial loss which he has suffered, and will probably suffer, as a result of the wrong done to him.”

and once again, in *Broome v Cassell & Co* [1972] AC 1027, 1085D, as:

“Damages for any tort are, or ought to be, fixed at a sum which will compensate the plaintiff, so far as money can do it, for all the injury he has suffered. Where the injury is material and has been ascertained it is generally possible to assess damages with some precision.”

3. **DISCOUNT RATE**

When considering future losses, the authority provided by Lord Diplock in *Mallet v McMonagle* [1970] AC 166 was that:

“Money should be treated as retaining its value at the date of judgment, and in calculating the present value of annual payments which would have been received in future years, interest rates appropriate to times of stable currency such as 4% to 5% should be adopted.”

Lord Diplock’s argument was that higher inflation should be balanced by high interest rates which reflect the fear of it, and capital appreciation of property and equities which are the consequence of it. Empirical evidence seems to point towards a discount rate of 4½% in use by the courts.

Investment conditions at the date of trial are not taken into account when assessing the level of damages.

The investment portfolio implicit in Lord Diplock’s judgment was not explicitly defined - House of Lords currently deliberating over this issue.

4. ALLOWANCE FOR TAX

Following the principle in *British Transport Commission v Gourley* [1956] AC 185, the multiplicand should be reduced for any tax which the plaintiff would have paid on the future loss, because the aim is to replace the net loss to him.

It follows that the multiplicand should be increased for any further tax which the plaintiff will have to pay on the investment proceeds (for example, tax on annuity instalments), if these are received via a third party (eg, insurance company, trust, etc). The reason for this is once again that the Court is interested in equalising the net benefit in the plaintiff's hand with the net loss. This was referred to as 'Gourley in reverse' by Lord Reid in *Taylor v O'Connor* [1971] AC 115.

Under the same principle it must also then follow that if the capital award is to be invested in a taxable medium then tax on investment income and capital gains should be allowed for in the multiplier, by netting down the discount rate. This is consistent with *Gourley* because the element of investment income which goes towards the tax will be lost to the plaintiff, and the principle is to equate the net income in his hand with the net loss. It is also consistent with the judgment in *Hodgson v Trapp* that the incidence of future taxation should be assumed to be taken care of in the interest rate assumption.

The Court does not make an explicit allowance for tax when assessing the discount rate for the multiplier, the inference being that the 4½% discount rate already makes an implicit allowance.

5. ALLOWANCE FOR INFLATION

The conventional method makes an implicit allowance in the discount rate for retail price inflation (RPI). This is the principle in the ruling in *Auty v NCB*. Whilst it is correct where the annual loss is linked to price inflation, there will be instances when the loss is related to other types of inflation, or is fixed in monetary terms. For example, in a loss of pension calculation, the loss prior to retirement age will be linked to earnings, and after retirement it may be linked to retail price inflation or to a fixed rate of pension increase. The cost of future care, often one of the biggest components in the calculation for future loss, will depend largely on the rate at which the earnings of the carers will increase. Medical costs will also inflate at a much higher level. Hitherto the courts have not accepted arguments for earnings inflation or medical inflation to be built into the calculation of the multiplier.

6. MORTALITY (LOSS OF EXPECTATION OF LIFE)

Where the plaintiff has suffered injuries which reduce his future expectation of life, future losses should be valued by reference to the mortality he would have experienced had it not been for the accident. A deduction must be made (*Pickett v British Rail Engineering Ltd* [1980] AC 136) for his own living expenses in the 'lost years' i.e. the period by which his expectation of life has been reduced.

Future costs which are a direct consequence of the injuries suffered (e.g. care and treatment) should be based on the mortality which the plaintiff is actually expected to experience in future as a result of the injuries.

7. EXPENSES OF INVESTING THE AWARD

There is no explicit allowance in most awards for the cost of investment advice for the investment of awards can be claimed by plaintiffs. However we believe that if plaintiffs are required to invest a substantial proportion of their awards in equities then they need such advice and the associated cost should be allowed as a legitimate head of claim.

8. COMPENSATION FOR HOUSING NEEDS

The principle in *George v Pinnock* expounded further by *Roberts v Johnstone* is that the net capital cost of the accommodation, is so far as it goes to create a capital asset or add value to an existing asset, cannot be awarded in full. The Court regards the purchase of residential property as the equivalent of purchasing an inflation proofed investment and considers 2% pa to be an appropriate return on the net capital expenditure.

Thus the compensation is calculated as follows:-

- The element of the capital expenditure which does not add value to the house is regarded as 'wasted expenditure' and compensated in full.
- The balance of the expenditure is expressed as an annual loss on the assumption that the opportunity cost is 2% pa net of inflation, taxes and expenses, and applied to a multiplier calculated in the usual way (at 4½% discount rate).

Housing is just one of many other heads of claims. The specific housing approach is only included to illustrate the particular initial income approach to the calculation.

9. CONTINGENCIES

Any award of damages must make allowance for the fact that a plaintiff might not have received the earnings or pension for the loss of which he or she is being compensated. The most important factors to be taken into account, other than mortality, are the probability of future redundancy and subsequent unemployment, temporary ill health, permanent disability and early retirement.

The Courts have typically deducted 10% or more from awards to allow for these contingencies. The explanatory notes to the Ogden Tables include a "ready reckoner" based on research by Professor Steven Haberman of City University which suggests that the deduction should normally be smaller.

APPENDIX 3 - INVESTMENT RETURNS

	EQUITIES				GILTS			
	Annual %	Inflation Adjusted %	Rolling 5 Yr Real Return % p.a.	Rolling 25 Yr Real Return % p.a.	Annual %	Inflation Adjusted %	Rolling 5 Yr Real Return % p.a.	Rolling 25 Yr Real Return % p.a.
1960	1.7	-0.1	13.7	-	-7.1	-8.7	-2.0	-
1961	1.7	-2.0	15.9	-	-8.1	-11.3	-3.3	-
1962	0.4	-1.9	16.7	-	24.7	21.9	2.8	-
1963	19.5	17.3	11.8	-	3.8	1.8	0.3	-
1964	-5.9	-10.2	0.2	-	-2.3	-6.7	-1.3	-
1965	12.4	7.5	1.7	-	4.4	-0.2	0.5	-
1966	-5.4	-8.8	0.3	-	4.2	0.5	3.0	-
1967	38.0	34.7	6.8	-	2.5	0.1	-0.9	-
1968	41.6	33.8	9.7	-	-2.4	-7.8	-2.9	-
1969	-11.7	-15.7	8.3	-	0.3	-4.3	-2.4	-
1970	-1.9	-9.0	4.7	6.0	3.5	-4.0	-3.1	-3.2
1971	45.3	33.3	13.0	6.6	27.5	16.9	-0.2	-2.9
1972	21.7	13.1	9.1	7.6	-3.9	-10.7	-2.4	-2.4
1973	-32.1	-38.6	-6.6	5.9	-8.8	-17.6	-4.6	-3.0
1974	-49.4	-57.5	-18.6	2.7	-15.2	-28.8	-10.1	-3.8
1975	149.6	99.8	-4.7	5.3	36.8	9.5	-7.7	-3.5
1976	-1.0	-14.0	-12.7	4.8	13.8	-1.1	-10.7	-2.7
1977	57.2	40.2	-8.9	6.3	44.8	29.1	-3.9	-1.6
1978	8.4	0.0	0.5	5.4	-2.7	-10.2	-2.2	-2.5
1979	11.4	-4.9	18.0	3.7	4.6	-10.7	2.3	-3.0
1980	35.2	17.4	6.1	4.1	20.7	4.8	1.4	-2.2
1981	13.6	1.4	9.7	4.7	1.6	-9.3	-0.3	-2.4
1982	29.2	22.6	6.8	5.8	53.6	45.8	2.1	-0.5
1983	29.1	22.6	11.2	5.0	16.4	10.5	6.5	-0.7
1984	31.8	26.0	17.7	4.2	7.2	2.5	9.4	-0.6
1985	20.7	14.3	16.9	4.7	11.2	5.3	9.5	-0.0
1986	27.4	22.8	21.6	5.7	11.5	7.5	13.3	0.7
1987	8.0	4.1	17.7	5.9	16.3	12.1	7.5	0.4
1988	11.5	4.5	14.0	5.5	9.4	2.5	5.9	0.4
1989	36.1	26.3	14.0	6.9	5.6	-2.0	5.0	0.6
1990	-9.7	-17.7	6.8	5.8	4.0	-4.8	2.4	0.4
1991	20.7	15.5	5.5	6.8	18.7	13.6	4.0	0.9
1992	20.4	17.3	8.1	6.2	16.9	13.9	4.3	1.4
1993	28.7	26.9	12.3	6.0	34.5	32.6	9.8	2.9
1994	-5.8	-8.5	5.3	6.3	-12.2	-14.7	6.8	2.4
1995	23.8	20.1	13.5	7.5	17.3	13.8	10.7	3.1
1996	16.7	13.9	13.2	6.8	9.0	6.3	9.3	2.7

APPENDIX 4

The English Life Tables are produced by the Government Actuary every 10 years and are based on the UK population censuses and deaths in a three year period at the start of each decade. The census data enables accurate estimates of population mortality to be assessed with the obvious subdivision by age and sex. The "crude" mortality rates are obtained from the raw data which in practice vary erratically from age to age and from year to year. This is because of the small number of deaths each year at each age, particularly in childhood and at very old ages. However at population level these variations are usually insignificant. These fluctuations and errors are reduced by checks and "smoothing" the crude rates. This is a well established and proven actuarial process. Separate rates are produced for males and females, reflecting significantly different underlying mortality patterns. Female mortality in the UK is lower than male mortality at all ages.

A similar exercise is also carried out for Scotland to produce the Scottish Life Tables. The geographic variation is also significant in that life expectancy differs in this separate legal jurisdiction. There are no official life tables produced for Northern Ireland, or the UK as a whole. In general mortality rates are lowest in England and highest in Scotland, with those for Wales and Northern Ireland in between.

There are different life or mortality tables produced which might be considered for use in calculating multipliers. For example mortality tables are produced from an analysis of the data for people taking out life assurance products (the **A80** tables). These tables however only cover a subset of the population, those deciding to take out life assurance products or purchasing an annuity. They represent the mortality of a group which has somehow selected itself and have features which distinguish themselves from the general population. In general, mortality rates in these groups are lower than for the population as a whole. The Duxbury Tables now use the **PF A80** tables having noted the mortality improvement from the previously employed **PA90** insured life tables.

ELT (in line with most mortality tables) records experienced mortality but it is well known that there has been a considerable secular change in the rates of mortality. There is every expectation that secular improvement will continue to be a feature of mortality. For certain purposes, actuaries do include allowance for this feature when preparing mortality tables particularly in assessing premium rates and provisions for pensions or annuities in payment. Direct allowance for improvements would also be used for population projections which generally have ELT as the starting point. Such projections are carried out biennially by the Government Actuary's Department.

For this current discussion the key point of introducing allowances for mortality improvement is that the future expectation of the life at any age is greater than the expectation implied by the historic tables. This is significant in valuing future income streams and in awarding damages.

Table

The advantages of the English Life Tables are -

- They are recognised as *authoritative* (broadly based data),
- The use of mortality rates from these tables for the calculation of multipliers in damages cases is accepted by "both sides",
- The rates are "smoothed" to remove statistical variations from year to year and age to age.

The disadvantages are -

- The tables are produced some years after the census,
- The tables are only produced every 10 years. The mortality rates could therefore be criticised as out of date,
- No allowance is included for projected changes in mortality. In the period 1980 to 1990 the life expectancy (at birth) increased by about two years. The increase is slightly higher for men.

The first of these disadvantages is not insurmountable.

A series of mortality tables known as "Interim Life tables" are produced internally by the Government Actuary's Department each year. These give mortality rates for the UK and constituent countries based on raw data for one and three year periods. These are not officially published but are available on request (or application?). Work is currently underway to produce smoothed sets of mortality rates for the UK and constituent countries every year using the approach of the English Life Tables. More up to date allowance for mortality rates, although arguably a small aspect in the multiplier "debate", is therefore available if such a refinement was considered appropriate.

A4A

Mean and Median Ages at Death using Mortality Rates from ELT15

Male				Females		
Age x (1)	Expectation of life at age x (2)	Mean age at death for person aged x (3)	Median age at death for person aged x (4)	Expectation of life at age x (2)	Mean age at death for person aged x (3)	Median age at death for person aged x (4)
0	73.4	73.4	76.0	79.0	79.0	81.7
20	54.5	74.5	76.2	59.7	79.7	81.8
40	35.3	75.3	76.5	40.2	80.2	82.0
60	17.8	77.8	77.9	22.1	82.1	82.9

(2) - original estimate at age 0, “three score years and ten”.

(3) - (1) + (2).

(4) - age at death when exactly half the original population or group has died.

A4B

Expectation of Life

Comparison of expectations of life using English Life Tables No. 15 with and without allowance for future improvements in mortality.

Age	English Life Tables No. 15 with no allowance for future mortality improvement		English Life Tables No. 15 allowing for future rates of mortality improvement in line with those assumed for the 1994 - based population projects	
	M	F	M	F
0	73.4	79.0	78.4	83.5
20	54.5	59.7	59.0	64.0
40	35.3	40.2	38.9	43.5
60	17.9	22.1	19.3	23.3

Increase in expectation of life between English Life Tables No. 15 with and without allowance for future mortality improvements.

Age	Increase in Years		Percentage Increase	
	M	F	M	F
0	5.0	4.5	6.8%	5.8%
20	4.5	4.3	8.4%	7.1%
40	3.6	3.3	10.0%	8.1%
60	1.5	1.2	8.1%	5.5%

A4C

Value of Ogden Table Multipliers

Based on English Life Tables No. 15 Mortality Rates

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	29.33	24.06	20.20	20	30.72	24.91	20.74
40	22.87	19.73	17.22	40	24.82	21.11	18.23
60	13.81	12.60	11.56	60	16.35	14.70	13.31

Based on English Life Tables No. 15 Mortality Rates with Allowance for Future Improvements in Mortality

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	30.45	24.72	20.60	20	31.68	25.46	21.06
40	24.25	20.70	17.92	40	25.99	21.91	18.78
60	14.67	13.30	12.14	60	17.01	15.22	13.73

Percentage Increase in Value of Multiplier

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	3.8	2.7	2.0	20	3.1	2.2	1.5
40	6.0	4.9	4.1	40	4.7	3.8	3.0
60	6.2	5.6	5.0	60	4.0	3.5	3.2

A4D

Expectation of Life

Comparison of Values using English Life Tables No. 14 and Scottish Life Tables for same period.

Age	English Life Tables No. 14		Scottish Life Tables No. 14	
	M	F	M	F
0	71.0	77.0	69.1	75.3
20	52.5	58.1	50.6	56.4
40	33.3	38.7	31.7	37.0
60	16.4	20.9	15.4	19.7

Difference in Expectation of Life between English Life Tables No. 14 and Scottish Life Table for same period

(Figures take English Life Tables as the base)

Age	Difference in Years		Percentage Increase	
	M	F	M	F
0	-1.9	-1.7	-2.7%	-2.2%
20	-1.9	-1.7	-3.6%	-2.9%
40	-1.6	-1.6	-4.9%	-4.2%
60	-1.0	-1.2	-5.8%	-5.5%

A4E

Value of Ogden Table Multipliers

Current Edition, based on English Life Tables No. 14 Mortality Rates

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	28.80	23.74	20.00	20	30.32	24.67	20.59
40	21.98	19.07	16.74	40	24.20	20.67	17.91
60	12.87	11.80	10.88	60	15.69	14.17	12.88

Based on Scottish Life Tables Mortality Rates for Same Period

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	28.21	23.35	19.74	20	29.86	24.39	20.41
40	21.19	18.47	16.27	40	23.50	20.16	17.53

60	12.23	11.26	10.41	60	14.96	13.56	12.37
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Percentage Increase in Value of Multiplier

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	-2.0%	-1.6%	-1.3%	20	-1.5%	-1.1%	-0.9%
40	-3.6%	-3.1%	-2.8%	40	-2.9%	-2.5%	-2.1%
60	-5.0%	-4.6%	-4.3%	60	-4.7%	-4.3%	-4.0%

A4F

Expectation of Life

Comparison of expectation of life using mortality rates from English Life Tables No. 15 and the same mortality rates with an addition of 0.01 to the mortality rate at each age.

Age	English Life Tables No. 15		English Life Tables No. 15 with addition of 0.01 to the mortality rate at each age	
	M	F	M	F
0	73.4	79.0	51.2	53.9
20	54.5	59.7	41.4	44.4
40	35.3	40.2	29.2	32.6
60	17.9	22.1	15.9	19.4

Decrease in Expectation of Life

Age	Decrease in Years		Percentage Increase	
	M	F	M	F
0	22.2	25.1	30.3%	31.7%
20	13.1	15.3	24.0%	25.7%
40	6.1	7.6	17.4%	19.0%
60	2.0	2.7	10.9%	12.1%

A4G

Value of Ogden Table Multipliers

Based on English Life Tables No. 15 Mortality Rates

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	29.33	24.06	20.20	20	30.72	24.91	20.74

40	22.87	19.73	17.22	40	24.82	21.11	18.23
60	13.81	12.60	11.56	60	16.35	14.70	13.31

Based on English Life Tables No. 15 Mortality Rates with addition of 0.01 to rate of Mortality at Each Age

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	23.88	20.04	17.15	20	24.73	20.57	17.50
40	19.60	17.11	15.12	40	20.97	18.10	15.84
60	12.51	11.48	10.58	60	14.61	13.22	12.05

Percentage Increase in Value of Multiplier

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	-18.6%	-16.7%	-15.1%	20	-19.5%	-17.4%	-15.6%
40	-14.3%	-13.3%	-12.2%	40	-15.5%	-14.3%	-13.1%
60	-9.4%	-8.9%	-8.5%	60	-10.6%	-10.1%	-9.5%

A4H

Expectation of Life

Comparison of expectation of life using mortality rates from English Life Tables No. 15 and the same mortality rates multiplied by 1.5 at each age.

Age	English Life Tables No. 15		English Life Tables No. 15 with mortality rates multiplied by 1.5 at each age	
	M	F	M	F
0	73.4	79.0	68.8	74.5
20	54.5	59.7	50.2	55.6
40	35.3	40.2	31.5	36.3
60	17.9	22.1	14.7	18.7

Decrease in Expectation of Life

Age	Decrease in Years		Percentage Increase	
	M	F	M	F
0	4.6	4.5	6.3%	5.6%
20	4.3	4.1	7.8%	6.9%

40	3.8	3.9	10.9%	9.8%
60	3.2	3.4	17.6%	15.3%

A4I

Value of Ogden Table Multipliers

Based on English Life Tables No. 15 Mortality Rates

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	29.33	24.06	20.20	20	30.72	24.91	20.74
40	22.87	19.73	17.22	40	24.82	21.11	18.23
60	13.81	12.60	11.56	60	16.35	14.70	13.31

Based on English Life Tables No. 15 Mortality Rates Multiplied by 1.5 at Each Age

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	28.13	23.30	19.71	20	29.69	24.29	20.36
40	21.19	18.49	16.31	40	23.28	20.02	17.45
60	11.78	10.88	10.10	60	14.39	13.09	11.98

Percentage Increase in Value of Multiplier

Age - M	Rate of Interest			Age - F	Rate of Interest		
	2.5%	3.5%	4.5%		2.5%	3.5%	4.5%
20	-4.1%	-3.2%	-2.4%	20	-3.4%	-2.5%	-1.8%
40	-7.3%	-6.3%	-5.3%	40	-6.2%	-5.2%	-4.3%
60	-14.7%	-13.7%	-12.6%	60	-12.0%	-11.0%	-10.0%

APPENDIX 5

Features of Duxbury Which Could Be Employed Positively

- (i) No multiplier or multiplicand, just a series of financial projections which are discounted back to give capital sum.
 - greater accuracy
 - greater consistency
 - more flexibility
 - removes errors in traditional system.
- (ii) Unbundling of assumptions with proper allowance for each element separately e.g.
 - gross investment return
 - expenses
 - explicit allowance for inflation - RPI; NAE; medical care
 - explicit allowance for tax.
- (iii) Allows "What if scenarios" to be tested for uncertain events
 - impact of different expert opinions e.g. life expectancy
 - contingencies
 - different risk/reward strategies.
- (iv) More control by courts, e.g. assumptions; adequacy tests etc.
- (v) Better understanding - could help to bridge the communication gap.

Disadvantages of Duxbury

- (a) More complex method requiring considerable skill in setting the correct package of assumptions. If actuarial involvement is excluded the projection may not be sound.
- (b) Matrix presentation of annuity assumes $a_x = ah_{\ominus}$ where $(h^{\ominus} = \dot{e}_x)$

At 4½% interest rate the approximation is within 3% - 4% which, in the context of other approximations, may be corrected through a contingency adjustment.
- (c) Use of computer software necessary, departing from traditional table of factors.