

NOTES AND COMMUNICATIONS

An Empirical Evaluation of Two Methods for Estimating Economic Damages: Comment

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Lambrinos and Harmon (1989) empirically evaluate two methods that have been used to estimate economic damages. The two approaches they evaluate are the offset approach and the augmented offset approach. The augmented offset approach is adjusted by an age-earnings factor. The estimated present values using each approach are calculated and then evaluated by comparing them with the present values of actual worker earnings drawn from the Panel Study on Income Dynamics (PSID). Discussing their comparison of estimated present values using the offset and augmented offset methods with the calculated present values using the PSID longitudinal survey earnings data, the authors state that "... both methods underestimate the loss . . ." (p. 737).

The use of an inappropriately low interest rate to discount PSID earnings could cause both methods of estimation to underestimate the loss. If an inappropriately low interest rate is used to discount actual PSID earnings, the resulting lump-sum awards will be higher than if higher interest rates were used. The resulting higher calculated lump-sum awards for actual PSID earnings would cause the estimated awards using both the offset and augmented offset methods to be low in comparison. The authors state that "... the rate chose for discounting the workers' actual earnings from 1971 through 1983 is the nontaxable municipal bond yield average from 1961 through 1970, 4.10 percent" (p. 735).¹ It can be argued that the use of the average municipal bond yield from 1961 through 1970 to discount actual 1971 through 1983 earnings is inappropriate.

To the extent that interest rates rise with inflation, it is likely that the discount rate would be higher if one rolled-over short-term instruments rather than invested in long-term bonds in an environment of rising inflation. Returns from a portfolio of long-term bonds do not change as interest rates rise. Thus, while Lambrinos and Harmon state that "Because

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¹ The Standard and Poors (S&P) municipal bond series has a 20 year maturity.

this period spans three full business cycles, the results are not likely to reflect the influence of a particular stage of the business cycle," (p. 738) they overlook an important postwar event—the rise of inflation in the 1970's. The authors, constrained by data availability, used the period 1971 through 1983 to compare the estimated present values using the offset and augmented offset approaches with present values using actual PSID earnings. Table 1 shows that this 13 year period (1971 through 1983) exhibited higher inflation, wage growth, and interest rates than the 1961 through 1970 decade that preceded it. Recall that Lambrinos and Harmon used the 1961 through 1970 period to calculate the average municipal bond yield which they used to discount actual PSID earnings.

Table 1
A Comparison of the
1961 through 1970 and 1971 through 1983 periods*

	1961-1970 (percent)	1971-1983 percent
annual average inflation rate	2.7	7.5
annual average rate of wage change	4.0	6.8
annual average Treasury bill rate	4.6	7.9
annual average municipal bond rate	4.1	7.3

* The inflation rate is for the consumer price index. The rate of wage change is for total private average weekly earnings. The Treasury bill rate is for 9 through 12 month issues for 1961 through 1970 and one year issues for 1971 through 1983. The municipal bond rate is the S&P high grade series. See: *Economic Report of the President* and the *Federal Reserve Bulletin*.

The use of short-term Treasury instruments to reduce exposure to inflation risk would have resulted in a higher discount rate. That is, the discount rate employed by the authors based on the 1961 through 1970 period was lower than would have been the case if interest rates that prevailed on short-term instruments during the 1971 through 1983 period had been used. An example similar to one presented by the authors is used to show that their findings may be sensitive to the interest rate selected to discount actual earnings. In this example an estimated present value is calculated using the offset approach augmented by an age-earnings adjustment factor. This estimated present value is then compared to present values calculated using a wage series discounted by two different discount rates—the 4.10 percent municipal bond yield and the prevailing one year Treasury bill rate.

The age-earnings adjustment factors shown in column 1 of Table 2 are those for a high school graduate who was 30 years old in 1970 (See Lambrinos and Harmon, Table 1, p. 736). The annual earnings shown in column 3 are private average weekly earnings multiplied by 52 weeks. This approach is used to determine baseline annual earnings of \$6,231 for 1970 in all cases. (See Total private average weekly earnings *Economic Report of the President*, February 1990). Column 4 shows these earnings discounted

at the 4.1 percent rate used by Lambrinos and Harmon while column 5 shows them discounted by the one year Treasury bill rate for each year. (See *Federal Reserve Bulletin*, various issues.) As can be seen in the last row of Table 2, the estimated present value using an age-earnings augmented offset approach is \$95,437, while actual earnings discounted at 4.1 percent and the prevailing one-year Treasury bill rate have present values of \$97,619 and \$81,201 respectively. Thus, in this example, the estimated loss using an augmented offset approach (\$95,437) is lower than the loss calculated using actual earnings discounted at the 4.1 percent rate used by the authors (\$97,619). This result conforms with the findings of Lambrinos and Harman that their estimated present values are lower than their actual present values. However, in this example, the estimated loss using an augmented offset approach (\$95,437) is higher than the loss calculated using actual earnings discounted at the prevailing on-year Treasury bill rate (\$81,201). Thus, whether estimate present values are judged to be overestimated or underestimated in comparison with actual present values can depend upon the interest rate selected to discount actual earnings. Furthermore, since the mean actual present value is a function of the interest rate selected to discount actual earnings, the magnitude of the errors found by Lambrinos and Harmon when evaluating the accuracy of the two estimating approaches can be affected as well. Thus, the degree of support the authors find for the use of the age-earnings adjustment approach will be clarified when a more appropriate interest rate is selected to discount actual earnings.

Table 2
An Example of the Effect of Using Different
Discount Rates to Calculate Actual Present Values

	Est. Pres. Values		Actual Pres. Values		
	(1) age- earning adj.	(2) earnings with adj.	(3) earnings	(4) earnings discounted at 4.1%	(5) earnings discounted at T-bill rate
1971	1.023	\$ 6374	\$ 6620	\$ 6359	\$ 6325
1972	1.023	6521	7119	6569	6492
1973	1.023	6671	7560	6701	6441
1974	1.023	6824	8048	6853	6366
1975	1.023	6981	8504	6956	6328
1976	1.030	7190	9123	7169	6434
1977	1.030	7406	9828	7418	6556
1978	1.030	7628	10596	7683	6561
1979	1.030	7857	11435	7964	6452
1980	1.030	8093	12225	8180	6220
1981	.992	8028	13270	8529	8968
1982	.992	7964	13898	8581	5627
1983	.992	7900	14596	8657	5431
1971-1983		95437		97619	81201

The use of the average municipal bond yield from 1961 through 1970 to discount actual 1971 through 1983 earnings may be inappropriate for additional reasons: First, none of the equations in the article explicitly reduce earnings to take account of taxes nor are baseline earnings described as being after-tax. When earnings are not reduced by taxes the normal discount rate is the before-tax return not the tax-exempt municipal bond return. The taxable treasury bond rate which the authors also used to discount actual earnings is not described as being after-tax. Secondly, the U.S. Supreme Court in *Jones and Laughlin Steel v. Pfeifer* (p. 783) has reaffirmed that "the discount rate should be based on the rate of interest that would be earned on the best and safest investments." According to the Bond Investors Association "... a surprising amount of municipal bonds have defaulted in recent years" (See Federal Register, 1989, p. 28801.) Municipal bonds are not the best and safest investments. United States Treasury instruments are the best and safest investments. Therefore, the use of municipal bond yields is subject to criticism. Thirdly, if one were to use a long-term interest rate, it can be argued that it should not be the average yield over the 1961 through 1970 period. The use of interest rates that were actually available to investors near the end of that period would be more appropriate.² Long-term municipal bond rates averaged 6.51 percent during 1970. The present value of actual earnings from 1971 through 1983 discounted at 6.51 percent is \$81.742. Thus, in this example, the estimated loss using an augmented offset approach is higher than the loss calculated using actual earnings discounted at the municipal bond rate prevailing during 1970.

Alternative analytical approaches can produce different discount rates. For example, the use of a roll-over approach can result in an effective discount rate that differs from the one resulting from the use of an average long-term bond approach. A discount rate derived by averaging a decade of past long-term municipal bond yields can be criticized. This is especially true when the authors note that "the theoretical justification for this [offset] approach is that wage growth rates and interest rates are both affected by inflation. . ." (p. 734). As noted earlier, returns from previously issued long-term bonds do not change as interest rates change on one reason interest rates change is inflation. The desirable use of longitudinal data to evaluate alternative approaches that have been used to estimate economic damages will be enhanced when greater attention is given to the selection of the interest rate used to discount historical earnings.

References

1. *Economic Report of the President*, 1990, Washington, D.C., U.S. Government Printing Office.

² Of course, neither of these approaches avoids the problem of unexpected future changes in inflation and interest rates.

2. *Federal Register*. Rules and Regulations. vol. 34, no. 130, (July 10, 1989).
3. *Federal Reserve Bulletin*, Board of Governors of the Federal Reserve System. various issues.
4. *Jones and Laughlin Steel Corp. v. Pfeifer*. 76L.Ed. 2nd.
5. Lambrinos. James and Oskar R. Harmon, 1989, An Empirical Evaluation of Two Method for Estimating Economic Damages, *Journal of Risk and Insurance*, 56: 731-39.

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