*Thomas R. Ireland**

Journal of Legal Economics, Fall 1999
9(2): 9-23

Total Offsets in Forensic Economics: Legal Requirements, Data Comparisons, and Jury Comprehension

Introduction

Total offsets in forensic economics are assumptions that one set of variables will have impacts that can be completely "offset" by another set of variables in such a way that both sets of variables can be eliminated from a damage calculation. The term *total offset* is often used to refer to an assumption that wage growth and an appropriate discount rate for reducing future values to present values exactly offset each other.

In forensic economics, the term *total offset* typically refers to either a complete offset between increases in wages and discount rates (the Alaska Rule, which was used in Alaska until 1986) or to a complete offset between rates of price increase and the discount rate (the Pennsylvania Rule, which still applies in Pennsylvania today). A third total offset involving discount rates is an assumed offset between increases in medical care costs and the discount rate. There are also

***Thomas R. Ireland, Professor of Economics, University of Missouri-St. Louis, St. Louis, Missouri**

other total offsets that are sometimes used by economic experts in personal injury and wrongful death damage analysis, but these will not be considered in this paper.[1]

Six total offset assumptions are considered in this paper from the standpoint of three criteria: (1) What is required by law? (2) What is most accurate from the standpoint of economic practice and theory? (3) What will be most helpful to a jury that is trying to assign damages in a case at hand?

The first criterion is a sine qua non for being an economic expert witness and consultant. In terms of admissible testimony, legal restrictions trump issues of theoretical accuracy and jury comprehension. If testimony does not conform to the requirements of law, it will not be permitted. The second criterion of accuracy focuses on how much empirical justification exists for the assumed offset. The third criterion of helpfulness to a jury takes into account the fact that a theoretically accurate and precise measurement of damages is not meaningful if a jury cannot comprehend and assess the method by which measurement was made. The social goal of expert testimony is having juries better informed and more able to assess complicated issues. As such, it may be important in some instances to sacrifice measurement precision to increase jury comprehension as long as this is done in a way that is not biased toward the plaintiff or the defendant. By its nature, any total offset calculation represents a simplification of the calculation process; therefore, any total offset method will have some advantages according to the third criterion.

The Alaska Rule Total Offset

When the term total offset is used in forensic economics, it typically refers to a total offset between wage increases and the discount rate. This is the rule that was mandated by the Alaska Supreme Court from 1967 to 1986; for that reason, it is sometimes referred to as the Alaska Rule.[2] In 1986, however, the Alaska legislature eliminated the Alaska Rule, and this author is not aware of any legal venues that require this specific offset to be made, though it may be frequently used in Pennsylvania (see below under the Pennsylvania Rule). This method is specifically mentioned and, with sufficient justification, [3] it is specifically allowed under the *Jones & Laughlin Steel Co. v. Pfeifer* (1983) decision which is the central precedent for lost earnings analysis in federal cases.[4] It is, however, not a favored method in that decision.

The advantage of this approach is its simplicity. If wage increases can be assumed to totally offset the discount rate needed to reduce future values to present values, wage loss can be assessed by multiplying the wage loss by the number of years over which the loss is projected to continue. From the standpoint of jury comprehension, this method gets the highest possible rating, though the need for an economic expert to make this calculation seems questionable. In a case where this method is used, arguments may center around the work life period over which losses should be projected, but a base year loss figure and the number of years of losses are the only necessary variables for an instant calculation of loss. Under the *Pfeifer* decision, this is a legally permissible method only if given proper evidentiary foundation. This is not an easy feat, given the lack of consistency of this method with basic wage growth and interest rate data for the American economy over the past 40 years. Thus, this method fails from the standpoint of accuracy.

The lack of accuracy of this method is shown in tables 1 and 2 at the end of this paper. The data contained in these tables is all taken from *The Economic Report of the President, 1999,* showing annual discount rates for six different interest rates and two wage series. The data cover the 40-year period from 1959 to 1998. However, data for the 30-year U.S. Treasury bond rate only begins in 1977 because that is the first year of issue. Likewise, data for the employer cost index (ECI) for earnings became available only in 1980. Arithmetic averages are calculated at the bottom of the table for 5-year, 10-year, 15-year, 19-year, 20-year, 22-year, 25-year, 30-year, 35-year and 40-year periods that end with 1998.[5] The odd 19 and 22-year periods are designed to pick up maximum periods available for the 30-year U.S. Treasury bond and the employer cost index.

Table 2 uses the averages for different time periods calculated for table 1 to calculate net discount rates for corresponding periods. An explanation of the specific processes that were used is provided in the notes to table 2. Net discount rates (NDP's) were calculated for all available periods using the "Average Weekly Earnings of All American Workers" series. In the table, EDP stands for "net discount rates calculated from rates of change in the employer cost index." EDP's are calculated through 19-year periods, which is the longest available period that ends with 1998. The final two columns show 0.00 values when one plus the growth rate in average weekly earnings is divided by itself or one plus the growth rate in ECI is divided by

Table 1. Comparison of Various Interest Rates to Rates of Increase in Average Weekly Earnings for All American Workers and the Employer Cost Index (after 1979)

Year	3-mo.	3-yr.	10-yr.	30-yr.	Corp Aaa	Muni Aaa	Ave. Wk. %	E Cost %
1959	3.405	4.46	4.33	n.a	4.38	3.95	4.9	n.a
1960	2.928	3.98	4.12	n.a	4.41	3.73	2.4	n.a
1961	2.378	3.54	3.88	n.a	4.35	3.73	2.4	n.a
1962	2.778	3.47	3.88	n.a	4.33	3.18	4.0	n.a
1963	3.157	3.67	4.00	n.a	4.26	3.23	3.0	n.a
1964	3.549	4.03	4.19	n.a	4.40	3.22	3.2	n.a
1965	3.954	4.22	4.28	n.a	4.49	3.27	4.5	n.a
1966	4.881	5.23	4.92	n.a	5.13	3.82	3.5	n.a
1967	4.321	5.03	5.07	n.a	5.51	3.98	3.1	n.a
1968	5.339	5.68	5.65	n.a	6.18	6.94	5.8	n.a
1969	6.667	7.02	6.67	n.a	7.03	5.81	6.4	n.a
1970	6.458	7.29	7.35	n.a	8.04	6.51	4.6	n.a
1971	4.348	5.65	6.16	n.a	7.39	5.70	6.2	n.a
1972	4.071	5.72	6.21	n.a	7.21	5.27	7.5	n.a
1973	7.041	6.95	6.84	n.a	7.44	5.18	6.2	n.a
1974	7.886	7.82	7.56	n.a	8.57	6.09	6.4	n.a
1975	5.838	7.49	7.99	n.a	8.83	6.89	5.7	n.a
1976	4.989	6.77	7.61	n.a	8.43	6.49	7.3	n.a
1977	5.265	6.69	7.42	7.75	8.02	5.56	7.7	n.a
1978	7.221	8.29	8.41	8.49	8.73	5.90	7.8	n.a
1979	10.041	9.71	9.44	9.28	9.63	6.39	8.0	n.a
1980	11.506	11.55	11.46	11.29	11.94	8.51	6.9	9.6
1981	14.029	14.44	13.91	13.45	14.17	11.23	8.5	9.9
1982	10.686	12.92	13.00	12.76	13.79	11.57	4.7	6.5
1983	8.630	10.45	11.10	11.18	12.04	9.47	5.0	5.7
1984	9.580	11.89	12.44	12.41	12.71	10.15	4.3	4.9
1985	7.480	9.64	10.62	10.79	11.37	9.18	2.1	3.9
1986	5.980	7.06	7.68	7.78	9.02	7.38	1.9	3.2
1987	5.820	7.68	7.68	8.39	9.38	7.73	2.5	3.3
1988	6.690	8.26	8.85	8.96	9.71	7.76	3.0	4.8
1989	8.120	8.55	8.49	8.45	9.26	7.24	3.8	4.8
1990	7.510	8.26	8.55	8.61	9.32	7.25	3.3	4.6
1991	5.420	6.82	7.85	8.14	8.77	6.89	2.5	4.4
1992	3.450	5.30	7.01	7.67	8.14	6.41	2.7	3.5
1993	3.020	4.44	5.87	6.59	7.22	5.63	2.8	3.6
1994	4.290	6.27	7.09	7.37	7.96	6.19	3.3	3.1
1995	5.510	6.25	6.57	6.88	7.59	5.95	2.2	2.6
1996	5.020	5.99	6.44	6.71	7.37	5.75	3.1	3.1
1997	5.070	6.10	6.35	7.27	7.87	5.55	4.5	3.4
1998	4.810	5.14	5.26	5.58	6.53	5.12	4.0	3.8
5 Yr Ave	4.94	5.95	6.34	6.76	7.46	5.71	3.42	3.20
10 Yr Ave	5.22	6.31	6.95	7.33	8.00	6.20	3.22	3.69
15 Yr Ave	5.85	7.18	7.78	8.11	8.81	6.95	3.07	3.80
19 Yr Ave	6.98	8.26	8.75	8.96	9.69	7.63	3.74	4.67
25 Yr Ave	6.95	8.15	8.59	n.a.	9.45	7.29	4.56	n.a.
30 Yr Ave	6.75	7.88	8.26	n.a.	9.12	7.03	4.83	n.a.
35 Yr Ave	6.41	7.45	7.77	n.a.	8.55	6.63	4.71	n.a.
40 Yr Ave	5.98	6.99	7.31	n.a.	8.02	6.25	4.54	n.a.

Interest Rates in table 1 are taken from table B-73 of the *Economic Report of the President: 1999*. Percentage increases in average weekly earnings are taken from table B-47. Percentage increases in the employer cost index are taken from table B-48. Abbreviations are explained in table 2.

itself. The remaining nonzero numbers provide minor insight into how the two wage series moved with respect to each other but are otherwise unimportant.

What is important in table 2 is that the smallest possible NDP's are the five year and 40 year NDP's using the 91-day Treasury bill rate of 1.47% and 1.38% respectively. Even with a 3-year Treasury note rate, the smallest possible net discount rate is 2.45 % for the past five years. On this basis, one can simply not find any time period over which a total offset assumption would work for a worker with average rates of earnings increases. Clearly, if age earnings effects are taken into account, even negative net discount rates imply wage increases greater than discount rates are possible for the early periods of the lives of workers. However, those rates are then offset by lower than average increases at the end of the age-earnings cycle. If the time frame is any period ending in 1998 and going back as far as 40 years, there is no empirical justification for a total offset between earnings increases and discount rates.

Table 2. Calculation of Net Discount Rates Based on Comparisons of Various Interest Rates to Average Weekly Earnings for All American Workers and the Employer Cost Index (after 1979)

Year	3-mo.	3-yr.	10-yr.	30-yr.	Corp Aaa	Muni Aaa	Av. Wk.%	E Cost %
5 Year NDP	1.47	2.45	2.83	3.23	3.91	2.22	0.00	-0.21
10 Year NDP	1.94	3.00	3.61	3.98	4.63	2.89	0.00	0.46
15 Year NDP	2.70	3.98	4.57	4.89	5.57	3.76	-0.00	0.71
19 Year NDP	3.12	4.36	4.83	5.03	5.74	3.75	0.00	0.89
20 Year NDP	3.05	4.21	4.64	4.83	5.51	3.47	-0.00	n.a.
22 Year NDP	2.64	3.80	4.22	4.41	5.05	2.97	0.00	n.a.
25 Year NDP	2.29	3.43	3.85	n.a.	4.68	2.61	0.00	n.a.
30 Year NDP	1.83	2.91	3.27	n.a.	4.09	2.09	0.00	n.a.
35 Year NDP	1.63	2.61	2.92	n.a.	3.67	1.83	0.00	n.a.
40 Year NDP	1.38	2.35	2.64	n.a.	3.33	1.63	0.00	n.a.
5 Year EDP	1.69	2.66	3.04	3.45	4.13	2.43	0.21	0.00
10 Year EDP	1.48	2.53	3.14	3.51	4.16	2.42	-0.45	0.00
15 Year EDP	1.98	3.25	3.84	4.15	4.83	3.03	-0.71	0.00
19 Year EDP	2.21	3.43	3.90	4.10	4.80	2.83	-0.89	-0.00

n tables 1 and 2, "3-month" refers to the ending rate on 91 day U.S. Treasury bills. '3-Year" refers to the ending rate on three year U.S. Treasury notes, "10-Year" and '30-Year" to the ending rates on 10 and 30 year U.S. Treasury Bonds, respectively. 'Corp Aaa" refers to the ending rate on Aaa rated corporate bonds. "Muni Aaa" efers to the ending rate on Aaa rated state and local bonds that are not subject to ederal income taxation. "Av. Wk. %" refers to the annual rate of change in average veekly earnings of all American workers during that year. "E Cost %" refers to the nnual rate of change in the employer cost index, starting after 1979. All data are aken from *The Economic Report of the President: 1999*, with tables and page numbers ndicated in the notes to table 1. NDP refers to the net discount rate, as calculated rom the Average Weekly Earnings Series. EDP refers to the Net Discount Rate, as alculated from the employer cost series.

Table 2 was developed from data reported in table 1, based on the general formula 1 + i)/(1 +g) = 1 + the appropriate net rate. Thus, in the first calculation reported bove, the period was a five year average. Using the five year average rate of interest or 10 year U.S. Treasury bonds of 6.34% and the five year average rate of increase n average weekly earnings of 3.42%, those numbers would be substituted into the eneral formula as 1.0634/1.0342 = 1.0283. Therefore, 2.83 is the net discount rate ased on a five year average of the interest rate on 10-year U.S. Treasury bonds and he five year average of annual rates of increase in average weekly earnings of all merican workers. The numbers reported in the final two columns are not net iscount rates but comparisons of data in the average weekly earnings series with the mployer cost series. The number zero appears for values in the "Ave. Wk. %" for ll NDP entries. The value is equal to the rate of change in average weekly earnings ivided by itself minus one, which equals zero. The first figure of -0.21 in the "E

Cost %" column implies that average weekly earnings percentage was larger than the employer cost percentage for that five year period. The same 0.21 appears in the comparison for the "5-Yr EDP" where the formula is based on the rate of change in the employer cost index. Numbers vary slightly due to rounding in some instances.

Since the employer cost index figures only began to be reported in 1980, the longest possible comparison of that data source is 19 years, which is why a 19 year period is included in tables 1 and 2. Likewise, the U.S. Treasury only began to issue 30 year bonds in 1977, which is why a 22 year period is included in tables 1 and 2.

The Pennsylvania Rule--An Offset between the CPI and the Discount Rate

The *Pennsylvania Rule* is confined to the state of Pennsylvania.[6] State law requires that an offset be assumed between the rate of inflation, represented by the consumer price index and the discount rate. Since the first criterion for being an economic expert is to conform one's calculations to existing law, experts in that state have no choices about this particular issue. It was, in fact, this issue that prompted the ruling federal precedent in *Jones & Laughlin Steel v. Pfeifer* (1983). Howard Pfeifer, a longshoreman in western Pennsylvania had won an award for damages under the Longshoremen's and Harbor Worker's Compensation Act, which had been, according to Pennsylvania law, calculated by the total offset method. The United States Supreme Court ruled that, contrary to Pennsylvania law, the total offset method was not mandated in federal courts in Pennsylvania. For this reason, the Supreme Court vacated the trial court decision and remanded the case for further consideration of damages.

In reading *Pfeifer* and cases following *Pfeifer*, it is not always clear that the courts have been cognizant of the difference between total offset as an offset between wages and the discount rate and total offset as an offset between the CPI and the discount rate. Indeed, over the past 20 years, calculations under the two different total offsets would have had quite similar results since wage increases, until the very recent past, have been quite similar to the rate of inflation, implying very little increase in real earnings. The difference between these two forms of total offset occurs when there are productivity increases in earnings. In other words, in theory, one could add productivity increases in earnings under the Pennsylvania Rule since the mandated total offset is between inflation and the discount rate.

Some forensic economists in Pennsylvania, however, have not chosen to do so, realizing that the mandated offset between inflation and the discount rate already implies overcompensation for lost earnings, at least for workers 35 and older. In general, the only uses of the Pennsylvania total offset method have been in the state of Pennsylvania and only because of the requirements of state law. Effectively, this means that the criteria of accuracy and clarity to a jury are moot issues.

Tables 3 and 4 are structured similarly to tables 1 and 2, but with the CPI-U and the medical CPI substituted for the growth rates in average weekly earnings and the employer cost index. Using the CPI effectively makes the net discount rates from Table 2 become real interest rates (RDP's) in table 4. Medical net discount rates are shown as MDR's. As is indicated in table 4, the smallest possible RDR is the 1.89% 10 year rate using the 91-day U.S. Treasury bill rate. For all other discount rates, no real interest rate is smaller over the past 20 years than the 2.95% for 10 years bonds in the 3- year U.S. Treasury note rate.[7]

A Total Offset between Medical Care Cost Increases and the Discount Rate

Apparently it is common in the medical economics literature to assume a total offset between rates of medical care increase and the discount rate.[8] Many forensic economists do this as well with respect to life care costs when an individual has been catastrophically injured and the costs of a life care plan are part of damages in personal injury cases. As table 4 suggests, a total offset between medical care costs and selected discount rates is much less unreasonable than an assumed total offset between earnings of an average worker and the discount rate. The average annual rate of medical care increase is reasonably similar to the three month Treasury bill rate for all historical periods in table 3 except for the past five year period, when medical increase rates were lower. If other historical discount rates are used, a total offset assumption would overstate projected future costs of medical care but by much smaller amounts than with earnings projections.

However, this semblance of parity between rates of medical care increase and discount rates is sometimes misused to characterize rates of cost increase in life care plans. Life care plans, especially life care plans with large values, contain large component costs for attendant care. Costs of trained attendants and even licensed practical nurses

have not increased at the rates indicated in tables 3 and 4 for the medical care CPI. Neither have many basic medical commodities, like wheel chairs and other basic types of equipment. Further, many items in life care plans are simply ordinary commodities made necessary because of the life care needs of the injured individual. This use of a total offset for the total annual costs of a life care plan would significantly overstate the true expected rates of increase for the majority of components in the plan, even assuming that a total offset for medical care itself is reasonable. That, of course, requires the use of the "parking value of money" 91-day U.S. Treasury bill rate. Other rates would result in higher net discount differences. With medical care cost increases, it also must be understood that historical rates of increase were so far above the average for other types of goods and services that they could not have been expected to continue at historical rates in any case.

From the standpoint of the legal criterion, this total offset poses no special problem. Neither the states nor the federal courts have special rules for dealing with rates of cost increase for medical or life care plans relative to discount rates used to reduce future costs to present value. From the standpoint of economic accuracy, an assumption of total offset between medical care costs and the discount rate is less unreasonable than total offsets between earnings and the discount rate or general price inflation and the discount rate. But this assumption still overstates future increases in medical care cost unless the discount rate used is the three month Treasury Bill rate. And it certainly overstates the rates of cost increase for most life care plans, especially those with large components for attendant care. From the standpoint of jury comprehension, there is usually little problem for jurors in understanding that medical care increases have been greater than other cost increases.

Table 3. Comparison of Various Interest Rates to Rates of Increase in the Consumer Price Index and the Medical Care Component of the Consumer Price Index.

Year	3-mo.	3-yr.	10-yr.	30 yr.	Corp Aaa	Muni Aaa	CPI Incr.	Med CPI
1959	3.405	4.46	4.33	n.a.	4.38	3.95	0.7	4.4
1960	2.928	3.98	4.12	n.a.	4.41	3.73	1.7	4.3
1961	2.378	3.54	3.88	n.a.	4.35	3.73	1.0	3.6
1962	2.778	3.47	3.88	n.a.	4.33	3.18	1.0	3.5
1963	3.157	3.67	4.00	n.a.	4.26	3.23	1.3	2.9
1964	3.549	4.03	4.19	n.a.	4.40	3.22	1.3	2.3
1965	3.954	4.22	4.28	n.a.	4.49	3.27	1.6	3.2
1966	4.881	5.23	4.92	n.a.	5.13	3.82	2.9	5.3
1967	4.321	5.03	5.07	n.a.	5.51	3.98	3.1	8.8
1968	5.339	5.68	5.65	n.a.	6.18	6.94	4.2	7.3
1969	6.667	7.02	6.67	n.a.	7.03	5.81	5.5	8.2
1970	6.458	7.29	7.35	n.a.	8.04	6.51	5.7	7.0
1971	4.348	5.65	6.16	n.a.	7.39	5.70	4.4	7.4
1972	4.071	5.72	6.21	n.a.	7.21	5.27	3.2	3.5
1973	7.041	6.95	6.84	n.a.	7.44	5.18	6.2	4.5
1974	7.886	7.82	7.56	n.a.	8.57	6.09	11.0	10.4
1975	5.838	7.49	7.99	n.a.	8.83	6.89	9.1	12.6
1976	4.989	6.77	7.61	n.a.	8.43	6.49	5.8	10.1
1977	5.265	6.69	7.42	7.75	8.02	5.56	6.5	9.6
1978	7.221	8.29	8.41	8.49	8.73	5.90	7.6	8.4
1979	10.041	9.71	9.44	9.28	9.63	6.39	11.3	9.2
1980	11.506	11.55	11.46	11.29	11.94	8.51	13.5	11.0
1981	14.029	14.44	13.91	13.45	14.17	11.23	10.3	10.7
1982	10.686	12.92	13.00	12.76	13.79	11.57	6.2	11.6
1983	8.630	10.45	11.10	11.18	12.04	9.47	3.2	8.8
1984	9.580	11.89	12.44	12.41	12.71	10.15	4.3	6.2
1985	7.480	9.64	10.62	10.79	11.37	9.18	3.6	6.3
1986	5.980	7.06	7.68	7.78	9.02	7.38	1.9	7.5
1987	5.820	7.68	7.68	8.39	9.38	7.73	3.6	6.6
1988	6.690	8.26	8.85	8.96	9.71	7.76	4.1	6.5
1989	8.120	8.55	8.49	8.45	9.26	7.24	4.8	7.7
1990	7.510	8.26	8.55	8.61	9.32	7.25	5.4	9.0
1991	5.420	6.82	7.85	8.14	8.77	6.89	4.2	8.7
1992	3.450	5.30	7.01	7.67	8.14	6.41	3.0	7.4
1993	3.020	4.44	5.87	6.59	7.22	5.63	3.0	5.9
1994	4.290	6.27	7.09	7.37	7.96	6.19	2.6	4.8
1995	5.510	6.25	6.57	6.88	7.59	5.95	2.8	4.5
1996	5.020	5.99	6.44	6.71	7.37	5.75	3.0	3.5
1997	5.070	6.10	6.35	7.27	7.87	5.55	2.3	2.8
1998	4.810	5.14	5.26	5.58	6.53	5.12	1.6	3.2
5 Yr. Ave	4.94	5.95	6.34	6.76	7.46	5.71	2.46	3.76
10 Yr. Ave	5.22	6.31	6.95	7.33	8.00	6.20	3.27	5.75
15 Yr. Ave.	5.85	7.18	7.78	8.11	8.81	6.95	3.35	6.04
19 Yr. Ave	6.98	8.26	8.75	8.96	9.69	7.63	4.39	7.10
20 Yr. Ave	7.13	8.34	8.78	8.98	9.69	7.57	4.74	7.27
22 Yr. Ave	7.05	8.26	8.70	8.90	9.57	7.40	4.95	7.27
25 Yr. Ave	6.95	8.15	8.59	n.a.	9.45	7.29	5.39	7.72
30 Yr. Ave	6.75	7.88	8.26	n.a.	9.12	7.03	5.32	7.45
35 Yr. Ave	6.41	7.45	7.77	n.a.	8.55	6.63	4.94	7.16
40 Yr. Ave	5.98	6.99	7.31	n.a.	8.02	6.25	4.46	6.73

Interest Rates in table 2 are taken from table B-73 of the *Economic Report of the President: 1999*. Percentage increases in the consumer price index and in the medical care portion of the consumer price index are taken from table B-64 Abbreviations are explained in table 4.

Table 4. Real Interest Rates and Medical Care Net Discount Rates Calculated from Comparisons of Various Interest Rates, Rates of Change in the Consumer Price Index and the Medical Care Component of the Consumer Price Index.

Year	3-mo.	3-yr.	10-yr.	30 yr.	Corp Aaa	Muni Aaa	CPI Incr.	Med CPI
5 Year RDR	2.42	3.41	3.79	4.20	4.88	3.17	0.00	1.27
10 Year RDR	1.89	2.95	3.56	3.93	4.58	2.84	0.00	2.40
15 Year RDR	2.42	3.70	4.29	4.60	5.29	3.48	-0.00	2.60
19 Year RDR	2.48	3.71	4.18	4.38	5.08	3.10	-0.00	2.59
20 Year RDR	2.28	3.43	3.86	4.05	4.73	2.70	-0.00	2.41
22 Year RDR	2.00	3.15	3.58	3.76	4.40	2.33	-0.00	2.21
25 Year RDR	1.48	2.62	3.03	n.a.	3.86	1.80	-0.00	2.21
30 Year RDR	1.36	2.43	2.79	n.a.	3.60	1.62	0.00	2.03
35 Year RDR	1.40	2.39	2.70	n.a.	3.44	1.61	-0.00	2.11
40 Year RDR	1.45	2.42	2.72	n.a.	3.41	1.71	0.00	2.17
5 Year MDR	1.14	2.11	2.49	2.89	3.57	1.88	-1.25	0.00
10 Year MDR	-0.50	0.53	1.13	1.49	2.13	0.42	-2.35	-0.00
15 Year MDR	-0.18	1.07	1.64	1.95	2.62	0.85	-2.54	0.00

Year	3-mo.	3-yr.	10-yr.	30 yr.	Corp Aaa	Muni Aaa	CPI Incr.	Med CPI
19 Year MDR	-0.11	1.09	1.54	1.74	2.42	0.49	-2.53	-0.00
20 Year MDR	-0.13	0.99	1.41	1.59	2.26	0.28	-2.36	-0.00
22 Year MDR	-0.20	0.92	1.34	1.52	2.14	0.12	-2.17	-0.00
25 Year MDR	-0.71	0.40	0.80	n.a.	1.61	-0.40	-2.16	0.00
30 Year MDR	-0.65	0.40	0.76	n.a.	1.55	-0.40	-1.98	0.00
35 Year MDR	-0.70	0.27	0.57	n.a.	1.30	-0.50	-2.07	-0.00
40 Year MDR	-0.70	0.25	0.54	n.a.	1.21	-0.45	-2.12	0.00

In tables 3 and 4, "3-month" refers to the ending rate on 91-day U.S. Treasury bills. "3-Year" refers to the ending rate on three year U.S. Treasury notes, "10-Year" and "30-Year" to the ending rates on 10 and 30-year U.S. Treasury bonds, respectively. "Corp Aaa" refers to the ending rate on Aaa rated corporate bonds. "Muni Aaa" refers to the ending rate on Aaa rated state and local bonds that are not subject to federal income taxation. "CPI Increase" refers to the annual rate of increase in the consumer price index. "Med CPI" refers to the annual rate of increase in the medical care component of the consumer price index. All data is taken from the Economic Report of the President 1999, with tables and pages indicated in the notes in table 3. RDR refers to the real net discount rate. MDR refers to the medical care component net discount rate.

Table 4 was developed from data reported in table 3, based on the general formula $(1 + i)/(1 + gi) = 1 +$ the appropriate net rate. Thus, in the first calculation reported above, the period was a five year average. Using the five year average rate of interest for 10 year U.S. Treasury bonds of 6.34% and the five-year average rate of increase in the consumer price index of 2.46%, those numbers would be substituted into the general formula as $1.0634/1.0246 = 1.0379$. Therefore, 3.89 is the real discount rate based on a five year average of the interest rate on 10-year U.S. Treasury bonds and the five year average of annual rates of increase in the consumer price index. The same process is involved in the calculation of the medical discount rate, MDR. The numbers reported in the final two columns are not net discount rates but comparisons of data in the CPI and Med CPI columns. The number zero appears for all values in the "CPI" column for the RDR categories because the value is equal to the rate of change in average weekly earnings divided by itself minus one, which equals zero. The first figure of 1.27 in the MDR column implies that the MCPI was greater than the CPI by that amount. The 1.25 value that appears in the comparison for the "5 Yr MDR" column where the formula is based on the rate of change in the MCPI. Numbers vary slightly due to rounding in some instances.

The U.S. Treasury only began to issue 30-year bonds in 1977, which is why an "n.a." is used for comparisons that would require more than 22 years. The 19 year entry is retained from tables 1 and 2 for comparative purposes only. A period of 19 years is the longest period over which an average rate of increase in the employer cost index can be calculated. This has no direct effect on any values in tables 3 and 4.

Endnotes

1. Other *total offsets* include: (a)An assumed offset between income taxes on lost earnings and income tax liabilities on interest paid on balances in loss replacement accounts. In most states, income taxes that would have to have been paid on lost earnings are not subtracted, so this offset would be irrelevant. However, in federal personal injury litigation and in Hawaii and South Carolina (and perhaps other states) taxes are subtracted from lost earnings. For loss calculations in those venues, some economic experts try to argue that if the taxes owed on income would offset taxes owed on the interest on the loss replacement fund both can be ignored. (b)An assumed offset between income taxes owed on lost earnings in the same venues, and fringe benefits that a worker would have received in addition to income. (c) Still another total offset, in use in Canada, is an assumed total offset between negative employment contingencies (mainly unemployment and non-participation) and job-related fringe benefits.

2. The Alaska Rule originated with *Beaulieu v. Elliot, 434 P 2d 665* (Alaska 1967). It was modified somewhat by *State v. Quinn*, 555 P.2d 530 (Alaska 1976), which affirmed the Court's earlier *Beaulieu* ruling of no growth and no discount, but allowed the plaintiffs to include known step increases that existed in current contracts. Quite interestingly, while sticking with *Beaulieu* and *Guinn*, the Court decided that pensions should be reduced to present value in *Alaska Airlines v. Sweat,* 568 P.2d 916 (Alaska 1977) and again in the same original case *Alaska Airlines v. Sweat*, 584 P.2d 544(Alaska 1978). The Alaska Rule was eliminated in 1986 by statute AS 09.17.040(b), which requires explicit consideration of inflation, real growth, and reduction to present value for all actions arising after passage in 1986. The author thanks Paul Taylor for this review of the history of the Alaska Rule.

3. This is discussed in the next section in the context of the Pennsylvania Rule since *Pfeifer* represented a specific challenge to the Pennsylvania Rule in federal actions in Pennsylvania.

4. This approach is used by only a small number of forensic economists but is commonly associated with employees of Vocational Economics, a business centered in Louisville, Kentucky that has branches in a number of states. It appears to be a business practice of Vocational Economics for this method to be used in all lost earnings cases and for the use of this practice to be justified in a particular way. A few other practitioners, including Dr. Charles Linke of the University of Illinois, argue for a total offset approach but offer different types of justification for this method.

5. Calculating geometric averages for the same periods involves an extensive process of formula development. Geometric averages were calculated for periods up to 22 years and showed very little difference from simple arithmetic averages of annual rates. Therefore, arithmetic averages were used in all calculations in both tables 1 and 2.

6. This is based on *Kaczkowski v. Bolubasz,* 491 Pa. 561, 421 A.2d 1027 (1980). Based on the name of the defendant, Bolubasz, this case is sometimes referred to by Pennsylvania attorneys as the "soup" case. This author thanks James D. Rodgers for this citation.

7. It is also interesting to note the consistency between real discount rates over a 15-year time horizon and current yields on TIPS bonds (Treasury inflation protected bonds).

8. The author thanks Ted R. Miller for suggesting this item.

References

Economic Report of the President, 1999. 1999. Washington, D.C.: U.S. Government Printing Offices.