A COMPARISON OF TWO ALTERNATIVE METHODS FOR DETERMINING LOSS OF FUTURE EARNINGS FOLLOWING PERSONAL INJURY

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Abstract

The law provides that any person injured through the fault of another can claim monetary compensation in the form of damages. *Restitutio in integrum* defines the objective and measure of damages. Damages in respect of loss of future earnings comprise the product of an estimated annual loss and an estimated number of years purchase. Estimates are made by means of intuition and precedent with little reference to labour economics. Damages calculated under an alternative methodology incorporating age-earnings profiles and conditional employment rates are compared with damages awarded in 100 adjudicated cases to reveal systematic and substantial under-compensation under the court method.

1. Introduction

The law in England and Wales provides that any person injured through the fault of another can claim monetary compensation, in the form of damages, for the injuries sustained. The purpose of damages is compensation (as opposed to punishment, retribution or deterrence) and the measure of damages is 'that sum of money which will put the party that has been injured, or has suffered, in the same position as he would have been in if he had not sustained the wrong' (Lord Blackburn 1880).[2]

The established principles that determine the amount of damages awarded in respect of loss of future earnings is the multiplier–multiplicand method. This involves the

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[2] *Livingstone v Rawyards Coal Co* [1880] 5 App. Cas. 25 p. 39.

product of the multiplicand, an estimated annual loss, and the multiplier, an estimated number of years' purchase. As described below, estimates are made by means of intuition and precedent and little attempt is made to incorporate labour market analysis. This is in contrast to accepted practice in US courts in which the opinion of labour economists (called forensic economists) are sought to determine the value of expected loss of future earnings.

The purpose of the present study is to consider whether the approach currently used by courts in England and Wales to determine loss of future earnings produces awards that are significantly different to those calculated using a labour economics methodology. The complexity of the labour economics methodology is constrained by the requirement that it be accessible to the courts. We draw heavily on the widely used practices of forensic economists in the US, practices which are similarly constrained but nevertheless firmly founded in labour market analysis.

The structure of the paper is as follows. In the next section we explain how damages are determined in the courts in England and Wales using the multiplier–multiplicand approach. In section 3, we present an overview of the US approach to calculating loss of earnings. Section 4 details how we have adapted this methodology for use in personal injury cases in England and Wales. A comparison of the awards calculated under the different approaches is presented in section 5.

2. How the Courts Measure Loss of Future Earnings

Damages for loss of future earnings are measured as the capital sum that will fully compensate the injured party at the time of trial for the stream of earnings in the

future that would have been available to the claimant in the absence of the injury. The calculation undertaken uses the multiplier–multiplicand method. An annual loss of earnings (multiplicand) is multiplied by the number of years between the date of the trial and the predicted date of retirement (multiplier). The number of years is then discounted to account for advanced payment and the risk of premature death (i.e., before retirement age). Both the multiplicand and the multiplier are unknown at the time of trial and must be determined by the court.

The mutiplicand represents the difference between the claimant's earnings before and after injury. In most cases future pre-injury earnings are the claimant's earnings at the time of injury plus any earnings growth to the date of trial. In general, no account is taken of any potential growth in real earnings after the date of trial. Where the claimant is not working at the time of injury, due to non-participation, unemployment or, in the case of injured children, having not yet entered the labour market, the court imputes a figure for future pre-injury earnings with reference to published average earnings data such as is available in the *New Earnings Survey*.[3]

Estimating future post-injury earnings is more speculative. In cases where the claimant is judged to be medically incapable of future employment, no calculation is required and the full loss of pre-injury earnings is awarded. However, where medical evidence indicates that the claimant is capable of employment in the future, a partial loss is awarded and the court must assess the value of future post-injury earnings. If the claimant is working at the time of trial, future post-injury earnings will be based

[3] The *New Earnings Survey* is routinely used by personal injury solicitors and we found frequent references to it both in evidence and in judgements. In fact, the occupational earnings tables (Part D) are reproduced in the personal injury practice manual (Kemp and Kemp, 1998).

upon the claimant's current earnings. If not, the court must impute a value, normally using average earnings for an occupational group for which the claimant is considered intellectually and medically capable of fulfilling.[4]

The multiplier component converts a future stream of lost income (the multiplicand) into a lifetime capital sum while discounting for early receipt and the risk of early death. The practice of the courts is to impose a uniform rate of interest and to use population mortality rates. Since 1984, the statistical information required to determine the multiplier has been published by the Government Actuary in the form of tables of multipliers discounted for life expectancy and by various rates of interest. These are known as the Ogden Tables.

The multiplier is further reduced to account for 'pre-injury labour market hazards' that may have prevented the claimant working continuously until retirement. The magnitude of this reduction is fairly arbitrary, taking the form of a percentage deduction determined by the judge. The conventional level of deduction for labour market risks is around 20 per cent (Luckett and Craner, 1994). In 1994, the Ogden Tables included actuarially–calculated percentage deductions for pre-injury labour market risks for broadly defined categories of workers estimated from activity, unemployment and sickness rates and industrial disputes observed in large scale cross sections of the labour force from the mid-1970s to the mid-1980s (Haberman and Bloomfield, 1990).[5]

[4] For example, the average earnings for lift operators or car park attendants are often used where an injured male was formerly a manual worker but is only capable of sedentary employment post injury.

[5] Haberman and Bloomfield are candid about the deficiencies of their method and consequently their estimates. Their estimates of future working life assume single life-time transitions into and out of the

In 1999, in a House of Lords judgement involving three cases of severe injury, the legal principles and practice relating to the calculation of future loss in personal injury litigation were changed. Prior to this judgement the multiplier was discounted on the assumption that the claimant could achieve a risk-free real rate of return of 4.5 per cent. Subsequently the discount rate was reduced to 3 per cent.[6] In addition, the authority of the Ogden Tables as a basis for setting the multiplier, established in 1991 only as a *post hoc* check on conventional multipliers, was upgraded, as were the supplementary tables detailing labour market deductions, to the status of a *starting* point for the determination of the multiplier.[7]

The estimation of future employment post-injury is considerably more speculative than the estimation of future pre-injury employment. Where medical evidence indicates that the claimant is capable of employment in the future but where the impact of displacement and/or residual disability is to weaken the claimant's competitive position in the labour market, the multiplier–multiplicand formula is often rejected and damages are awarded as a lump sum figure, the determination of which is particularly arbitrary.[8] According to conventional principles, the award is between 6 and 24 months' earnings (Ritchie 1994)[9] and is invariably lower than one calculated using the multiplier–multiplicand approach. An award of this kind has

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labour force, unimodal age-specific activity and unemployment rates which are not conditioned upon previous labour force status. They anticipate an upward bias in expected working life which, on the basis of comparative work carried out in Denmark, they predict will be of the order of 5 per cent.

[6] The Lord Chancellor has since used legislative powers to reduce the rate to 2.5 per cent.

[7] "A judge should be slow to depart from the relevant actuarial multiplier on impressionistic grounds" Lord Lloyd in *Wells v. Wells [1999] 1 AC 345 at 379.*

[8] It has been described as 'plucking from the air a suitable number of pounds sterling' (by Lord Justice Stephenson, 1976 *Moeliker v a Reyrolle & Co Ltd* [1976] I.C.R. 253.

[9] Based upon the ratio of average unemployment rates between the disabled and able-bodied.

come to be called a *'Smith v Manchester'* lump sum after the case in which the principles for such an award were established.[10] A *Smith v Manchester* award may also be made in addition to a multiplier–multiplicand award for the loss of future earnings where, for example, there is an ongoing loss and the possibility of a period of greater loss. The risk of redundancy and subsequent unemployment are the sorts of speculative risks that attract a *Smith v Manchester* award, as are claimants who have lost the chance of securing earnings in excess of the pre-injury earnings.

3. Assessing Loss of Future Earnings in US Courts

While the calculation of damages in respect of loss of future earnings undertaken by forensic economists in the US has a firm foundation in labour economics, this does not mean that there is uniformity in the way that damages are assessed. Indeed, as Anderson and Roberts (1989) note, methodologies and benchmarks used by US courts differ markedly.[11] However, the differences that exist primarily reflect a lack of consensus about the way the key economic variables, such as earnings growth and expected working life, are measured. There is far more consensus about what the key economic variables are and that these should form the basis for determining the level of damages.

[10] In *Smith v. Manchester Corporation* [1974] 17 K.I.R. 1 C A an award was made to a claimant who, at the time of trial, was employed on light duties by her pre-injury employer at her pre-injury wage. There was a risk that she might lose her job in the future and where the effects of her injury would reduce the prospects of re-employment. The Court of Appeal increased her award for loss of earning capacity from £300 to £1,000.

We present a basic framework that describes the methodology employed by US economists. The intention is not to provide a wide-ranging review of the many individual practices used. Rather, the discussion is guided by the need to identify a methodology that could be applied in personal injury cases in England and Wales. This methodology replicates the most widely used practices employed in US personal injury cases, while recognising that the labour market data available in the UK are different to those in the US and that there is perhaps a greater reluctance on the part of courts in England and Wales to embrace statistical or econometric analysis.

A Methodological Framework

The model that underpins expert opinion in US personal injury cases is the human capital theory of wage determination where an individual's earnings are positively related to the stock of human capital. Age-earnings profiles are widely used to represent the effect of additional experience and training on earnings (see, for example, Bryan and Linke, 1988; Lane and Glennon, 1985; Gilbert, 1994, 1997; Thornton *et al*, 1997). Technological change, general economic conditions and cohort effects also affect the path of future earnings (Rodgers *et al*, 1996) and are included in an average figure for economy-wide earnings growth.

The following formula is used to represent expected future earnings over an individual's working life expressed in present value terms,

[11] The variety of practices used by economists in the US is evidenced by two surveys of prevailing methodologies among members of the National Association of Forensic Economists (Brookshire and Slesnick, 1997)

$$PV(W) = \sum_{j=1}^{T} \frac{W_j \prod_{i=1}^{j} (1+g_i)}{\prod_{i=1}^{j} (1+r_i)}$$

(1)

W_j denotes the wage an individual receives at each age (j) over a T-year working life. W_j varies from year to year due to increases in individual productivity resulting from additional training and experience. The growth rate (g_i) represents the combined effects of average productivity growth over time and possible cohort effects. r_i is the real discount rate used to obtain the capitalised value the stream of earnings. Use of a real discount rate avoids the need to adjust earnings growth for the possible effects of inflation. The formula highlights the key variables to be estimated. First, how should Wj and g_i be measured? Second, how should the length of working life over which the earnings stream is calculated be measured?

Measuring Wage Growth

Two sources of wage growth are identified. First, W_j increases or decreases with age, reflecting changes in an individual's stock of human capital and therefore his/her level of productivity. This component of wage growth is obtained from sex- and education-specific age-earnings profiles. These profiles are measured either by computing the average earnings of cohorts of workers at each age, or at various age intervals, often disaggregated by education level, or by estimating earnings functions that relate individual earnings to a vector of personal characteristics including a measure of age or labour market experience. Within the simple cross-sections of earnings and characteristics that are most commonly used (such as the Current Population Survey

(CPS) in the US, or the *Labour Force Survey (LFS)* in Britain), little more can be done than to take the implied growth in earnings across each cross-section as corresponding to the likely earnings path over each individual's work horizon. The use of cross section data to measure age-earnings profiles, a longitudinal phenomenon, typically generate inverted U-shaped profiles which under-predict the growth of earnings at younger ages and over-predict the decline in earnings of older workers (Murphy and Welch, 1990).

Age-earnings profiles constructed using the mean earnings of workers at each age produce profiles that are erratic Gilbert (1994, 1997). Estimated mean earnings increase and decrease as one moves from one age to another, thereby contradicting the underlying theory. Smoother profiles are obtained by using mean earnings calculated for age intervals though this is at the cost of less accurate estimates. The alternative is to estimate empirical earnings functions but this requires that one specifies an appropriate functional form that approximates the way earnings vary with years of experience. The most widely used is a quadratic specification, though more recent evidence for the US suggests that fourth degree polynomials provide better approximations of earnings profiles. However, these too under-predict earnings at each end of an individual's working life.

Forensic economists have explored the use of longitudinal data in the estimation of future earnings. Results reported by Thornton *et al* (1997) show that earnings profiles estimated using longitudinal data do not have the inverted U-shape typically found using cross-section data but that earnings profiles continue to rise until retirement. However, using both CPS cross-section data and panel data from the US to compare

age earnings profiles for male and female high school and college graduates, Rodgers *et al* (1996) find that the forecasts of the present value of earnings for young workers using both data sets are very close.

A second source of earnings growth, g_i, is economy-wide and reflects changes in general economic conditions. In effect, g_i shifts the age-earnings profile over time. Measures of g_i are typically based on historical data for movements in average economy-wide earnings. Estimates of g_i tend to be in the region of 1 - 2 per cent per annum (in real terms), though these vary by education, gender and race (Nelson and Patton, 1993; Mullett *et al*, 1990). Ignoring this, albeit small, annual growth rate substantially understates an individual's life time loss of earnings. Gohmann *et al* (1998) show that the present value of an earnings stream for a 20 year old man would be 24 per cent less if no adjustment is made for the growth in real average earnings. Similarly, Gilbert (1997) reports that the total lifetime earnings of a 25 year old college graduate would be 7 per cent higher when adjusted for the long term growth in earnings of college graduates. For people with lower levels of education, Gilbert finds that expected real average earnings have declined over time.

Measuring expected working life.

The most commonly used practice in the US involves the use of worklife tables published by the Bureau of Labor Statistics (BLS) (Smith, 1982). These tables provide an estimate of worklife expectancy (the number of years an individual of a stated age is expected to remain in the workforce until final separation either because of retirement or death). The BLS tables are calculated using the probabilities of movement into and out of the labour force for people of a particular age. Information

on current earnings and expected earnings growth are then used to calculate the value of loss of future earnings over the expected the number of years of worklife expectancy.

However, the use of worklife expectancy tables does not produce the correct mathematical expectation of future earnings (Alter and Becker, 1985). The sum of an income stream estimated over the length of an expected working life is not the same as the sum of expected annual earnings over an individual's working life. Two methods have been proposed to estimate expected annual earnings using the correct mathematical expectation. The first simply weights each annual earnings figure by the probability of being active and alive at each age. These weights do not reflect a person's past labour force behaviour or status and are thus biased estimates of the conditional probabilities of future labour market activity (Alter and Becker, 1985).

Alter and Becker provide an alternative methodology based on age-specific transition probabilities. To illustrate the Alter-Becker methodology, consider the expected earnings of someone at age j. This can be measured as,

$$E(W_j) = [(W_j . P_{aaj} . P_{swj} . P_{sj}) + (0.5 . W_j . P_{aaj} . P_{lwj} . P_{sj}) + (0.5 . W_j . P_{aaj} . P_{swj} . P_{dj}) + (0.5 . W_j . P_{anj} . P_{ewj} . P_{sj})] \quad (2)$$

where $E(W_j)$ is expected earnings at age j, P_{aaj} is the probability of being alive and in the workforce, P_{anj} is the probability of being alive and not in the workforce, P_{swj} is the probability of staying in the workforce, P_{lwj} is the probability of leaving the workforce, P_{ewj} is the probability of entering the workforce, P_{sj} is the probability of

surviving the year and P_{dj} is the probability of dying during the year. The methodology assumes that W_j is made in two equal biannual payments during the year and that someone who changes labour market status or dies does so half way through the year.

Although, the use of transition probabilities to estimate expected annual earnings is theoretically superior to the use of worklife expectancy tables, it is computationally more costly and is less accessible to the courts. Given the cost, it is an important question whether or not the approach based on transition probabilities produces estimates of the loss of future earnings that are different to BLS worklife expectancies. Using numerical examples for men and women at ages 30, 45 and 60 years, Schieren (1993) demonstrates similarity between both estimates and this might explain why the more straightforward worklife expectancy tables are preferred in US trials.

4. An Alternative Methodology for Courts in England and Wales

This alternative method of calculation draws heavily on those practices commonly used in the US and uses age-earnings profiles and employment probabilities to determine the expected future path of earnings. Base earnings are measured as the actual earnings of the claimant at the time of trial. In those cases where pre-injury earnings are not known (such as cases involving children and inactive persons), we have used the earnings figure determined by the court. To obtain the present value of the earnings stream, we have used the court-determined discount rate.

Measuring Lifetime Earnings Functions: Age-Earnings Profiles

The basic premise of the labour market approach to determining loss of future earnings is that the path of future earnings growth depends upon how earnings increase with age (the age-earnings profile) and on the growth in the level of average earnings over time. The age-earnings profile is estimated by regressing earnings on experience holding constant such characteristics as education and sex. The non-linear shape of the age-earnings profile is approximated by a polynomial of sufficiently high degree in the number of years of experience. Although Murphy and Welch (1990) advocate the use of a quartic or a cubic specification over the use of the standard quadratic in order to minimise the down-turn in earnings for workers in their fifties, our own analysis for the UK, along the same lines suggests that the quadratic provides the best approximation of the earnings profile. Quartic and cubic formulations do not improve the overall explanatory power of the estimated earnings functions.

Disability and Earnings.

Where the claimant is able to work after injury, but where the amount and type of work is affected by displacement and/or residual disability, this must be reflected in the award of damages. The proposed methodology is amended to estimate the post-injury earnings stream for such claimants.

Whilst obtaining accurate survey information on some characteristics, such as education or gender, is reasonably straightforward, self-reported health assessments are subjective and therefore less reliable. Typically, questionnaires ask whether poor health limits the amount or kind of paid work an individual can perform, and then, how a respondent would rate their health in terms of excellent, very good, good, fair

or poor. The problems that arise from these questions come from, first, their subjective element which it makes very difficult to compare responses.[12] Secondly, responses may not be independent of labour market outcomes. The problem is compounded by survey questionnaires that only collate data on disability conditional on such disability limiting the amount of work an individual can do, (as in the *LFS*). Work, wages and disability may be determined simultaneously. Thirdly, a break from continuous employment due to poor health often has less social stigma than being unemployed or looking after children. Some survey respondents may be more inclined to cite a health reason for economic inactivity to rationalise their behaviour. Fourthly, there are financial incentives to record poor health in order to qualify for certain benefits.[13] Measurement error in any variable that seeks to capture disability will lead to under-estimates of the impact of health on labour force participation and earnings. Further, the potential endogeneity of self-reported health on labour market status could lead to biased estimates of the impact of other economic variables on participation, whether or not the impact of health has been measured correctly. Typically, data on disability do not distinguish individuals who have been disabled as a result of injury from those who have had the same or similar disability from birth. It may well be the case that people with a congenital disability are more able to adapt, and thereby fare better in the labour market, than someone who is faced with a disability following a sudden injury.

[12] For example, British data contains a high proportion of workers who suffer from back problems. The severity of these range across a wide spectrum and alter the type and intensity of work which individuals can perform.

[13] Walker and Thompson (1996) focus on the issue of disability and receipt of welfare payments. One of their findings is that losing a disability is not symmetric with acquiring one in terms of subsequent labour market outcomes.

Kidd *et al* (1998) work with a self-reported health variable in the second and fourth quarters of the 1996 *LFS*. Their work is embedded within the literature on discrimination inasmuch as they attempt to decompose the differences in the labour market fortunes of disabled and able-bodied men into differences in human-capital endowments and differences associated with actual productivity. By estimating a probit model on the probability of labour market participation, they retrieve a sample selectivity correction parameter which is then included in a typical least squares earnings function for the separate samples. They conclude that actual differences in productivity between their two groups of male workers account for some 50 per cent of the wage and participation rate differences. However, they find little justification for the inclusion of sample selectivity correction techniques in their results.

In Blackaby *et al* (1998), also using *LFS,* employment differentials between the disabled and able-bodied workers are found to be more significant than earnings differentials. They report a typical earnings gap between disabled and able-bodied men of around 13 per cent. The aggregate employment rate differential between able-bodied and disabled men is around 20 per cent, although this varies with disability type.

Walker and Thompson (1996), using three-year longitudinal data and a dichotomous self-reported disability variable highlighting a scarring effect of disability. Even when a worker has recovered from a temporary disability, there is evidence of its history on the worker's future labour market outcomes. This scarring effect on wages is

important given that the majority of claimants are medically capable of returning to work.[14]

Data on Earnings and Disability

We use data on earnings and earnings-related characteristics from *LFS* 1996–7.

From a sample of 45,000 men and women for whom we have pay information, 4,000 are disabled and in work. The disability variable is derived from questions relating to the health-related problem as reported by respondents. All potentially economically active men and women are asked if they have poor health or a disability that limits the amount or kind of paid work that they can do. Although individuals are able to cite up to 15 types of health problems, we use a simple dichotomous variable which flags an individual as having specified any work-limiting ailments in the health section. Our disability variable is set equal to one if a disability occurs.

Age-Earnings Profiles: Results

The empirical model used to estimate age-earnings profiles model is,

$$\ln W_i = \alpha_1 + \alpha_2 D_i + \alpha_3 D_i X_i + \alpha_4 D_i X_i^2 + \beta X_i + \beta X_i^2 + \chi \mathbf{z_i} + u_i \qquad (3)$$

where W_i is the weekly wage, D_i is a dichotomous variable that takes the value 1 if the person is disabled, otherwise it is 0, X_i is years of work experience, $\mathbf{z_i}$ is a vector of control variables including marital status, education and region of residence and u_i is a random disturbance term. This equation is estimated for six separate occupation

[14] Ruhm (1991) finds a scarring effect for displaced able-bodied workers four years after displacement mirrored by their wages which were 10 – 13 per cent below those of continuous workers.

groups and for men and women. These are then used to predict weekly wages and wage growth by years of experience. The estimates of wage growth are generated by subtracting the wage at experience level *t* from the wage at *t+1* and subsequently dividing this figure by the wage at *t*.

Measuring Employment Probabilities

In order to obtain estimates of expected future earnings, the annual earnings stream derived using an appropriate age-earnings profile has to be weighted by the probability that an individual will be in employment at each age until final separation. The most widely used approach employed by forensic economists in the US is to estimate the number of years over which the stream of future earnings is summed, based on the government worklife expectancy tables. Equivalent worklife expectancy tables are not available for England and Wales and so two alternative methodologies were considered. The first simply uses unconditional employment probabilities (the number of people of a stated age in employment/ the total number of people of that age). Data to calculate employment probabilities in this way are available from the *LFS*. The second approach is that proposed in Alter and Becker (1985). This uses transition probabilities between different activity statuses to obtain the likelihood of being in employment at each age, conditional on activity status at injury and age at trial. It provides a more appropriate basis for calculating employment probabilities and is the one recommended by Haberman and Bloomfield (1990).

The *LFS* provides information for each person on current activity status and the individual's activity status 12 months earlier. To estimate transition probabilities (for someone initially in employment) we calculate the likelihood that someone of a stated

age who was in employment 12 months ago is still in employment, the likelihood that someone in employment has become unemployed and the likelihood of becoming inactive. Let EE_{age} denote the number remaining employed, $EU_{age,}$ the number who become unemployed and EI_{age} the number who become inactive,[15] then

EE_{age} = [number of people of a given age currently in employment who were in employment 12 months previously / number of people in employment 12 months previously]

EU_{age} = [number of people of a given age currently unemployed who were in employment 12 months previously / number of people in employment 12 months previously]

EI_{age} = [number of people of a given age currently inactive who were in employment 12 months previously / number of people in employment 12 months previously]

These transition probabilities have been used to estimate employment probabilities for each age conditional on activity status at injury and age at trial. Consider 1000 people aged 25 years who were in employment aged 24 years. The number employed at age 25 years is equal to $1000.EE_{25}$, the number unemployed will be equal to $1000.EU_{25}$ and the number inactive is equal to $1000.EI_{25.}$. Suppose that 950 of the 1000 people employed at age 24 years are still in employment, 40 have become unemployed and 10 have become inactive. It is now possible to estimate the expected number of people currently aged 25 years who will to be in employment at age 26 years. This

[15] We use the first letter to denote activity status twelve months ago and the second to denote current

will be equal to ($950.EE_{26} + 40.UE_{26} + 10.IE_{26}$). The number of people unemployed at age 26 years is expected to be ($950\ EU_{26} + 40.UU_{26} + 10.IU_{26}$) and the number of people inactive ($950.EI_{26} + 40.UI_{26} + 10.II_{26}$).

This process can be continued until final separation age. Dividing the number of people in employment at each age by 1000 gives an inflow weighted employment probability conditional on activity status at injury and age at trial. Employment probabilities were calculated in this way for males and females, able-bodied and disabled and by activity status for all starting ages. The volume of material documenting the estimated employment probabilities (12 tables each containing 50 columns) precludes useful commentary. We would note that although the estimated employment probabilities were different from those derived using the proportion of people currently in employment at each age, the differences were not sufficiently large to be of concern.

Perhaps the most critical assumption made in these calculations is that the likelihood of someone now aged, say 40 years, who was in employment one year ago and is still in employment need not be the same as that faced in 15 years time by someone who is currently aged 25 years. Unfortunately, there is little that can be done in the present context to control for such cohort effects. The proposed methodology is preferable to one simply based on current activity rates (which would also face the problem of cohort effects) since it captures the dynamic nature of the labour force and the relationship between current activity status and previous activity status.

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status.

The Alternative Calculation

For each individual, we use the court-determined level of earnings at time of trial as a measure of base earnings. The future path of earnings is then projected using the appropriate growth rate series to derive W_j over the claimant's remaining working life. In addition to individual earning growth, we include an allowance of 2 per cent per annum for the effects of economy-wide factors. To obtain an expected future earnings path, the earnings figure at each age is then weighted by the age- and activity status-specific probability of being in employment (EP_j). For comparative purposes, we also undertake the calculation using unconditional employment rates. In those cases that involve post-injury earnings potential, a W_j series is also derived using age-earnings profiles for disabled workers. The net wage used to predict loss of earnings is then the difference between the two profiles. The capitalised value of the resulting earnings stream is then obtained by discounting by the real rate of discount used by the court in each case (usually 4.5 per cent).

5. A Comparison of the Alternative Methodologies.

The application of the alternative method to a set of 100 adjudicated cases, and a comparison of the level of compensation awarded using each method of calculation, indicates that claimants are under-compensated under the court method. We find that 87 per cent of claimants in the sample are under-compensated by the court method. Half of those who are under-compensated would have received an award at least 50 per cent greater under the alternative calculation and for, 17 per cent, the award calculated by the alternative method was at least double the court award. We anticipate that the difference will be non-uniformly distributed across the sample of

claimants. It will be greater for men, younger claimants and those with post-injury earnings potential. It is the young who have more years of potential employment, and thus earnings growth, ahead of them. For women, the absence of compensation for earnings growth is offset by the absence of any allowance for the effects of childcare-based periods of inactivity on future employment rates and earnings growth. Those claimants who are deemed medically capable of work after injury will be particularly under-compensated because *Smith v Manchester* awards fail to reflect adequately post-injury employment risks.

In Table 1 the *LFS*-based estimates of loss of future earnings are compared to the level of compensation awarded by the court. The court award in the first column is compared first with an award calculated on the basis of a strict application of the Ogden Tables and subsequently with the alternative awards. We report the ratio of the alternative award to the court award separately for men and women claimants and for those who were judged to have post-injury earnings potential for the court award. Alternative 2 is based upon individual age-related earnings growth from equation (3) and unconditional age-specific employment rates. Alternative 3 is based upon the individual age-related earnings growth in Alternative 2 and age-specific conditional employment rates. Alternative 4 is Alternative 2 with the addition economy-wide earnings growth, estimated at 2 per cent per annum.

Table 1

For the sample as a whole, the ratio using Alternative 4, which includes both individual and economy-wide earnings growth, is 1.57. In cases where injury does not

preclude future earnings, the differential between the alternative and court award is particularly large. This reflects the failure of *Smith v Manchester* awards to fully compensate the claimant for future competitive disadvantage in the labour market. This is an important difference between the alternative method of calculation and the method currently used by the courts. In contrast to a lump sum payment in the range of 6–24 months post-injury earnings, the estimation of age- and status-specific post-injury risks to both employment and earnings are an integral part of the alternative calculation.

Where there is no post-injury earning potential, the court and alternative awards are much closer. In fact, where the alternative award is based upon individual but not economy-wide earnings growth (Alternative 3) there is no difference between the court and the alternative award. The explanation for this lies in the different approaches to the calculation of pre-injury labour market risks. The employment rates implied by the Ogden deductions (increasingly used by the courts even before 1999) are significantly higher than the employment rates used in the alternative calculation which are based upon transition probabilities in the *LFS*. It just so happens that on average the lower pre-injury employment rates used in the alternative calculation more or less offset the extra compensation for individual age-related lifetime earnings growth.

Contrary to expectations, women and men claimants appear to be are equally under-compensated under the court method. Although the courts' fail to make sufficient allowance for earnings growth over an individual's working life (for both men and women), there is an offsetting effect for women because in general the courts do not

reduce life-time employment rates to account for women's disproportionate responsibilities in respect of childcare. In contrast, women's lower participation rates are reflected in the *LFS* transition probabilities upon which the employment rates used in the alternative calculations are based. This unexpected result may be due to the effects of age. Women in the sample are younger than men and the ratio increases with remaining working years.

Since 96 per cent of claimants of working age were employed at the time of injury, the expectation is that future earnings calculated on the basis of conditional employment rates (Alternative 3) will exceed those based upon unconditional employment rates (Alternative 2). This result is confirmed by comparing Alternative 3 and Alternative 2.

Given that the effect of closer adherence to the Ogden Tables since 1999 has been to increase court awards, it is interesting to compare the court awards made prior to this date with the award which would have resulted from a strict application of the Ogden Tables. The ratio between the Ogden and the court awards is greater than unity because the courts have conventionally applied a greater deduction for non-mortality risks than those reported in the Ogden Tables. The difference is lower for women claimants because the Ogden Tables make greater allowance for lower life-time inactivity rates for women.

In Table 2 we use a multivariate framework to investigate potential correlates of the difference between the court and alternative methods of calculation. The dependent variables is the ratio between alternative 4 (based upon individual age-earnings

profiles, average economy-wide earnings growth and conditional employment probabilities) and the court award. The purpose is to identify any systematic patterns of under-compensation. In column (i) we see that the ratio increases with the claimant's potential remaining years in the labour market. This reflects the fact that the courts' methodology for determining the loss of future earnings makes no allowance for earnings growth over an individual's working life. This result is robust to the inclusion of other variables. In column (ii) we include a variable measuring whether or not the claimant has post-injury earnings potential. The ratio is greater for those with post-injury earnings potential, holding constant the number of potential years in the labour market. This is because the court method of using a *Smith v Manchester* lump sum payment fails to adequately account for the impact of displacement and/or continuing disability on post-injury earnings. Again this result is robust to changes in included explanatory variables.

Table 2

We introduce individual earnings-related characteristics in columns (iii) and (iv). As predicted, the impact of being male is to increase the differential between the alternative and court award. Ethnicity has no impact. Being under 16 years of age at the time of injury, and thus without an established record in the labour market, does not significantly increase the differential. Under-compensation is less for clerical workers, perhaps because the displacement effects following injury are less than for manual workers. This is consistent with the impact of qualifications. Where the claimant's highest qualifications were achieved at school, displacement effects, and thus the differential, are likely to be greater.

Case characteristics appear to have little impact on the size of the differential in column (v). The main exceptions are some evidence of a regional effect, the differential is lower in London compared to the other regions, and the differential is lower for awards made in County Courts than in the higher courts. There is no independent impact of the size of award on the differential.

6. Conclusions

This paper proposes an alternative method for the calculation of loss of future earnings following personal injury which has its foundation in the principles and practice of labour economics. While constrained by the requirement that any alternative method must be accessible to the courts and amenable to the routine application of standard spread sheet calculations, the alternative method incorporates the advancement of earnings over the claimant's remaining working life weighted by age-specific and activity status-conditioned employment rates.

The extent to which the alternative method would make a difference in practice is illustrated in a comparison of damages for loss of future earnings with those from a sample of court-adjudicated cases. In order to identify the impact of the central components of the alternative method, namely age-earnings profiles and conditional employment probabilities, the other variables in the calculation, base earnings, discount rate and mortality rates are those used by the courts.

The ratio of alternative awards to the court award is generally greater than one, indicating that the courts do not fully compensate injured claimants for loss of future earnings. The source of under-compensation is two-fold: first, the multiplier–multiplicand method fails to account for earnings growth over the claimant's working life and, secondly, *Smith v Manchester* awards fail to compensate sufficiently for the competitive disadvantage following displacement and/or residual disability. Furthermore, the differential is not uniformly distributed across the sample of claimants. It is most significant for men, for younger claimants and for those with post-injury earning potential.

The acceptance of the Ogden Tables is hailed by the legal profession as a major advance towards a more 'scientific' approach to the assessment of damages. While these tables encourage a more systematic, consistent and transparent approach to the calculation of loss of future earnings, they do no more than support the existing multiplier–multiplicand method. In particular, they do not address the absence of compensation for earnings growth or the arbitrary and insufficient nature of *Smith v Manchester* awards as compensation for post-injury disadvantage in the labour market. Within the context of the accepted aims of the damages award in tort, the court method fails to fully compensate claimants for their loss of future earnings.

References

Alter,G.C. and Becker,W.E. (1985). 'Estimating lost future earnings using the New Worklife Tables', *Monthly Labor Review*, Vol. 108 (2), pp 39–42.

Anderson, G.A and Roberts, D.L (1989). 'Stability in the present value assessment of lost earnings', *The Journal of Risk and Insurance*, Vol. 56 (1), pp 50–66.

Blackaby, D. Clark, K. Drinkwater, S. Leslie, D., Murphy, P. and O'Leary, N. (1998). 'Earnings and employment opportunities for people with disabilities', Employment Department.

Brookshire, M.L and Slesnick, F.(1997). 'A 1996 study of "prevailing practice" in forensic economics', *Journal of Forensic Economics*, Vol. 10 (1), pp 1–28.

Bryan, W. and Linke,C.M. (1988). 'The estimation of the age/earnings profiles in wrongful death and injury cases: comment', *The Journal of Risk and Insurance*, Vol. 55 (1), pp 168–173.

Gilbert, R.F. (1994). 'Estimates of earnings growth rates based on earnings profiles', *Journal of Legal Economics*, Vol. 4 (2), pp 1–18.

Gilbert, R.F. (1997). 'Long-term and short-term changes in earnings profiles', *Journal of Forensic Economics*, Vol. 10 (1), pp29–49**.**

Gohmann, S.F., McCrickard, M.J. and Slesnick, F. (1998). 'Age-earnings profiles estimates: Do they change over time?', *Journal of Forensic Economics*, Vol. 11 (3), p173.

Haberman, S. and D. Bloomfield (1990) 'Work time lost to sickness, unemployment and stoppages: Measurement and application', *Journal of the Institute of Actuaries*, pp 533–578.

Kemp and Kemp (1998). *The Quantum of Damages*, Sweet & Maxwell, London.

Kidd, M., Sloane, P. and I. Ferko (1998). 'Disability ad the labour market: Analysis of British Males', Working Paper, University of Tasmania and University of Aberdeen.

Lane, J. & Glennon, D. (1985). 'The estimation of age/earnings profiles in wrongful death and injury cases', *Journal of Risk and Insurance*, Vol. 52 (4), pp 686–695.

Luckett, N., and Craner, J., (1994). 'Multipliers: Are the courts being fair to claimants?', *Journal of Personal Injury Litigation*, pp. 139-46.

Mullet, M.J., Nelson, D.M. and Patton, R.T. (1990). 'Alternative measures of earnings growth', *Journal of Forensic Economics*, Vol. 3 (1), pp. 29–50.

Murphy, K. and Welch, F. (1990). 'Empirical age-earnings profiles', *Journal of Labour Economics*, Vol. 8 (2), pp. 202–229.

Nelson, D.M. and Patton, R.T. (1990). 'Measuring earnings growth in the U.S.', *Journal of Legal Economics*, Vol. 3 (3), pp. 11–22.

Ritchie, D. (1994). '*Smith v Manchester* awards: How do courts assess loss of capacity on the labour market', *Journal of Personal Injury Litigation*, pp.103–107.

Rodgers, J.D., Brookshire, M.L. and Thornton, R.J., (1996). 'Forecasting earnings using age-earnings profiles and longitudinal data', *Journal of Forensic Economics* Vol. 9 (2), pp. 169–210.

Ruhm, C.J. (1991). 'Are workers permanently scarred by job displacements?', *American Economic Review*, Vol. 81 (1), pp. 319–324.

Schieren, G.A. (1993). 'Median worklife, mean age at final separation, or transition probabilities to calculate expected lost earnings*?', Journal of Forensic Economics*, Vol. 7 (1), pp. 103–108.

Smith, S.J. (1982). 'New worklife estimates reflect changing profile of labor force', *Monthly Labor Review*, Vol. 105 (3), pp. 15–20.

Thornton, R.J., Rodgers, J.D. and Brookshire, M.L. (1997). 'On the interpretation of age–earnings profiles', *Journal of Labour Research*, Vol. 18 (2), pp. 351–365.

Thornton, R.J. and Slesnick, F. (1997). 'New estimates of life expectancies for persons with medical risks', *Journal of Forensic Economics*, Vol. 10 (3), pp. 285–290.

Walker, I. and Thompson, A. (1996). 'Disability, wages and labour force participation: Evidence from UK panel data', mimeo Keele.

Table 1 Loss of future earnings: A comparison of Court and Alternative awards

	No.	Court Award Mean £	Ratio of alternative award and court award			
			Ogden (1)	Alternative (2)	Alternative (3)	Alternative (4)
Total Sample	100	104,268	-	1.16	1.21	1.57
With post-injury potential earnings	55	78,238	-	1.34	1.37	1.74
Without post-injury potential earnings	45	136,081	1.10	0.93	1.01	1.36
Males	78	109,296	-	1.20	1.23	1.54
Males with post-injury potential earnings	48	77,852	-	1.36	1.37	1.70
Males without post-injury potential earnings	30	159,607	1.12	0.96	1.01	1.28
Females	22	86,439	-	1.00	1.13	1.67
Females with post-injury potential earnings	7	80,890	-	1.30	1.38	2.03
Females without post-injury potential earnings	15	89,029	1.04	0.85	1.01	1.51

Notes:

Alternative (1) Ogden award (not applicable where the claimant has post injury earnings potential)

Alternative (2) actual earnings growth, unconditional employment rates

Alternative (3) actual earnings growth conditional employment rates

Alternative (4) actual earnings growth conditional employment rates plus annual economy-wide growth

Table 2 Determinants of Differential between Court Awards and Alternative

	(i)	(ii)	(iii)	(iv)	(v)
Constant	0.931 (6.987)***	0.783 (5.554)***	0.966 (5.479)***	0.649 (1.282)	1.4714 (2.487)**
Remaining years to retirement	0.028 (5.521)***	0.027 (5.377)***	0.024 (4.252)***	0.025 (4.189)***	0.023 (3.099)***
Post-injury earning potential	-	0.328 (2.621)***	0.429 (3.143)***	0.371 (2.630)***	0.420 (2.436)**
Male	-	-	-0.246 (-1.602)*	-0.390 (-2.265)**	-0.160 (-0.812)
Black	-	-	-0.092 (-0.457)	0.001 (0.003)	-0.153 (-0.623)
Under 16 years at injury			0.268 (1.000)	0.668 (1.354)	0.371 (0.712)
Pre-injury occupation					
Professional/managerial	-	-		0.182 (0.434)	-0.282 (-0.282)
Craft manual	-	-		0.711 (1.502)	-0.007 (-0.015)
Clerical	-	-		-0.299 (-1.630)*	-0.981 (-1.652)*
Other non manual	-	-		0.434 (0.961)	0.002 (0.005)
Semi-and un-skilled manual	-	-		0.414 (0.989)	-0.105 (-0.213)
Highest qualification					
School	-	-		0.431 (1.655)*	0.614 (2.085)**
Higher Education	-	-		0.004 (0.140)	0.163 (0.544)
Vocational	-	-		0.031 (0.173)	0.075 (0.413)
Region					
South	-	-			-0.603 (-2.840)***
South West	-	-			-0.243 (-0.934)
Midlands	-	-			-0.514 (-1.961)**
North	-	-			-0.023 (-0.977)
Wales	-	-			0.087 (0.359)
Source of injury					
Industrial disease	-	-			-0.116 (-0.461)
Road traffic	-	-			-0.124 (-0.723)
Clinical negligence	-	-			-0.09 (-0.325)
Other	-	-			-0.153 (-0.427)
Court					
County Court	-	-			-0.362 (-1.843)*
Court of Appeal	-	-			0.078 (0.439)
House of Lords	-	-			0.353 (1.085)
Criminal Injuries Compensation Authority	-	-			0.734 (1.348)
Damages for loss of future earnings *100000	-				-0.161 (0.088)

Observations	100	100	100	100	100
R^2	0.23	0.28	0.28	0.31	0.39
F-statistic	30.48***	19.60***	8.66***	4.33***	3.29***

Notes: Dependent variable Alternative award 4 / Court award
t statistics in parentheses
*** indicates significant at 1 per cent level ** indicates significant at 5 per cent level * indicates significant at 10 per cent level
Reference categories: no pre-injury occupation, no qualification, London, accident at work, High Court