Comments on

Merle F. Dimbath, "The Economic Value of a Still-Born Child: A Case Study,"

by

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NAFE Winter Meeting, Puerta Vallarta, Mexico, Feb. 2, 2001.

This is a stimulating paper on an interesting topic. Before making some specific comments on the paper, I will offer some remarks about the investment approach to finding the economic value of a child.

I. Overview of the Investment Approach

The investment approach to placing a dollar value on the damages resulting from the death of a child is based on revealed preference. Parents are assumed to make a conscious choice to have children. That choice is assumed to be made in full knowledge of the costs of giving birth to a child and raising the child to the age at which the child will be emancipated and live independently as an adult. The costs of raising the child include (a) explicit out-of-pocket costs for food, clothing, shelter, transportation, medical care and other expenses, possibly including primary and secondary education expenses if the child attends a private school, and college expenses if the parents plan to send the child to college, and (b) the opportunity cost of the time the parents spend giving care and attention to the child while the child is growing up.

Given the validity of the assumption that parents willingly choose to have a child, the value of the child must be at least as great as the costs parents anticipate having to bear because of the decision to bring the child into existence. While I doubt that many parents consult the *Family Economics and Nutrition Review* to assist them in forming an estimate of the costs of raising a child before making the decision to have one, it is safe to assume that families know that costs will be incurred. And the assumption that children are brought into the world as a conscious choice is more reasonable given that there are lots of forms of birth control and legal abortion. While it would probably be absurd to argue that all children are "planned," the existence of options for avoiding having to raise a child increase the likelihood that any given child was consciously chosen.

There remains the possibility that some children are "accidents" but the parents raise them anyway due to social pressure to (a) avoid abortion, (b) avoid giving up children for adoption, (c) fulfill their social obligations as parents. For this latter group of parents it may not be appropriate to assume there was some moment of decision where the expected future benefits of having a child were judged by the prospective parents to exceed the anticipated future costs, unless one of the "benefits" of keeping and raising the child is construed to be the avoidance of the disutility involved in having an abortion, or

giving up the child for adoption. However, determining whether in a specific child death case the parents are the type that fit the model or the type that do not is clearly not the job of the economist, but of some other kind of expert or group of experts (family planning counselors and social workers?) who are familiar enough with the economic model to assist the economist by issuing an opinion as to whether the couple likely made a conscious decision to have a child.

For the couple who makes the informed decision to have a child, Ireland and Ward (1995, p. 56) describe the investment approach in mathematical terms with following equation:

$$(1) \quad \sum_{i=0}^{N} B_i / (1 + d)^{(i - i_p)} \geq \sum_{i=0}^{M} I_i / (1 + d)^{(i - i_p)}$$

where:

B_i = parental benefit from the child in year i,
I_i = parental investment in the child in year i,
i_p = the present year,
d = the rate of discount for past and future,
N = the index of life expectancies of the parents,
M = the year in which parental investment ends.

In Eq. (1), the flow of benefits, B_i, from having a child over the life expectancies of the parents is composed of (a) “the benefits of companionship, counsel, guidance, emotional support and dynastic elements,” and (b) “direct financial contributions and household services the child might have made to parents once old enough to do so.” (Ibid, p. 55) These relational values are indirectly measured via Eq. (1), which states that for it to be optimal to have a child, the flow of benefits measured by the left-hand side must have a present value at least as large as the expected parental investment measured by the right-hand side. Hence, even though the benefits of having a child represented by the B_i are largely psychic and difficult to quantify, the investments made by the parents are capable of being quantified in dollar terms and used as a minimum benchmark value for the benefits lost as a result of the child’s death occurring in year i_p.

The superscript, $i - i_p$, on the (1 + d) term on the right-hand side of Eq. (1) indicates that investments occurring before the present year should be augmented for lost interest, whereas investments occurring after the present year should be discounted back to the present. Thus, if a five year old child dies, the values for the power to which the denominator term in the discount factor 1/ (1 + d) is raised equals -5 for past expenditures

made in year 0, -4 for expenditures made in year 1, and so on, representing the compounding of past losses up to the date of the child’s death. Similarly, for future years beyond the child’s date of death, the power of the denominator in the discount term is +1, +2 and so on, for the discount factor applied to future expenditures contemplated when the child would have been age 6, age 7, and so on.

The values in Eq. (1) for the B_i and I_i pertain to the values that were anticipated by the parents at the point in time when the decision was made to have a child. After having the child and with the passage of time, the annual values of these anticipated variables can and will likely change. With the passage of time, expected investment amounts in the first years of the child’s life become realized amounts, which may differ from the amounts anticipated at the point of decision to have the child. Furthermore, the passage of time reveals information about the child that was unknown at the time of the decision to have the child. For example, after birth it could be discovered that the child has a birth defect or congenital disease, implying higher annual investment amounts for child care and medical costs than were originally anticipated, and perhaps lower anticipated future relational benefits.

Even though the decision to have the child is irreversible, the outcomes realized following the child’s birth may change the values of the B_i and I_i in Eq. (1), and these changes may alter the value of the child to the parents. The birth of child (and perhaps even the mere knowledge of pregnancy) would begin the flow of the direct relational benefits that was only anticipated in the decision to have the child. This direct experience, in and of itself, would likely increase the B_i.[1] On the other hand, unforeseen adverse health events raise the investment in the child due to extra care and medical costs. If these higher costs are substituted from the original costs in Eq. (1), the implication of the investment approach is that health problems raise the investment in and therefore the economic value of the child. This is a somewhat counterintuitive result. The introduction unforeseen health problems would be expected to raise the I_i, and, if this increase was larger than the increase in the B_i that might accompany the provision of special care to the child, then it is not clear that the value of the child to the couple would necessarily increase with the introduction of a health problem. Ireland and Ward make the valid point that the economist is not really able to determine how events beyond the decision point to have the child impact the B_i in Eq. 1. Indeed, there is little or no reliable evidence about the distribution of the B_i over the life expectancy of the parents. Hence, Ireland and Ward advocate simply using the benchmark value of Eq. (1) as of the moment the decision was made to have the child, without adjustment, noting that the lay jury is as qualified as the economic expert to make adjustments they deem to be reasonable, given the events between the date of the

[1] See Ireland and Ward, p. 58.

decision to have the child and the child’s date of death.

II. Issues and Problems in the Use of the Investment Approach

Ireland and Ward note several problems posed by the investment approach, most of which relate to the uncertainty about the size and exact time distribution of the B_i – uncertainty which, of course, is why the investment approach is used in first place. I discuss three problems most directly relevant to my remarks about the Dimbath paper.

The first problem is the “past offset problem.” If a child dies at, say, age 12, some of the benefit of having the child has already been received. The use of Eq. (1) computes total investment as a proxy for total benefits. Should some offset be made to the loss shown by Eq. (1) to allow for benefits already received? Ireland and Ward argue that economists are not experts in how the B_i are distributed through time. Hence, economists are not qualified to specify what offset should be made. Ireland and Ward simply suggest using Eq. (1) and explicitly mentioning that no offset for past benefits has been made.

The second problem is the “future offset problem.” If a child dies, the future investment costs that would have been borne by the parents are saved. Should these savings be deducted from the total investment value as computed by Eq. (1)? If future intended expenses are deducted, the implication is that a 15 year-old child is approximately three times as valuable as a 5-year-old child. This kind of conclusion flies the face of the reasonable assumption that the parental loss from the death of a child of any age, 0 to 18, is quite similar, aside from the effects of different discounting and compounding periods. Ireland and Ward argue that making no deduction for future intended expenses is the most reasonable approach because (a) “the investment approach focuses on the economic value of a child as a consumer-durable asset from a pre-birth perspective,” and (b) “once a child is born or adopted and bonded with parents, there is a fundamental utility transformation such that a child may have almost infinite value to parents.” (Ireland and Ward, p. 60). Bonding produces huge increases in the B_i and causes future investment expenses to become a serious underestimate of parental willingness to pay to avoid the loss of the child. Not making the deduction for saved future expenses avoids unreasonable value differences based on age and recognizes the large excess of benefits over costs once the bonding has occurred with the parents.

A third problem arises with the death of a very young child. Given that the parents are usually relatively young themselves when a young child dies, the option exists for the couple to have another child to replace the one who died. Ireland and Ward argue that the economist should provide the estimate of economic value specified by Eq. (1), leaving it up the jury to determine what kind of adjustment to make to allow for the possibility of a replacement child.

III. Comments on the Dimbath Paper

Having provided this review of the investment cost approach, I now make a few comments about the Dimbath paper. On the whole, this paper is an interesting and thoughtful application of the investment cost approach. However, the paper does have a few flaws, or matters that could be questioned.

1. Analysis of the Dimbath Table. The most significant comment regards a potentially misleading procedure with respect to the paper's discounting and compounding procedures. In the table accompanying the paper, the values in Columns 4 (projected direct cost) and 12 (total indirect cost) are compounded forward at 7.5% per year and shown in Columns 5 and 13, respectively. This forward compounding does not seem appropriate if the present value of the child is to be determined as of the child's date of death. The figure of $435,949 is the value of the investment costs as of the date that the child reaches age 18, in 2018. Using the paper's annual discount rate of 7.5%, a lump sum of $435,949 available in 18 years has a present value in 2000 of only about 27% of the value in 2018, or about $118,599. Though the table does present a present value of about this size in Column (17), I think the forward compounding is more or less extraneous and is potentially misleading.

In terms of Eq. (1), for a stillborn child the value of i_p is at most approximately equal to 1 (i.e., this allows for nine months for the pregnancy and three months of having fun trying to get pregnant), and virtually all the investment expenditures lie in the future. Hence in Eq. (1) $i > i_p$ for virtually all i, meaning future expenses should be discounted rather than compounded. To compound the costs forward to age 18 implies that the child died at age 18 in 2018 rather than at birth in 2000.

Table 1, attached, computes the present value of investment expenses. Columns (a) and (b) show the year and age of the child. Columns (c) and (d) show the direct and indirect cost of rearing the child to age 18 and are taken directly from (4) and (12) of the Dimbath paper. Column (e) shows the total of the direct and indirect costs, which is the same as Column (14) in the Dimbath table. Column (f) shows the compound factors for expressing what a dollar invested in the indicated year would be worth as of the child's 18^{th} birthday. Like the Dimbath paper, I use a mid-year convention. I also treat the death as if it had occurred at the beginning of 2000 rather than on 5/6/2000. Thus, the total cost of $17,778 for the last year in Column (e) is multiplied by the factor 1 + 0.075/2 = 1.0375. The total cost of $17,095 in the next-to-last year is multiplied by 1.0375 x 1.075 = 1.115313, and so on.

Column (g) shows total cost plus interest of $436,237, which differs very slightly

from the total of Column (15) in the Dimbath paper of $435,949. This difference is probably due to rounding. In Column (h), I show the discount factors for computing present value as of the beginning of the year 2000. The first figure is just the reciprocal of the last figure in Column (f), namely, 1/(1 + 0.075/2), the second figure in the reciprocal of the next-to-last figure in Column (f), and so on.

The Dimbath table in Column (16) contains a present value of the stream of payments in Column (14) that uses a 5.1% discount rate, whereas Column (17) uses a 7.5% rate. This former rate is no where justified in the paper and it is confusing to have it introduced into the calculations, given that the paper does attempt to justify and uses a 7.5% rate. The presence of two different interest rates is likely to be a source of confusion and trouble. If a 5.1% rate is appropriate for discounting, why is that rate not also appropriate when compounding is preformed? It could undermine the credibility of the witness with the court if the court is given reason to believe that the plaintiff’s expert witness uses 7.5% to compound forward and 5.1% to discount. In seems to me that one rate should be used consistently for both compounding and discounting. Using one rate consistently through one’s analysis would seem to be the best course to follow.

2. When does “bonding” occur? The situation of a stillborn child analyzed in this paper raises an additional question about the precise point at which the “bonding” by the parents with the child occurs. This is obviously not a question an economist has the expertise to answer. However, the Ireland and Ward paper emphasizes a distinction between the pre-birth perspective, to which Eq. (1) applies, and the “fundamental utility transformation” after bonding. At what point in the process does the bonding occur for parents? Is it after the child is conceived? After the child is born? Somewhere in between? The case of the stillborn child could possibly be interpreted as one where “bonding” has not yet occurred. If so, the Ireland/Ward arguments for not deducting future expenses seem weaker. The Dimbath paper does not mention whether the injuries to the child’s mother and father in the May 5, 2000, accident were such that the couple would not be able to have any more children. This may be a factor the jury would want to consider because it determines whether a natural replacement child is possible.

3. Adjustments for Risk. In regard to the adjustment made in the discount rate to reflect the risks involved in child rearing (particularly mortality and morbidity risks), there seems to be a puzzle. For children of average health, the year-by-year risk of death between any given age and age 18 is readily calculated from mortality statistics, and could be included as a factor reducing somewhat the likelihood that expenses would be incurred, rather than by raising the discount rate. The risk of serious injury or disease, on the other hand, would increase expenditures for uninsured health care. Can increasing the discount rate be the correct procedure for dealing with both kinds of risks, one of which reduces and the other of which increases expenditures? Rather than adjusting the discount rate, direct

adjustment of the I_i in Eq. (1) might be a more flexible and straightforward manner for taking such risks into account.

Reference

Thomas R. Ireland and John O. Ward, *Valuing Children in Litigation: Family and Individual Loss Assessment* (Tucson, AZ: Lawyers & Judges Publishing Co., 1995).

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Table 1

Computing the Economic Value of a Stillborn Child Using the Investment Approach

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Year	Age	Direct Cost	Indirect Cost	Total Cost (c) + (d)	Com-pound Factors	Total Plus 7.5% Interest (e) x (f)	Discount Factors 7.5%	Total with Discounting @ 7.5% (e) x (h)	Discount Factors 5.1%	Total with Discounting @ 5.1% (e) x (j)
2000	0	$5,707	$3,978	$9,685	3.547578	$34,358	0.963855	$9,335	0.975134	$9,444
2001	1	$5,935	$4,137	$10,072	3.300073	$33,238	0.896610	$9,031	0.927815	$9,345
2002	2	$6,172	$4,708	$10,880	3.069835	$33,400	0.834056	$9,075	0.882793	$9,605
2003	3	$6,579	$4,896	$11,475	2.855661	$32,769	0.775866	$8,903	0.839955	$9,638
2004	4	$6,842	$2,555	$9,397	2.656429	$24,962	0.721735	$6,782	0.799196	$7,510
2005	5	$7,116	$2,657	$9,773	2.471096	$24,150	0.671382	$6,561	0.760415	$7,432
2006	6	$7,609	$2,763	$10,372	2.298694	$23,842	0.624541	$6,478	0.723516	$7,504
2007	7	$7,913	$2,874	$10,787	2.138320	$23,066	0.580969	$6,267	0.688407	$7,426
2008	8	$8,230	$2,989	$11,219	1.989135	$22,316	0.540436	$6,063	0.655002	$7,348
2009	9	$8,716	$3,109	$11,825	1.850358	$21,880	0.502731	$5,945	0.623218	$7,370
2010	10	$9,064	$3,233	$12,297	1.721263	$21,166	0.467657	$5,751	0.592976	$7,292
2011	11	$9,427	$3,362	$12,789	1.601175	$20,477	0.435030	$5,564	0.564202	$7,216
2012	12	$11,142	$3,497	$14,639	1.489465	$21,804	0.404679	$5,924	0.536824	$7,859
2013	13	$11,587	$3,637	$15,224	1.385549	$21,094	0.376445	$5,731	0.510774	$7,776
2014	14	$12,051	$3,850	$15,901	1.288883	$20,495	0.350182	$5,568	0.485989	$7,728
2015	15	$12,434	$4,003	$16,437	1.198961	$19,707	0.325750	$5,354	0.462406	$7,601
2016	16	$12,931	$4,164	$17,095	1.115313	$19,066	0.303024	$5,180	0.439968	$7,521
2017	17	$13,448	$4,330	$17,778	1.037500	$18,445	0.281882	$5,011	0.418618	$7,442
		$162,903	$64,742	$227,645		$436,237		$118,523		$143,056