Volume 104
Issue 4 *Dickinson Law Review - Volume 104, 1999-2000*

6-1-2000

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I. Introduction

In actions such as wrongful death, injury, and wrongful dismissal, the level of the purely economic damages is the present value of the lost earnings of the plaintiff over a relevant time period,[1] i.e., the estimate of the lost work life of the plaintiff. Setting the amount of damages requires a projection of what would have been the likely course of the plaintiff's earnings stream over time and the employment of a reasonable discount factor to bring the amount to present value. The projection of future income requires an economic analysis as to the effect of forecasted inflation and the trend of productivity on the level of earnings.

Legislation and judicial procedure for setting the amount of damages varies among the states.[2] Nevertheless, the problem could be greatly simplified with the employment of the total offset method, where current earnings are simply multiplied by the appropriate lost work life time period of the plaintiff. In effect, total offset uses a discount factor of zero. At first thought, this notion seems quite odd. But in fact, the total offset is solidly based on economic theory and on the empirical observation that over time, the market interest rate, which is composed of the sum of the real interest rate plus the expected rate of inflation, tends to equal the rate of earnings growth. Thus, because the real interest rate and the secular rate of economic growth (i.e., productivity) tend to equality over time, the growth rate in the earnings numerator and

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1. Punitive damages and damages for pain and suffering etc., are outside the ken of the economist expert witness.

2. *See* MICHAEL L. BROOKSHIRE AND STAN V. SMITH, ECONOMIC/HEDONIC DAMAGES 246-47 (1990).

the discount factor cancel out. In short, the total offset method of simply multiplying current earnings by the number of time periods of lost income yields the present value of a stream of projected earnings rising at the same rate as the interest rate. The result is an understandable, efficient, and a reasonably fair method of settling the claim. Of course, an exception to the simple multiplication of current earnings must be made when the claimants are at the beginning of their careers (e.g., a newly fledged lawyer or an intern doctor whose future income growth is expected to exceed the norm by a measurable amount).

II. Prevalence of the Total Offset Method

In spite of its simplicity and the reasonable degree of equity embodied in the outcome, the application of a total offset rule is hardly universal across the states.[3] A notable exception is the Commonwealth of Pennsylvania, where the 1979 decision by the Pennsylvania Supreme Court in *Kaczkowski v. Bolubasz*[4] did move Pennsylvania practice toward the employment of a non-discounting method of calculating the present value of lost income. Unfortunately, probably because in fact the inflation rate had exceeded the market interest rate in the previous 5 years, Justice Nix left matters a bit complicated by stating that as a matter of law "inflation shall be presumed equal to future interest rates with these factors offsetting."[5] This statement seemed to imply, although it did not require, that an additional productivity growth factor could be added to the claim. If a net growth factor is applied to the claim, the discount rate is not just zero, it is negative. However, in practice in Pennsylvania, a large number of expert economic witnesses employing the total offset method refrained from adding a productivity factor in the general case.

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3. However, in most jurisdictions, economic experts do seem to make some effort to insert earnings growth as some offset to the discount rate in their analysis. Federal practice is discretionary; the total offset method is allowed if the expert witness explains the economic assumptions behind his or her results. In *Culver v. Slater Boat Co.*, 722 F.2d 114 (5th Cir. 1983), the court restricted the real interest discount rate to 1.5% to 3.0%. There was no numerical restriction placed on the growth rate of real earnings. Obviously if the forecasted growth of earnings and the discount rate come to equality, the total offset is completely justified.

4. 421 A.2d 1027 (Pa. 1980).

5. *Id.* at 1039. Too often long term decisions are promulgated on the basis of what appears to be a structural change going back a mere five years. In the short term, the real interest rate can be zero or negative if the actual rate of inflation exceeds the previously anticipated rate of inflation. In the long run, as inflation becomes anticipated, the market rate will rise sufficiently to re-assert the real rate (i.e. the market rate of interest will exceed the rate of inflation).

III. Below Market Interest Rates and the True Total Offset

It is interesting to note that in some jurisdictions, many economists have employed a "below market interest rate" or net discount rate to set the present value of lost income claims.[6] In general, this means that the expected rate of inflation is subtracted from the market interest rate to obtain the real interest rate as the discount factor. A further adjustment is required to account for the normal growth in real earnings or productivity over time. This can be accomplished by subtracting from the market interest rate both the expected inflation rate and the expected rate of real growth in income. If as previously stated, the long term individual income growth rate and the interest rate tend toward equality, the resulting below "market interest rate" or the net discount rate comes to zero. In this case, the below market interest rate and the total offset method converge; the present value of the damages can be obtained by simple multiplication.

IV. Average Earnings vs. Individual Earnings Growth

Arguing against the use of the total offset method is the fact that although aggregate average earnings growth exceeded the interest rate in the immediate post-World War II period,[7] in more recent periods, the non-tax adjusted real interest rate has exceeded the growth rate of the aggregate average real wage. From about 1979 to 1994, there has been no measurable increase in aggregate average real earnings.[8] (This has led to the employment of low net discount rates in the range of one to one and a half percent in setting the value of claims.) However the trend of aggregate average incomes can be misleading. A proper evaluation of claims should be based on the projection of the individual income stream over time. It is crucial to note that individual real incomes can be increasing over time even though the statistical average of all income remained constant.

This seeming paradox rests on the observation that lifetime income trends are generally upward sloping. It can be illustrated as

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6. Roy F. Gilbert, *The Below Market Discount Rate vs. East Coast Black Magic*, 9 J. OF FORENSIC ECON. 1 (1996).

7. From 1947 to 1965, the average growth rate in hourly compensation was about 4.75%. The long term rate on AAA Corporate bonds ranged from 2.61% to 4.49% at the end of the period. The increase in the CPI averaged about 2.0%.

8. Data for 1980 to 1996 show an increase of 4 1/2% in gross compensation per annum and an increase in the CPI of 4 1/4% per annum. More recent data has begun to show an increase in the level of aggregate real earnings.

follows. Suppose as shown in Table I, we construct a pared down hypothetical model of the labor force consisting of four classes, ten years apart in age. Because of experience, each class's income is higher than that of the previous class by an amount more or less equal to inflation plus some increase in productivity. If over time, the retirement of the older higher paid class and the arrival of new entries is about equal, the time series of average earnings would be constant, showing no gain. Nevertheless, the average individual income recipient would experience an increase in earnings over time. (Even more misleading in the tracking of individual incomes is the case where the entering cohort is larger than the previous cohort. Here, even though individual incomes are rising over time, the time trend of the statistical average of all incomes may show a decline.)

Table I*
Hypothetical Example of Life Time Earnings

Grade, Average Age	Actual Average Earnings in Year T_0 per Grade	Year T_{20} Current Earnings per Grade	Year T_{20} Earnings per Grade Deflated by CPI Increase of 2.5% Per Annum
Entering, 20 to 29 yrs	$15,253	$25,000	$15,253
Skilled, 30 to 39 yrs.	20,500	33,600	20,500
Junior Grade, 40 to 49 yrs.	27,555	45,150	27,555
Senior Grade, 50 to 59 yrs.	37,029	60,690	37,029
Unweighted Average Earnings**	$25,084	$41,113	$25,084

*Adapted and modified from Table 3 in Robert J. Thornton, et al., *On the Interpretation of Age-Earnings Profiles*, 18 J. LABOR OF RESEARCH 351-364 (1997).
**This represents the average earnings if each cohort were equal in size. It would still provide an index of earnings over time if the cohort weights did not change over time.

Table IA
Comparison of Earnings From Grade to Grade over 20 Years

Income Change from Entering to Junior Grade	
Entering Grade (20-29 yrs) Income, T_0 $15,253	Entering Grade (20-29 yrs) Income, T_0 $15,253
Junior Grade (40-49 yrs) Income, T_{20} Deflated at 2.5% $27,555	Jr. Grade Current $'S Income, T_{20} $45,160
Difference in Real Income Entering Grade to Junior Grade over 20 yrs $12,302	Difference in Current $'s Income Entering Grade to Jr. Grade over 20 yrs $29,907
% Change per Annum in Real Income 3.0%	% Change per Annum in Current $'s * 5.6%
Income Change from Skilled to Senior Grade	
Skilled Grade (30-39 yrs) Income, T_0 $20,500	Skilled Grade (30-39 yrs) Income, T_0 $20,500
Senior Grade (50-59 yrs) Income, T_{20} Deflated at 2.5% $37,029	Sr. Grade Current $'s Income T_{20} $60,690
Difference in Real Income Skilled Grade to Sr. Grade over 20 yrs. $16,529	Difference in Current $'s Income Skilled Grade to Senior Grade over 20 yrs. $40,190
% Change per Annum in Real Income 3.0%	% Change per Annum in Current $'s* 5.6%

*5.6% deflated by 2.5% yields a net growth rate of 3.0%.

Table I and IA depict this paradox in numerical terms. The figures are set so that over twenty years, aggregate average income rises by only 2.5% a year, equal to the rate of increase in the cost of living. Thus in Table I, the price adjusted time series shows a zero growth in unweighted average real incomes over time. However, as shown in Table IA, the data for the individual worker depicts a gross income growth rate of 5.6% per annum, equal to an increase

of 3.0% real per an Suppose for purposes of the illustration presented in Tables I and IA the *market interest rate* was 5.6%[9]; then the total offset method is quite accurate. If we use a longitudinal measure and compare the income of the entering cohort to its expected income in the junior grade 20 years later, the forecast rate of income increase is 5.6% per num, as the individual proceeds in time to higher, more experienced skill levels. annum.[10] The depicted rise in nominal income for the average individual comprising of the various grades equals the presumed market rate of 5.6%, which is composed of an inflation premium of 2.5% and real rate of 3.0%

V. After Tax Income and the Total Offset

In many jurisdictions the lost income award is to be calculated on the basis of after tax income. At this point we may note another useful aspect of the total offset method. Under any number of reasonable assumptions, the award varies very little from that which would be calculated on after tax income when a proper after-tax adjusted interest rate is employed as the discount factor.

For the example illustrated in Table II below, we assume a market interest rate of 5.5% and a basic income growth rate resulting from productivity plus inflation totaling the same 5.5%. The claimant had a gross annual income of $50,000 per year, an average tax rate of 20.0%, (an after tax income of $40,000), non-taxable benefits of $13,000, and a work life expectancy of 20 years.

9. The real rate and inflation premium are not quite additive. The real rate is obtained by deflating the market rate by the inflation rate. Current taxes also effect an increase in the market inflation premium necessary to restore an after tax real rate. *See* Eli Schwartz and Robert Thornton, *The Effect of Taxes and Inflation on the Real Interest Rate*, 5 J. OF FORENSIC ECON. 71 (1991).

10. It might be noted that following the recommendation of R.J. Thornton, M.L. Brookshire, and J.D. Rogers, a longitudinal measure is employed for use in the example. Because of the needs of simplicity, the cross section increase in income in Table I, and the longitudinal measure are the same. However, in practice, various exogenous factors may affect the structure of the grades, and the cross section measure can give erroneous results.

Table II

Pre-tax income	$50,000
After tax income (20% average tax)	$40,000
Non-taxable benefits (26% of gross income)	$13,000
Work-life expectancy	20 years
Basic market interest rate	5.5%
After tax interest rate (5.5% x .80%)	4.4%
Expected income growth (inflation 3.5% plus productivity 2% 5.5%)	5.5%

If we use a below market interest rate, we would first adjust the discount rate by the tax factor, obtaining an after-tax rate of 4.4%. If we discount or subtract from this rate the sum of inflation and productivity

However the calculation is easier to follow if the growth items are put in the numerator, and the after tax earnings are discounted by the after tax interest rate. We arrive at an annuity formula as follows:

$$\sum_{y=1}^{n} \frac{(Y(AT) + Benefits)(1 + p + g)^{1+n}}{(1 + i(AT))^{1+n}}$$

Or in this case,

$$\sum_{y=1}^{20} \frac{(\$40{,}000 + 13{,}000)(1 + 3.5\% + 2.0\%)^{1to20}}{(1 + 4.4\%)^{1to20}}$$

The growth rate and the after tax interest rate are offsetting, leaving a net growth rate of approximately 1.0%. We solve by the use of the summary value of a stream of returns for 20 years for an annuity due at a 1% positive rate positive rate

$$s_{\overline{20}|}^{1\%})$$

The award is $53,000 x 22.24 or $1,179,000. On the other hand, if we use the total offset method and multiply the gross income of ($50,000 income + $13,000 benefits) $63,000 by 20 years, we obtain an award of $1,260,000. As argued earlier by Wolfgang W. Franz, the difference is de minimis.[11]

It might be noted that difference between the results of the total offset method and the use of an after tax based interest discount rate narrow at higher nominal growth rates and resulting

11. *See* Wolfgang Franz, *The Effect of Recent Income Tax Reforms on the Calculation of Lost Earnings*, 2 J. OF FORENSIC ECON. 15 (1989).

higher market interest rates. Thus at a total inflationary and real growth rate of 7.5%, an equal market interest rate of 7.5%, and an after tax discount rate of 6.0%, we have a net positive rate of 1.5%. In the example cited above, the annuity due value of $1,244,000 is almost indistinguishable from the total offset amount of $1,260,000.

VI. Summary

Settlement claims for lost earnings vary given differing forecasts of general earnings growth and the estimates of the level of the real interest.[12] In truth the attempt to prognosticate the movements of earnings and interest levels based on the trends of the last five or even ten years is probably a fool's game. In this respect, the straightforwardness of total offset method has much to offer. The economic basis of the total offset is quite well supported. For although the correlation of the variables of earnings growth and the factors underlying the level of real interest are not always very strong in short run periods, the correlation of the combination of these variables is quite robust over the longer term.

The total offset is an efficient and fair method of setting lost income claims. Because it would reduce many of the complications and costs of litigation in the area of lost income claims, it is deserving of wider adoption in judicial practice.[13]

12. *See* BROOKSHIRE & SMITH, *supra* note 2, at 43-45.

13. *See* Michael T. Brody, Comment, *Inflation, Productivity and the Total Offset Method of Calculating Lost Future Earnings*, 49 U. CHI. L. REV. 1003 (1982).