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Compensatory Damages and the Appropriate Discount Rate: A Comment

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In "Compensatory Damages and the Appropriate Discount Rate," (*Journal of Forensic Economics*, Winter 1992) Marc S. Margulis addresses issues concerning the appropriate discount rate. He states,

> The contention of this article is that the appropriate discount rate is one which counterbalances the uncertainties associated with projecting future losses. Such uncertainty is defined, herein, as risk. Parity in risk must be maintained between projected losses and the discount rate. A risk-free rate of interest is an appropriate discount rate only when applied to projected losses which are, themselves, risk-free. As elements of uncertainty, or speculation, enter into the projection of future losses, either those elements must be removed from the analysis or the discount rate must be increased commensurately to maintain parity in risk. To do otherwise would yield an award which overcompensates the plaintiff (p. 33).

and

> To discount expected, but uncertain, future sums of money by a risk-free rate of return lacks parity in risk (p. 38).

This contention is not correct. Some simple algebra shows that a risk-free rate is the appropriate rate to be used to calculate the present value of an *expected* future loss in order to properly compensate the individual. Discounting by using a rate reflecting risk is appropriate only when the future loss being discounted is not the expected future loss (e.g. capitalizing current earnings in a business valuation).

Assume that an individual has lost earning capabilities for a future year n. Let the present amount required to compensate the individual for the loss in year n be the present value of the amount which he or she would have been expected to earn in year n except for the lost capability. With risk neutrality, the individual would then be on the same indifference curve when ignoring all but money. Generally, forensic economists measure expected lost income, $E(Y_n)$, by using some probability-based model; the LPE model, for example, takes into account the probabilities of being alive, participating in the labor force and, being employed. There is a p.d.f. associated with Y_n, but, for the purposes here, it is not necessary to specify the p.d.f., one only need know $E(Y_n)$.

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When the economist reaches an opinion concerning $E(Y_n)$ it becomes necessary to choose a discount rate in order to calculate a discount factor. The decision to be considered here is whether to choose a risk-free rate, r_1, or a rate which entails risk, r_2. The discount factors, df, would be

1) $$df_1 = \frac{1}{(1+r_1)^n}$$

or,

2) $$df_2 = \frac{1}{(1+r_2)^n}$$

Then, the economist would calculate the amount required now for future compensation, pv, as either

3) $$pv_1 = df_1 \cdot E(Y_n)$$

or

4) $$pv_2 = df_2 \cdot E(Y_n)$$

The amount the person is expected to end up with in period n, E(fv), is then,

5) $$E(fv_1) = E((1 + r_1)^n) \cdot pv_1$$

or

6) $$E(fv_2) = E((1 + r_2)^n) \cdot pv_2$$

As discussed, the goal is that E(fv) be equal to $E(Y_n)$. Since there is no uncertainty involved with r_1 the term $E((1 + r_1)^n)$ in 5) is non-stochastic and is $(1 + r_1)^n$ so that the right-hand-side of 5) collapses to $E(Y_n)$. Using r_1 gives the desired position of $E(fv) = E(Y_n)$. On the other hand, r_2 does involve risk so that $E((1 + r_2)^n)$ is stochastic. There is a non-zero probability that r_2 will be zero (i.e. the non-default rate of return is r_2 and the default rate of return is 0). This means $E((1 + r_2)^n) < (1 + r_2)^n$. From 2), 4) and 6) one sees that when r_2 is used $E(fv) < E(Y_n)$. The conclusion then is that the expected future earnings must be discounted with a riskless rate in order for the expected future value to be equal to the expected future earnings loss.

The conclusion has a heuristic meaning. The calculation of expected future earnings takes into account the various risk factors such as death and unemployment. Subjecting the expected amount, which has been adjusted for risk factors, to further risk adjustment by discounting with a rate which reflects a non-zero risk of default results in an under-compensation to the plaintiff.

References

Margulis, Marc S., "Compensatory Damages and the Appropriate Discount Rate," *Journal of Forensic Economics*, Winter 1992, *6*(1), 33-41.