The Present Value of Lost Financial Support due to Wrongful Death

By

Kurt V. Krueger and Gary R. Albrecht

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Kurt V. Krueger
John Ward Economics
8340 Mission Rd., Ste 235
Prairie Village, KS 66206
Tel: 913-381-9420
Fax: 913-648-5740
Email: Krueger@JohnWardEconomics.com

Gary R. Albrecht
Albrecht Economics
Post Office Box 15685
Winston-Salem, NC 27113
Tel: 336-727-9435
Fax: 336-722-9452
Email: AlbrectGR@aol.com

Abstract

This paper presents a mathematical model to calculate the present value of lost financial support due to wrongful death. Such a model is noticeably absent from the literature. From the model's simplified form, the economic loss of financial support is equal to the present value of the deceased's expected but-for-death remaining lifetime labor-related earnings less his or her personal consumption. Simplification of the model requires that the decedent and survivor have equal obtainable investment yields. Without investment yield equalization, every term in the complete model requires estimation. The relevance of this paper is twofold. First, the model verifies that the complexities of trying to calculate the but-for-death remaining lifetime "accumulations" in the decedent's estate or wealth is not necessary to determine damages to survivors. Second, the model illuminates the terms and assumptions of the present value calculation opening a door to future discussion and research.

Introduction

This paper presents a mathematical model to calculate the present value of lost financial support due to wrongful death. Such a model is noticeably absent from the literature. From the model's simplified form, the economic loss of financial support is equal to the present value of the deceased's expected but-for-death remaining lifetime labor-related earnings less his or her personal consumption. Simplification of the model requires that the decedent and survivor have equal obtainable investment yields. Without investment yield equalization, every term in the complete model requires estimation. The relevance of this paper is twofold. First, the model verifies that the complexities of trying to calculate the but-for-death remaining lifetime "accumulations" in the decedent's estate or wealth is not necessary to determine damages to survivors. Second, the model illuminates the terms and assumptions of the present value calculation opening a door to future discussion and research.

The first section of this paper addresses the economic concepts within the calculation of the present value of the loss of financial support along with the literature that has discussed the problem. The second section presents the mathematical model of the deceased's and survivors' economic situations that leads to the conclusion. The paper ends with a discussion of the economic

terms and assumptions that are embedded into the model which need to be a part of case-specific estimation of the model.

Economic Problem and Literature

Survivors' claims for the loss of financial support derive from the expected living expenses, gifts, and bequeathment that would have been provided to them by the decedent but for the wrongful death. The objective of the wrongful death loss computation is to calculate the present value dollar amount that, with investment, will enable the survivors to replace their economic losses incurred due to the wrongful death of their benefactor. Within case law, wrongful death damages are often referred to as the sum of lost support and lost net accumulations.[i] Lost support can be referred to as the present value of the expected routine payments of living expenses and gifts to the survivors by the decedent, and lost net accumulations represent the present value of what the decedent's estate would have been worth to the survivors at the time of normal death less the value of the estate at the time of death.

Several authors have described the wrongful death problem (without a mathematical model) involving the death of a husband or wife limiting their analyses to decedents' earnings and personal consumption (see for example, Thornton and Schwartz (1987); Depperschmidt (1998); and, Trout and Foster (1993)). For single

person households, Brown (1998) used savings as the obverse of consumption and estimated savings rates in lieu of estimating the personal consumption rate to apply against earnings. As opposed to lost regular support derived from the decedent's earnings, Scott and PonArul (1991) and Frasca (2002) both develop models to estimate the expected value of lost prospective inheritance as a result of premature death. In Scott and PonArul, lost savings are relevant in the model that divides earnings between consumption and savings and the savings accumulate and become a loss to survivors. In the Frasca model, the dollar amount added to the potential inheritance is forecasted for each time period considered. In both Scott and PonArul and Frasca, the amount of future dollars added to the estate on an ongoing basis is estimated directly, so it becomes necessary to estimate the future decisions by the decedent in dividing his or her income between routine or annual support for dependents/survivors and savings in the form of investment for bequeathment to survivors. In addition, in order to calculate loss to survivors, these models require estimation of the rates of return that would have been achieved with future investment.

Model of the Economic Loss of Financial Support

For simplicity, we assume one male decedent and one female survivor. At the time of death, the decedent had three assets that provided for his personal consumption: (1) stored wealth with

some known balance (net zero, negative, or positive), (2) his earning capacity (whether he utilized it for labor income or not), and (3) the monetary value of expected gifts provided to him (net zero, negative, or positive). This situation can describe nearly every decedent with the most common decedents in forensic economics being married working husbands and wives sharing and gifting assets.

The years within the model begin at the date of death, t_0, and end at what was the date of the decedent's expected normal survival, T. Income and estate taxes are ignored. But for the death, the survivor's expected lifetime financial support from the decedent from time t_0 to T is the amount

$$(1) \qquad Y_T = \sum_{t=1}^{T} D_t + W_T$$

where Y is the total financial support provided to the survivor by the decedent, D is the amount of support provided by the decedent to his survivor, and W is the value of stored wealth. The decedent's basket of wealth items after t years is subject to a return at the decedent-applicable yield vector r as

$$(2) \qquad W_t = W_0(1+r)^t + \sum_{i=1}^{t} I_i(1+r)^{(t-i)} \text{ for} t = 1, 2, 3, \ldots, T$$

where I is the annual amount of investment. Annual investment is determined under the identity

(3) $$I_t = E_t - P_t - D_t$$

where E is the decedent's labor income and P is his personal consumption.[ii] The decedent's cash flow is adequately described by equation (3). When $(P_t + D_t) < E_t$, I_t is positive. When $(P_t + D_t) > E_t$, I_t is negative, and W must be tapped to pay for P_t or D_t.

The vector of yields r associated with each component of the W basket is available to the decedent or survivor assuming a known and accepted risk premia embedded in the r that the decedent chooses or influences.[iii] Any return earned by the decedent on his investment activity above the yields on comparable passive investment is a return to the decedent's labor, human capital, or personal goodwill which is a component of E (see for example: Brown (1995), Frasca (2002), Romans and Floss (1997), Sliwoski (1996), Spizman and Floss (2002), and Trevino (1997)). Oppositely, any discount to the relevant risk-free market yield voluntarily assumed by the decedent is a return foregone by the decedent for non-economic reasons.

At the time of his normal death, T, the decedent's wealth would have been worth

(4) $$W_T = W_0(1+r)^T + \sum_{i=1}^{T} I_i(1+r)^{(T-i)},$$

or, substituting (3) into (4)

(5) $$W_T = W_0(1+r)^T + \sum_{i=1}^{T} (E_i - P_i - D_i)(1+r)^{(T-i)}.$$

Substituting equation (5) into equation (1), we can restate the survivor's expected lifetime financial support from the decedent as

(6) $$Y_T = \sum_{t=1}^{T} D_t + W_0(1+r)^T + \sum_{i=1}^{T} (E_i - P_i - D_i)(1+r)^{(T-i)}.$$

For the wrongful death economic loss solution, in order to properly compensate the survivor, Y_T must be reduced to a present value.

In order to calculate the present value of Y_T, we need to recognize two discounting periods and two discount rates. The first discounting period is from t_0 to each t. This is required in order to calculate the present value of support given at each t, D_t, and the amount of new investment at each t, $(E_t - P_t - D_t)$. The discount rate from t_0 to t is equal to the interest rate q that is relevant in forensic economics to discounting earnings and personal consumption. The second discounting period is from t to T. This is required in order to calculate the present value of the financial return achieved on the amount of new investment at each t, $(E_t - P_t - D_t)$, through the terminal date T. Since W is expected to increase

with yields earned within the vector *r*, the appropriate interest rate to discount financial return from *t* to *T* is the vector *r*. The survivor must have the same capacity as the decedent to achieve *r*. If *r* is not achievable by the survivor, the decedent used his or her own labor, human capital, or goodwill to achieve that return. Conversely, if *r* was held deliberately below a risk-free market return by the decedent, then he voluntarily forwent investment return which could be accounted for with a negative adjustment to the discount rate *r* in order to avoid over-compensating the survivor.

The total discount factor, $(1+q)^{\alpha}(1+r)^{\beta}$, is used for each summation on the right-hand-side of equation (6), but each summation has different discounting periods (the α and β exponents reference different discounting periods for each summation on the right-hand-side of equation (6)). The simplified present value of the aggregate amount Y_T is then

$$(7)\quad \mathrm{PV}(Y_T) = \sum_{t=1}^{T} \frac{D_t}{(1+q)^t} + \frac{W_0(1+r)^T}{(1+r)^T} + \sum_{i=1}^{T} \frac{(E_i - P_i - D_i)(1+r)^{T-i}}{(1+q)^i (1+r)^{T-i}}.$$

The first term of equation (7) related to D_t terminates at time *t*, so the applicable compounding on *q* is the amount of time from t_0 until *t*, and since *r* is irrelevant, the compounding on *r* is zero and so the $(1+r)$ term is omitted. In the second term of equation (7) related to W_0, compounding on *r* occurs from t_0 until *T* and since *q* is

irrelevant, the compounding on q is zero and so the $(1+q)$ term is omitted. In the third term of equation (7), both time periods are relevant with compounding on q from t_0 until time t and compounding on r from t until T. We can simplify equation (7) to

$$(8) \qquad \mathrm{PV}(Y_T) = \sum_{t=1}^{T} \frac{D_t}{(1+q)^t} + W_0 + \sum_{i=1}^{T} \frac{(E_i - P_i - D_i)}{(1+q)^i},$$

and further to

$$(9) \qquad \mathrm{PV}(Y_T) = W_0 + \sum_{t=1}^{T} \frac{(E_t - P_t)}{(1+q)^t}.$$

Equation (9) represents a present value calculation of the amount of financial support the survivor would have received from the deceased had the deceased remained alive. Since the survivor receives W_0 at the time of death, the present value of the economic loss to the survivor is:

$$(10) \qquad \mathrm{PV}(\text{Economic Loss}) = \sum_{t=1}^{T} \frac{(E_t - P_t)}{(1+q)^t}.$$

Discussion and Case-Specific Considerations

Two important results follow from equations (9) and (10). First, if equation (10) is equal to or less than zero, then the economic loss of financial support to the survivor does not exist—in fact, the survivor is better off by receiving the post-death W_0 before its expected tapping to pay for the decedent's personal

consumption. Second, equations (9) and (10) also show that the economic loss of financial support does not depend on how the decedent would have allocated routine annual support to his survivor or to investment with later bequeathment to his survivor. This result is important as such allocation would be difficult to reliably measure and it eliminates the need for a separate net estate accumulations calculation. An often overlooked condition or assumption of calculating the present value of lost financial support due to wrongful death is the ability of the decedent and survivor to achieve or have the same investment return *r*. If that assumption is violated, the terms of equation (6) must be calculated and then discounted under the *r* relevant to the survivor.

When confronting a variety of wrongful death cases, the economist must at a minimum be able to estimate the decedent's labor-related earnings and personal consumption from the date of the wrongful death through his normal lifetime. In cases where the decedent investment yields were higher or lower than the passive yields available to his survivor, the economist will need to employ available forensic economic methods that isolate those positive or negative financial returns and assign them to labor-related earnings or personal consumption, respectively. Without that adjustment, a mismatch occurs between the decedent's and survivor's investment

return that renders simplification of the model to equation (10) impossible.

Conclusion

This paper has explored the ramifications of the deceased's wealth holdings and anticipated investment upon the make-whole amount required to compensate survivors. Under the assumption of the equalization of investment yield before and after the death, we show that a separate accounting for accumulations in the decedent's estate or wealth is not required when calculating loss of financial support to survivors. The survivor completes the make whole process by investing inherited wealth along with the present value award of lifetime earnings less personal consumption at the yield associated with the risk premia assumed by their decedent.

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[i] For example, the 2007 Florida Statutes 768.21 (5) (a) states: Loss of earnings of the deceased from the date of injury to the date of death, less lost support of survivors excluding contributions in kind, with interest. Loss of the prospective net accumulations of an estate, which might reasonably have been expected but for the wrongful death, reduced to present money value, may also be recovered.

[ii] Investments include the portion of the decedent's earnings allocated to items such as Social Security, pensions, and life insurance (e.g., "investments" that can produce different streams of income associated with the date of the decedent's normal or wrongful death). While such investments do not change the macro-structure of the model, the economist will likely need to make specification calculations related to such forms of investment when present in a specific wrongful death case.

[iii] For example, the decedent's wealth might consist of two assets (a_1 = a home, and a_2 = marketable securities) with two matching passive r's (r_1 = increase/decrease in home value, and r_2 = average annual investment return on the decedent's chosen portfolio).

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