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# **A Primer on Annuity Contracts, Structured Settlements, and Periodic-Payment Judgements**

## **Introduction**

Economic experts will increasingly be called upon to play roles that involve consulting and testifying about annuity contracts, structured judgments, and periodic payments. These roles may occur in the context of assessing settlement proposals or providing direct testimony before, during and after trials. In New York, this is a regular part of the tort process for all types of tort actions because of New York's Structured Judgement Laws (CPLR 50 - A and B). However, twenty nine other states<sup>1</sup> have some sort of periodic payment laws, particularly in circumstances involving uncertainty about the degree to which severe injury has diminished a claimant's post-injury probabilities of survival. A periodic payment law is simply a law that provides for a compulsory distribution of payments over an extended period of time.

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In all states, structured settlements are possible with the purchase of annuity contracts, or alternatively, through reversible trusts or through other fixed payment schedules. These mechanisms can provide real benefits for claimants in tort actions. These are benefits with which forensic economists need to be conversant.<sup>2</sup> This is a primer designed to provide forensic economists with the rationales behind these alternatives to lump sum payments and to provide an introduction to how they work.

The decision of Judge Louis F. Oberdorfer in the case of *Tarpeh-Doe v. United States* (1991) speaks clearly to the equity problem that arises when there is no agreement between the parties about adequately compensating a plaintiff over the remainder of an undetermined period of post-injury life. Judge Oberdorfer was responding to a situation in which an individual (in this case a child) had been injured catastrophically and the experts for the two sides in the litigation presented different views of the mortality probability distribution of the child, whose name was Nyenpan Tarpeh-Doe. Judge Oberdorfer wrote:

This conflict of expert opinion as to Nyenpan's life expectancy creates an issue that is difficult to resolve equitably. A lump sum award of damages may be too crude an instrument. If the 8.3 year estimate is too low, the plaintiffs will lose relief to which they are plainly entitled. If the 55 year estimate is too high, they will realize a gross windfall at great expense to the taxpayers. There should be a way to minimize the guesswork. It can be determined with reasonable certainty what it will cost to maintain Nyenpan per year, i.e. \$ 84,680.00, adjusted in future years for inflation (or deflation).

A solution may be available through one of several alternative mechanisms: (1) defendants could undertake to pay an annual amount (adjusted for inflation) for the benefit of Nyenpan during his lifetime; or (2) defendants could be required to contribute to a trust a discounted principal sum measured originally by the 55 year life expectancy anticipated by plaintiffs' experts, with distributions by the trustee from income and, if necessary, from principal, in amounts appropriate to maintain Nyenpan during his lifetime with the remainder reverting to defendants at his death. See, e.g., *Friends For All Children v. Lockheed Aircraft Corporation*, 563 F. Supp. 552 (D.D.C. 1983); 587 F. Supp. 180, 202 (D.D.C. 1983). Finally, it is conceivable that (3) commercial insurance companies would be willing to bid on a commercial annuity, the cost of which would be measured by Nyenpan's life expectancy as determined by the insurance carrier on the basis of actuarial experience generally adjusted to reflect Nyenpan's unique condition. See, e.g., *Nemmers v. United States*, 795 F.2d 628, 635 (7th Cir. 1986); but see *Friends for All Children*, 563 F. Supp. at 553. Accordingly, the accompanying Order will require counsel for both parties to investigate these alternatives and to file on or before September 9, 1991 either a joint proposal or separate ones for payment by defendant of the cost of maintaining Nyenpan during his remaining years.

In this passage Judge Oberdorfer lays out a simple framework to explain many of the issues that underlie what this primer is about. We begin with a discussion of what an annuity contract is and how it can function for providing life care. This is the third option posed by Judge Oberdorfer. We also consider the complexities and practical problems involved with a defendant's financing of periodic payments, which is Judge Oberdorfer's first option. We will not consider the nature of reversible trusts, which is the second option posed by Judge Oberdorfer. That is for a future paper. We will, however, discuss the possible use of a Special Needs Trust in conjunction with an annuity contract.

### The Annuity Concept

The annuity concept has been traced back to ancient kingdoms in China, Babylon and Egypt. Romans received payments under schemes that closely resemble benefits that retirees receive from modern pension plans. In the seventeenth century, the annuity concept was further advanced by the development of actuarial tables that could be used to compute annuity values based on mortality rates in conjunction with the effects of compounded interest. From this background came the application of scientific principles of actuarial science and the evolution of the types of annuity payout arrangements found in annuity contracts in structured settlements and structured judgments.

In the United States, the concept of guaranteed annuity contract payments gained popularity after the crises in banking and the financial markets of the Great Depression in the 1930's. Life insurance companies provided crucial guarantees to beneficiaries of their fixed<sup>3</sup> annuity contract benefit payments by maintaining reserves in a "General Account." The General Account holds assets used to fund a life insurer's obligations for guaranteed annuity benefit payments and, as such, are the policy reserves for an annuity contract. Funding requirements for the General Account are regulated by the laws of the various states in which a life insurance company's annuity contracts are sold. These laws focus on preserving the safety of those assets and thus their reliability for meeting the benefit payment terms of the contracts. Both regulations and regulatory power are determined by the individual states in which the companies do business. State regulations specify not only the categories of investments eligible to be put into the General Account, but also the minimum quality criteria for individual investments and the maximum aggregate amounts that are allowed in those categories. The licensing and selling practices of sales agents are

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also covered by state regulations.

### Terms and Definitions

At this point, before proceeding, it will be useful to provide basic terms and definitions used in discussing how annuity contracts are applied in structured settlements.

Simply stated, an *annuity contract* is an agreement between the owner of the contract and the issuing life insurance company that provides for benefit payments to be made to at least one beneficiary or payee. The contract may be for a fixed period of time or for a period of time contingent upon an annuitant's life. For example, the contract might specify that the issuer of the contract will pay the annuitant of the contract monthly benefits starting of \$1,000 per month and increasing by 4% at each anniversary of the contract for the remainder of the annuitant's life. Either the annuitant, or someone on the annuitant's behalf, will have paid (at least) an immediate single lump sum premium to the issuer to initiate this flow of payments.

There may be four possible parties to an annuity contract, though a structured settlement contract only consists of three parties. Each of these parties will have rights and duties under the terms of the contract.

(1) The "owner" of the annuity contract can best be described as the individual or entity that purchases the annuity contract. In structured settlement contracts the owner is usually an insurance carrier, or its assignee, to avoid the possibility of default risk if the carrier goes into bankruptcy.

(2) The "annuitant" is the individual whose life will be used in determining how long the annuity payments will continue to be paid.

(3) The "beneficiary" (or payee) is an individual or entity that will receive payments (benefits) payable under the terms of the annuity contract. The beneficiary has no contractual rights, except to receive benefit payments. In structured settlements, the annuitant and primary beneficiary are the same person.

(4) The "issuing insurance company" is a life insurance company that receives the premium(s) from the owner and promises to pay out (guarantees) the benefit payments according to the terms of the contract.

Annuity contracts have two periods: the pay in or "accumulation period" and the payout or "annuitization period."<sup>4</sup> The accumulation period for most annuity contracts occurs prior to the annuitization period. When all premium payments by the owner are made first and the annuitization period begins immediately thereafter, the annuity contracts

are classified as "immediate annuity contracts." Annuity contracts in structured settlement agreements must be immediate in order to preserve the tax exempt status of benefit payments. As such, the defendant (property and casualty insurer, etc.) purchases the annuity contract from a life insurance company by paying a single premium and payments to the annuitant-beneficiary begin immediately. Another example of this type of immediate annuity contract purchase arrangement are "rolled over" into an annuity contract upon an individual's retirement.<sup>4</sup>

Before proceeding with terms, it is important to note that annuity contracts may contain many different types of payout arrangements, with correspondingly different costs to a life insurance company for providing for those different types of payout arrangements. All else equal, the costs of providing for a particular payout arrangement determines the purchase premium of the annuity contract. The next set of terms involve common types of payout arrangements.

(5) A "Life Annuity/Straight Life" payout plan guarantees that periodic payments will be made to the annuitant for as long as the annuitant remains alive. If only two monthly payments were received and the annuitant then died, no additional payments would be made. This is the purest form of an annuity contract because benefit payments are perpetual and life contingent. Throughout the rest of this paper, the term "life annuity" will carry the same meaning as "Life Annuity/Straight Life."

(6) A "Fixed Period Annuity" allows the annuitant to receive contractual benefit payments over a set number of years. At the end of the period, no further benefits are payable for the remainder of the annuitant's life. However, if the annuitant died during the fixed period, a surviving beneficiary would receive the remaining value by receiving periodic payments to the end of the fixed period, or by receiving a lump sum of equal worth of such payments.

(7) A "Life with a Periodic Certain Guarantee Annuity" provides payments for as long as the annuitant remains alive, but with the hybrid provision that payments are guaranteed to be made over a fixed period, even if the annuitant dies during that fixed period. If the annuitant died during the fixed period, the remaining portion of specified benefits for the specified period would be paid either periodically or in a lump sum to a surviving beneficiary.<sup>5</sup>

The final set of terms are actuarial definitions relating to the use of life tables and variations on degrees of risk reflected in life tables.

(8) A *life table*, or *mortality table* is a table providing a listing of the

number of individuals expected to remaining alive out of a birth base of 100,000 individuals. The table may be broken down by sex or race, to reflect cohorts, but it will, at a minimum, show the number of individuals surviving and dying at each year of age starting from age 0 and continuing to an advanced age, now usually age 100 or 120. (The tables may be static in the sense that they rely exclusively on past experience or cohort in the sense that they attempt to project the number of survivors likely to exist in the future. [This distinction will not be of importance in the current paper and examples will be based on the United States life tables.]<sup>6</sup>)

(9) The term *survival rate*, or simply *survival*, refers to the percent of individuals surviving up to a given age divided by the number of individuals alive at some starting age from which the survival rate is calculated. Thus, for example, if the starting age for males is age 60 in the 1998 U.S. Life table, the number of males out of 100,000 born who survived to age 60 was 84,188. The number of males in that group still alive at the start of age 65 was 77,547. Thus the survival rate for males age 60 expected to survive to age 65 would be  $77,547/84,188 = 0.9211$ , or 92.11%.

(10) The term *mortality rate*, or simply *mortality*, refers to the percent of individuals who are projected to die as of future ages on a year by year basis. Thus, if an individual is 50 years of age, his mortality consists of the probabilities that he will die at age 51, 52 and so forth. The mortality rate at age 51 is also equal to one minus the survival rate for age 51. Thus, for the example in (9), age 60 to 65 expected mortality =  $1 - 0.9211 = 0.0789$ , or 7.89%.

(11) The term *standard risk* is applied to an individual if an insurance underwriter evaluates the survival and mortality rates of that individual as being typical of the cohort population included in the life table.

(12) The term *substandard risk* is applied to an individual whose survival rates are evaluated by an insurance underwriter as lower than that of an average individual in a life table and whose mortality risks are therefore higher.

### How Structured Settlements Work

The premium costs of annuity contracts are set by individual life insurance companies and the same contracts may involve different premiums with different life insurance companies, depending on both differences in actuarial assumptions about an individual and business objectives of the companies. Generally, a contract's premium quoted by

a life insurance company will depend on (1) an annuitant's survival probability distribution (life expectancy), (2) expected rates of return from the insurance company's investments, (3) sales and administrative expenses incurred by the insurance company, and (4) the insurer's desired profit margin. There is no simple and discrete formula that is offered here to explain the various premiums that might be quoted by different life insurers for a particular structured settlement contract, except to say that it is a complex process.

A structured settlement agreement is a release of damages claims by a potential claimant in exchange for a promise by the defendant to make future periodic payments to the plaintiff. Typically, an immediate lump sum payment is made to the plaintiff and periodic payments are funded by the defendant's subsequent purchase of an annuity contract from a life insurance company that provides for any periodic payments agreed to between the parties. The annuity contract then produces a stream of periodic payments to the plaintiff according to amounts and time schedules agreed to between the parties in the structured settlement agreement. An issuing life insurance company is chosen by the defendant, who will then become the owner of the contract by paying a single purchase premium to the life carrier. Note, however, that the defendant could also purchase government bonds to fund the periodic payment structure specified in the settlement agreement. To preserve the tax exemption on the periodic payments, there is no specific requirement that an annuity contract be purchased, though it is the most common option.<sup>7</sup>

The first reported case to use a structured settlement annuity contract was *M & P Stores, Inc. v. Taylor* (1958).<sup>8</sup> The term *structured settlement annuity* does not appear in this case, but the jury awarded \$36,000 in damages "to be paid at \$150 per month for twenty years." It was not until 1968, however, following the Thalidomide birth defect cases that structured settlements became widely used. The Canadian manufacturer of Thalidomide was facing bankruptcy following hundreds of catastrophic injury claims for multiple birth defects. Since the drug company was not insured, both plaintiff and defense counsel undertook negotiations to implement structured settlements that would meet the needs of plaintiffs and also prevent the company from actually going into bankruptcy.

A major impetus for seeking structured settlements comes from their tax advantages compared with lump sum payments.<sup>9</sup> Section 104(a) of the Internal Revenue Code exempts periodic payments derived from properly designed structured settlements from tax liability on the part of

annuitants. This section of the code was originally designed to exempt only Workers Compensation payments from income tax liability and long pre-existed the application of this code section to structured settlement agreements. As a result, there was limited interest in structured settlements. In fact, general acceptance of structured settlements involving annuity contracts did not occur until at least July of 1979, when the Internal Revenue Service handed down Private Revenue Ruling 79-220. Revenue Ruling 79-220 clarified the application of section 104(a) to structured settlements and provided controlling precedent for the tax exemption concept. This ruling was further codified by Congress in 1982, under HR 5470 and, as such, was signed into law in December of 1982. This new law also included provisions for the defendant, or the defendant's property and casualty insurer, to assign its liability and ongoing benefit payment obligation to an independent third party. The assignment of the later obligation reduces the risk of benefit payment default in the event of a bankruptcy filing by the defendant or its property and casualty insurer. Default risk is reduced by allowing for contract ownership by an independent assignee firm, with separate, unattachable annuity contract reserves. Although these events do not constitute the only reason for the substantial growth in the structured settlement annuity market, it is noteworthy that in 1976, the annual volume of contract premiums was only about \$5 million dollars. That volume is in the range of \$12 billion currently.<sup>10</sup>

### **Earning Capacity of an Annuity Contract to Replace Lost**

Annuity contracts within structured settlements can be used for a number of purposes. Most forensic economists are familiar with the tax and financial planning advantages of structured settlements to replace lost earning capacity, so that is not a focus of this primer. However, it will be useful to briefly review those advantages before considering the additional advantages in cases involving life care needs. If the loss in a tort action is limited to lost earning capacity or to lost earning capacity plus some loss of household services, there will not ordinarily be any changes in the annual survival probability distribution of the plaintiff. One could imagine an injury that reduced annual survival probabilities (life expectancy) without requiring a life care plan, but this would ordinarily be rare. How one would modify this discussion in such cases will be obvious after considering the sections that follow, but the current

discussion presumes no changes in survival probabilities.

To make the discussion concrete, assume that the injured plaintiff, Bill Smith is 43 years of age. The economist for the plaintiff has projected an earnings loss over a 20 year period of \$373,870, starting from \$25,000 in 2002, increasing at an annual rate of 1.942% per year and reduced to present value at a discount rate of 5.0% per year. The practical implication of this calculation is that a 20 year work life expectancy is being assumed, but the result is provided as a certainty equivalent for that period even though use of annual work life probabilities through, say, age 70 would reduce the present value. Assume further that the jury is likely to accept the plaintiff's economic expert's projection because liability is very clear. Further, the circumstances of the case are such that the defendant would like very much to settle the case and would probably be willing to offer \$373,870 to settle the case. Assume that the attorney's fee is one third so that the lump sum amount to be received by the plaintiff for a settlement of \$373,870 is \$249,247 and the attorney's fee is \$124,623. The question is whether, in an effort to settle this case, there would be any mutual advantage in a structured settlement proposal from the defendant.

Framed in this way, the defendant will gain if his cost for the settlement falls below \$373,870 and the plaintiff will only gain if the plaintiff receives a proportion of settlement benefit worth more than \$249,247. A structured settlement may be able to do that, using a fixed annuity over a 20 year period that paid out the same payments as shown in table 1. There are three reasons a structured settlement annuity may be beneficial to Bill Smith. The first is an investment advantage that we have been discussing. The life insurance company can invest \$249,247 in such a way that it would expect to earn much more than the risk free rate assumed in the calculations of the plaintiff's economic experts calculations (in this case 5%). The life insurance company would invest in a very conservative portfolio of assets, but it would not be as conservative as the portfolio assumed by the plaintiff's economist. Thus, the life insurance company would be willing to guarantee payments of the amounts shown in table 1 in return for having the use of a principal of something less than \$249,247.

The second reason lies in the tax advantage discussed above. Bill Smith will not owe taxes on annuity payments, assuming that they have met the requirements discussed above. If Bill Smith took a lump sum of \$249,247, he would have to pay taxes on the investment yield unless the portfolio was entirely invested in Municipal tax free bonds. Thus, there will be an important tax advantage to Bill Smith in receiving the

payments in the form of a structured annuity rather than in a lump sum.

**Table 1. Projected Lost Earning Capacity of Bill Smith**

Year	Age	Lost Earning	Monthly Pmt	Present	
				Value	Cumulative
2002	43	\$25,000	\$2,083	\$24,398	\$24,398
2003	44	\$25,486	\$2,124	\$23,687	\$48,084
2004	45	\$25,980	\$2,165	\$22,997	\$71,082
2005	46	\$26,485	\$2,207	\$22,327	\$93,409
2006	47	\$26,999	\$2,250	\$21,677	\$115,086
2007	48	\$27,524	\$2,294	\$21,046	\$136,132
2008	49	\$28,058	\$2,338	\$20,433	\$156,565
2009	50	\$28,603	\$2,384	\$19,838	\$176,402
2010	51	\$29,159	\$2,430	\$19,260	\$195,662
2011	52	\$29,725	\$2,477	\$18,699	\$214,361
2012	53	\$30,302	\$2,525	\$18,154	\$232,516
2013	54	\$30,890	\$2,574	\$17,626	\$250,142
2014	55	\$31,490	\$2,624	\$17,112	\$267,254
2015	56	\$32,102	\$2,675	\$16,614	\$283,868
2016	57	\$32,725	\$2,727	\$16,130	\$299,998
2017	58	\$33,361	\$2,780	\$15,660	\$315,659
2018	59	\$34,009	\$2,834	\$15,204	\$330,863
2019	60	\$34,669	\$2,889	\$14,762	\$345,624
2020	61	\$35,342	\$2,945	\$14,332	\$359,956
2021	62	\$36,029	\$3,002	\$13,914	\$373,870

The third advantage is that the structured annuity can provide monthly payments that Bill Smith, who had not had to deal previously with large sums of money, can better manage than if Bill Smith received a lump sum payment of \$249,371 and had to try to learn how to budget his use of that money over the next twenty years. Effectively, the award of a lump sum award for lost earnings liquifies those lost earnings. For persons with financial sophistication, that would be an advantage, giving an expert more control over the use of his or her financial resources. For someone who lacks sophistication, however, it opens the door to very poor money management that would not have been possible if lost earnings had been paid over the years rather than in a lump sum. Having direct control of \$249,371 at one time could operate to the significant disadvantage of Bill Smith. An annuity approach would effectively put Bill Smith back onto a monthly budget that was similar

to the income level that he worked with before his earnings were lost. Note that the tax free aspect of tort awards is such that the amounts received after attorney fees are likely to be similar to the amounts Bill Smith received after paying taxes on his earned income, such that Bill Smith may well be able to receive a stream of monthly payments that will come fairly close to replicating his net, after tax, lost earnings stream.

### **Disadvantages of an Annuity Contract to Replace Lost Earning Capacity**

The first disadvantage of using an annuity contract to replace lost earnings is the danger that Bill Smith will decide later to sell his rights to the structured payments for much less than they are worth. There is no existing legal mechanism that could prevent Bill Smith from making that mistake.<sup>11</sup> Advertisements regularly appear in a variety of media offering to purchase rights to a future earnings stream. Many of these offers consist of paying not much more than 50% of the present value of the earnings stream being sold. Thus, if Bill Smith is later tempted into making such a sale, he will effectively give away half of the remaining value that he has recovered. Suppose, for example, that the present value of the lump sum he could have received was \$500,000. He was talked into receiving the benefit in the form of an annuity, but three years later wants access to the principle. If he sells his earnings stream, he is likely to get about half of the present value of the remaining payment stream.

The second disadvantage is that Bill Smith will have tied his future income to the financial viability of the insurance company from which his annuity contract was purchased. While no one has yet lost income promised in a structured settlement arrangement, there is no guarantee that this might not happen in the future. If he had lost his job with one company, there is a good chance he could have gone to work for another. If he had invested a lump sum of money and his investments appeared to be in trouble, he could have moved them. With an annuity contract, his future payments must come from one provider whose financial commitment becomes critical to Bill Smith's future payments.

The third disadvantage is that an annuity contract locks in the stream of future payments Bill Smith will receive. The annuity contract can be written so that there is an annual increase in periodic payments equal to what his or her financial advisors anticipate as increases in the cost of

living. However, if inflation is greater than projected, there is no mechanism for Bill Smith to respond by changing his investments, as he could if he invested a lump sum himself. This disadvantage, however, is a two edged sword. It could be that the future rate of inflation was lower than expected at the time the annuity contract was written. In that case, the annual increases built into the contract will give Bill Smith annual increases in real purchasing power. Thus, what could be a disadvantage could also turn out to be an advantage.

Before proceeding, it should be noted that except for the tax exemption on periodic payments, most of the advantages and disadvantages involved with replacing lost earnings with an annuity contract in a structured settlement would be the same as those that apply to the use of annuity contracts for other purposes as well.

### **Providing Life Care with a Standard Survival Probabilities Expectation**

There is an important distinction between the part of tort award to replace lost earning capacity and the part of tort award to provide for life care needs that resulted from an injury. If an individual had a typical life expectancy before an injury, alterations of that individual's annual survival probabilities after an injury typically have nothing to do with the basis for an award for lost earning capacity.<sup>12</sup> However, life care needs are based on only post-injury considerations and, as such, directly depend on the individual's altered annual probabilities of survival after an injury. Our discussion of life care provision will begin with an example in which annual survival probabilities are not altered and then proceed to a discussion of an instance where they have been altered in the next section. In this discussion, we will not consider lost earning capacity or other loss elements. The advantages of a periodic payments from an annuity contract (a/k/a "annuity payments") for each type of circumstance will be considered at the end of each section.

For the first hypothetical example, John Green, a ten year old boy, has been catastrophically injured and will require life care planning for the rest of his life but is assumed to have the same annual probabilities of surviving that he had before his injury. (Attorney fees will be assumed to be \$0 in the following discussion.) The life care planning expert has projected there will be one time costs of \$200,000 for architectural modifications and that life care, including \$90,000 per year for attendant care, will cost \$120,000 per year for the rest of John Green's life. An economic expert has projected that the overall costs of

the plan will increase at an annual rate of 2.43% (actually 2.42718%) per year under current market conditions and should be reduced to present value at a discount rate of 5.5%. (These numbers have been chosen so that the net real discount rate is 3.0%.) The 1998 life table (Anderson 2001) for Males shows 64.6 years as the life expectancy of a ten year old boy, so that figure is used to project the life care needs of John Green. A projection of the necessary lump sum value to provide the projected life care over 64.6 years is shown in the first five columns of table 2, reaching a total of \$3,616,830 six tenths of the way through the year 2066. The first two columns show the year and John Green's age at the start of each year. The next column, "Life Care," shows the nominal amount projected to be needed in that year. That is followed by "Pres. Value Certainty Equity" which is the present value of the care in that year assuming that life care will be needed with certainty. The fifth column, "Certainty Cumulative," provides a running total of the present values through that year. On this basis, a forensic economist might claim that the cost of providing John Green's life care is \$3,616,830.

The projection of the cost of life care begins in 2002, with \$200,000 in initial expenditures for architectural modifications plus \$120,000 for annual expenses. The \$120,000 is reduced to present value as of January 1, 2002 at an annual rate of 5.5% for half of a year, so that the present value is \$200,000 plus \$116,830, or \$316,830. Since there were no prior expenditures, the "Certainty Cumulative" value is also \$316,830. As of 2003, the \$120,000 has increased at an annual rate of 2.43% to \$122,913. Life care costs of \$122,913 have a present value certainty equivalent of \$113,427 and the certainty cumulative at the end of two years has risen to \$430,258. The projection continues for John Green's life expectancy of 64.6 years to age 74.6 in the year 2066 in table 1, at which time John Green is expected to die and no further life care will be needed. For each year up to 0.6 of the year 2066, the amount of life care needed is shown increasing at 2.43% per year in the "Life Care" column, and reduced to present value in the "Certainty Cumulative" column at a discount rate of 5.5%. This is how many forensic economists would make this calculation.

However, as has been pointed out by Ben-Zion and Reddall (1985), Eck, Baker and Davis (1988), Fjeldsted (1993) and Riccardi (1996), there is an important difference between the calculation of the present value for a period certain to the end of John Green's life expectancy and an actuarially adjusted payment stream based on the same *life expectancy* (mortality probability distribution). The difference is shown in the last four columns of table 2. The persons living column is taken

Table 2. Comparison of Certainty Equivalent Present Value vs. Actuarial Present Value

Year	Age	Life Care	Pres. Value		Persons Living	Percent Surviving	Pres Value Actuarial	Actuarial Cumulative
			Certainty Equiv	Certainty Cumulative				
2002	11	\$320,000	\$316,830	\$316,830	98953	1.0000	\$316,830	\$316,830
2003	12	\$122,913	\$113,427	\$430,258	98938	0.9998	\$113,410	\$430,240
2004	13	\$125,896	\$110,124	\$540,381	98918	0.9996	\$110,085	\$540,325
2005	14	\$128,952	\$106,916	\$647,297	98885	0.9993	\$106,843	\$647,168
2006	15	\$132,082	\$103,802	\$751,099	98834	0.9988	\$103,677	\$750,845
2007	16	\$135,287	\$100,779	\$851,878	98765	0.9981	\$100,587	\$851,432
2008	17	\$138,571	\$97,843	\$949,721	98679	0.9972	\$97,572	\$949,005
2009	18	\$141,934	\$94,994	\$1,044,715	98578	0.9962	\$94,634	\$1,043,638
2010	19	\$145,379	\$92,227	\$1,136,942	98466	0.9951	\$91,773	\$1,135,411
2011	20	\$148,908	\$89,541	\$1,226,482	98346	0.9939	\$88,991	\$1,224,402
2012	21	\$152,522	\$86,933	\$1,313,415	98217	0.9926	\$86,286	\$1,310,688
2013	22	\$156,224	\$84,401	\$1,397,816	98079	0.9912	\$83,655	\$1,394,344
2014	23	\$160,016	\$81,942	\$1,479,758	97935	0.9897	\$81,099	\$1,475,443
2015	24	\$163,900	\$79,556	\$1,559,313	97790	0.9882	\$78,621	\$1,554,063
2016	25	\$167,878	\$77,238	\$1,636,552	97648	0.9868	\$76,220	\$1,630,283
2017	26	\$171,953	\$74,989	\$1,711,541	97511	0.9854	\$73,896	\$1,704,179
2018	27	\$176,126	\$72,805	\$1,784,345	97377	0.9841	\$71,645	\$1,775,824
2019	28	\$180,401	\$70,684	\$1,855,030	97244	0.9827	\$69,463	\$1,845,288

Table 2 continued

Year	Age	Life Care	Pres. Value		Persons Living	Percent Surviving	Pres Value Actuarial	Actuarial Cumulative
			Certainty Equiv	Certainty Cumulative				
2020	29	\$184,780	\$68,625	\$1,923,655	97109	0.9814	\$67,347	\$1,912,634
2021	30	\$189,265	\$66,627	\$1,990,281	96970	0.9800	\$65,291	\$1,977,926
2022	31	\$193,859	\$64,686	\$2,054,967	96826	0.9785	\$63,296	\$2,041,221
2023	32	\$198,564	\$62,802	\$2,117,769	96676	0.9770	\$61,357	\$2,102,578
2024	33	\$203,384	\$60,973	\$2,178,742	96520	0.9754	\$59,474	\$2,162,051
2025	34	\$208,320	\$59,197	\$2,237,939	96356	0.9738	\$57,643	\$2,219,695
2026	35	\$213,376	\$57,473	\$2,295,412	96184	0.9720	\$55,864	\$2,275,559
2027	36	\$218,555	\$55,799	\$2,351,210	96003	0.9702	\$54,135	\$2,329,694
2028	37	\$223,860	\$54,173	\$2,405,384	95812	0.9683	\$52,454	\$2,382,148
2029	38	\$229,294	\$52,596	\$2,457,979	95610	0.9662	\$50,819	\$2,432,967
2030	39	\$234,859	\$51,064	\$2,509,043	95395	0.9640	\$49,228	\$2,482,195
2031	40	\$240,559	\$49,576	\$2,558,619	95163	0.9617	\$47,678	\$2,529,872
2032	41	\$246,398	\$48,132	\$2,606,752	94914	0.9592	\$46,168	\$2,576,040
2033	42	\$252,379	\$46,731	\$2,653,482	94647	0.9565	\$44,697	\$2,620,737
2034	43	\$258,505	\$45,369	\$2,698,852	94369	0.9537	\$43,268	\$2,664,005
2035	44	\$264,779	\$44,048	\$2,742,900	94050	0.9505	\$41,865	\$2,705,870
2036	45	\$271,206	\$42,765	\$2,785,665	93171	0.9416	\$40,266	\$2,746,136
2037	46	\$277,788	\$41,519	\$2,827,184	93356	0.9434	\$39,171	\$2,785,307
2038	47	\$284,531	\$40,310	\$2,867,494	92966	0.9395	\$37,871	\$2,823,178



Table 2 continued

Year	Age	Life Care	Pres. Value		Persons Living	Percent Surviving	Pres Value Actuarial	Actuarial Cumulative
			Certainty Equiv	Certainty Cumulative				
2039	48	\$291,437	\$39,136	\$2,906,630	92546	0.9353	\$36,602	\$2,859,781
2040	49	\$298,510	\$37,996	\$2,944,626	92096	0.9307	\$35,363	\$2,895,144
2041	50	\$305,756	\$36,889	\$2,981,516	91616	0.9259	\$34,154	\$2,929,298
2042	51	\$313,177	\$35,815	\$3,017,331	91104	0.9207	\$32,974	\$2,962,272
2043	52	\$320,778	\$34,772	\$3,052,103	90556	0.9151	\$31,821	\$2,994,093
2044	53	\$328,564	\$33,759	\$3,085,862	89968	0.9092	\$30,694	\$3,024,787
2045	54	\$336,539	\$32,776	\$3,118,638	89334	0.9028	\$29,590	\$3,054,377
2046	55	\$344,708	\$31,821	\$3,150,459	88646	0.8958	\$28,507	\$3,082,883
2047	56	\$353,074	\$30,894	\$3,181,353	87899	0.8883	\$27,443	\$3,110,327
2048	57	\$361,644	\$29,995	\$3,211,348	87084	0.8801	\$26,397	\$3,136,723
2049	58	\$370,422	\$29,121	\$3,240,469	86197	0.8711	\$25,367	\$3,162,090
2050	59	\$379,412	\$28,273	\$3,268,741	85232	0.8613	\$24,352	\$3,186,443
2051	60	\$388,622	\$27,449	\$3,296,191	84188	0.8508	\$23,353	\$3,209,796
2052	61	\$398,054	\$26,650	\$3,322,840	83056	0.8393	\$22,368	\$3,232,165
2053	62	\$407,716	\$25,874	\$3,348,714	81829	0.8269	\$21,396	\$3,253,561
2054	63	\$417,612	\$25,120	\$3,373,834	80502	0.8135	\$20,436	\$3,273,997
2055	64	\$427,748	\$24,388	\$3,398,222	79075	0.7991	\$19,489	\$3,293,486
2056	65	\$438,130	\$23,678	\$3,421,900	77547	0.7837	\$18,556	\$3,312,042

Table 2 continued

Year	Age	Life Care	Pres. Value		Persons Living	Percent Surviving	Pres Value Actuarial	Actuarial Cumulative
			Certainty Equiv	Certainty Cumulative				
2057	66	\$448,764	\$22,988	\$3,444,888	75926	0.7673	\$17,639	\$3,329,680
2058	67	\$459,656	\$22,319	\$3,467,207	74211	0.7500	\$16,738	\$3,346,419
2059	68	\$470,813	\$21,669	\$3,488,876	72392	0.7316	\$15,852	\$3,362,271
2060	69	\$482,241	\$21,038	\$3,509,913	70450	0.7120	\$14,978	\$3,377,249
2061	70	\$493,945	\$20,425	\$3,530,338	68375	0.6910	\$14,113	\$3,391,362
2062	71	\$505,934	\$19,830	\$3,550,168	66170	0.6687	\$13,260	\$3,404,622
2063	72	\$518,214	\$19,252	\$3,569,420	63850	0.6453	\$12,423	\$3,417,045
2064	73	\$530,792	\$18,692	\$3,588,112	61423	0.6207	\$11,602	\$3,428,647
2065	74	\$543,676	\$18,147	\$3,606,259	58899	0.5952	\$10,802	\$3,439,449
2066	75	\$556,872	\$10,571	\$3,616,830	56288	0.5688	\$10,022	\$3,449,471
2067	76	\$570,388			53600	0.5417	\$9,266	\$3,458,736
2068	77	\$584,232			50847	0.5139	\$8,534	\$3,467,270
2069	78	\$598,413			48024	0.4853	\$7,825	\$3,475,095
2070	79	\$612,937			45121	0.4560	\$7,138	\$3,482,233
2071	80	\$627,814			42127	0.4257	\$6,470	\$3,488,703
2072	81	\$643,052			39032	0.3945	\$5,820	\$3,494,523
2073	82	\$658,660			35846	0.3623	\$5,189	\$3,499,713
2074	83	\$674,647			32606	0.3295	\$4,583	\$3,504,296
2075	84	\$691,022			29377	0.2969	\$4,009	\$3,508,305

Table 2 continued

Year	Age	Life Care	Pres. Value Certainty Equiv	Certainty Cumulative	Persons Living	Percent Surviving	Pres Value Actuarial	Actuarial Cumulative
2076	85	\$707,795			26219	0.2650	\$3,474	\$3,511,778
2077	86	\$724,974			23135	0.2338	\$2,976	\$3,514,754
2078	87	\$742,570			20167	0.2038	\$2,518	\$3,517,273
2079	88	\$760,594			17351	0.1753	\$2,104	\$3,519,376
2080	89	\$779,055			14723	0.1488	\$1,733	\$3,521,109
2081	90	\$797,964			12310	0.1244	\$1,407	\$3,522,516
2082	91	\$817,332			10133	0.1024	\$1,124	\$3,523,640
2083	92	\$837,170			8204	0.0829	\$884	\$3,524,524
2084	93	\$857,490			6528	0.0660	\$683	\$3,525,207
2085	94	\$878,303			5100	0.0515	\$518	\$3,525,725
2086	95	\$899,621			3910	0.0395	\$385	\$3,526,110
2087	96	\$921,456			2938	0.0297	\$281	\$3,526,391
2088	97	\$943,821			2163	0.0219	\$201	\$3,526,592
2089	98	\$966,730			1558	0.0157	\$141	\$3,526,733
2090	99	\$990,194			1098	0.0111	\$96	\$3,526,829
2091	100	\$1,014,228			757	0.0077	\$64	\$3,526,894

from the same 1998 life table from which the 64.6 life expectancy figure was obtained. The numbers in the "Persons Living" column are taken directly from the "Number living at the beginning of age interval" column of table 2 of the 1998 life table. This is the number alive out of a birth-base of 100,000 persons. At ten years of age, 98953 persons remain alive out of 100,000 males born ten years earlier. Those numbers decline year by year to age 100 when just 757 remain. The column labeled "Percent surviving" is calculated as a percentage of 98953 remaining alive in that year, so that the number starts from 1.0000 in 2002 and gradually declines to .0077 at age 100. The numbers in the "Percent Surviving" column, if added up, can also be interpreted as fractions of each year that an individual would be expected to live. Therefore, if those values are added together, they sum to life expectancy.

In the column labeled "Pres Value Actuarial" the probability and present value discounted value of the Life Care needed in that year is calculated. In the way the table is structured, this makes no difference in the year 2002 because the probability of survival assumed to be 100%.<sup>13</sup> Thus, the number in the certainty present value column and actuarial present value column are the same. However, in the year 2003, the value in the certainty column is \$113,427 while the number in the actuarial column is \$113,410. The \$17 difference is because there is a .0002 chance of mortality. The numbers in the actuarial present value column are obtained by multiplying the cost of life care by the number in the "Percent Surviving" column and then reducing that figure to present value. Because there remains some chance, however small, that John Green would survive to age 100, the table continues to age 100.<sup>14</sup> The result is a reduction in the cumulative present value of 2.5% when using the annual probabilities of survival compared with the method of calculating the cost to life expectancy certain.

An annuity approach would capture this 2.5% reduction along with the advantages of a qualified annuity discussed in the context of an annuity award for lost earning capacity. The reduction in the cost to the defendant of an annuity approach to life care in this circumstance is similar to that encountered with using an annuity approach to replace lost earnings. With unaltered annual survival probabilities, the primary financial advantage of annuity payments to provide life care is the tax advantage discussed earlier with respect to lost earnings. There is, however, another practical advantage that has been of significance for both judges and legislators. John Green is a catastrophically injured ten year old boy, whose financial decisions will be made by his parents or

guardians. It is unlikely that they have the financial acumen or self control to manage a loss replacement fund of three and a half million dollars. Thus, there is some tendency for funds to be mismanaged or misused on the presumption that the funds are relatively unbounded sources of money, rather than used for the annual expensive provision of life care expenses. What has sometimes happened is that parents or guardians have mismanaged the funds so that they ran before the needs of the child, now often an adult without the competency to manage his or her own affairs, had ended.

When funds for the provision of life care have been mismanaged the result has been that the injured person's life care expenses fall back on the state for provision, causing legislators to be interested in increasing the financial controls under which parents and guardians function. Annuity payments are well suited to maintaining this kind of fiduciary control in that the money is typically provided in monthly amounts, which do not seem so endless, even to financially unsophisticated parents and guardians. States have adopted a variety of regulations for situations involving what parents and guardians are permitted to do with life care funds for dependent children or adults and annuity contracts can be written to conform with those regulations. This is especially true for life care made necessary by medical malpractice.

### **Providing Life Care With Reduced Annual Survival Probabilities**

In the previous example, the difference in present values between the certainty equivalent and actuarial calculations is only 2.5%. This was not a large difference. However, if the injury has altered the mortality probability distribution of the child, other factors come into play that produce much more significant differences. It is those factors that normally lead to controversies about the use of an annuity contract approach for dealing with life care.

When an injury requiring life care needs has potentially reduced an individual's annual probabilities of survival, this is often an area of disagreement between the litigating parties. In litigation contexts, that controversy is normally framed in terms of degrees of reduction in life expectancy even though that is an imprecise way of discussing reduced annual survival probabilities. It is quite common for plaintiff attorneys to argue that the injured individual's life expectancy is normal or near normal and to have medical experts who state opinions that the injured individual's life expectancy is longer than will be claimed by medical

experts for the defense. Because life care costs for catastrophic injuries can be much larger than lost earnings, this is often the area of most concern to the litigants in such cases. These disagreements are likely to occur in two areas: (1) Differences among the medical experts about how long the injured person might live; and (2) Differences in the costs recommended by the life care planning experts for each side.

The magnitudes of these differences obviously depends on the experts being relied upon. However, table 3 provides an example for purposes of illustration and discussion. Assume that the plaintiff has hired life care planner A, who has projected \$200,000 in immediate costs and \$120,000 per year in annual costs over the lifetime of the plaintiff child, starting from age 11. The defendant has hired life care planner B, who has projected \$150,000 in immediate costs and \$100,000 per year in costs over the lifetime of the plaintiff. Medical experts for the plaintiff have opined that the plaintiff child will live 20 more years, while medical experts for the defense have opined that the plaintiff child will only live 10 more years. Calculations of loss in table 3 are based on certainty equivalents for all years up to 20 years of life, with a growth rate of 2.43% and a discount rate of 5.5%, as in the examples above. In this example, at a 10 year lifespan, the costs of the two life care plans are \$1,313,415 versus \$1,097,318, or a \$216,097 difference. At a 20 year life span, the costs are \$2,054,067 versus \$1,715,278, or a \$338,789 difference. This is a 16.5% difference at either life span. The more important difference is the difference between a 10 year and a 20 year life span. With estimates based on life care planner A, the difference is between \$1,313,415 and \$2,054,967, a 56.5% increase. With the estimates based on life care planner B, the difference is between \$1,097,318 and \$1,715,278, a 56.3% increase.

In terms of money differences in this example, the big difference is obviously the difference in life expectancy. This poses the significant problem that medical doctors are not experts on how long individuals are likely to live with specific physical conditions. Medical doctors have anecdotal experience with how long their patients with similar conditions have lived, but most medical doctors would readily admit that there is a good deal of variability among their experiences and that they have never made any systematic study of how long large populations of persons with those physical limitations have survived. Thus, the opinions they express are very ad hoc opinions that may or may be accurate. Given that non-annuity life care funds will run out if they are wrong, this is quite important. The fundamental reality is that no one can know in the present how long any catastrophically injured

**Table 3.** Comparison of Life Care Plan Differences with Life Expectancy Differences

Year	Age	Life Care-A	PresValue-A	Cumulative-A	Life Care-B	PresValue-B	Cumulative-B
2002	11	\$320,000	\$316,830	\$316,830	\$200,000	\$266,830	\$266,830
2003	12	\$122,913	\$113,427	\$430,258	\$102,427	\$94,523	\$361,353
2004	13	\$125,896	\$110,124	\$540,381	\$104,913	\$91,770	\$453,123
2005	14	\$128,952	\$106,916	\$647,297	\$107,460	\$89,097	\$542,219
2006	15	\$132,082	\$103,802	\$751,099	\$110,068	\$86,502	\$628,721
2007	16	\$135,287	\$100,779	\$851,878	\$112,739	\$83,982	\$712,703
2008	17	\$138,571	\$97,843	\$949,721	\$115,476	\$81,536	\$794,240
2009	18	\$141,934	\$94,994	\$1,044,715	\$118,279	\$79,161	\$873,401
2010	19	\$145,379	\$92,227	\$1,136,942	\$121,150	\$76,856	\$950,257
2011	20	\$148,908	\$89,541	\$1,226,482	\$124,090	\$74,617	\$1,024,874
2012	21	\$152,522	\$86,933	\$1,313,415	\$127,102	\$72,444	\$1,097,318
2013	22	\$156,224	\$84,401	\$1,397,816	\$130,187	\$70,334	\$1,167,651
2014	23	\$160,016	\$81,942	\$1,479,758	\$133,347	\$68,285	\$1,235,937
2015	24	\$163,900	\$79,556	\$1,559,313	\$136,583	\$66,296	\$1,302,233
2016	25	\$167,878	\$77,238	\$1,636,552	\$139,898	\$64,365	\$1,366,598
2017	26	\$171,953	\$74,989	\$1,711,541	\$143,294	\$62,491	\$1,429,089
2018	27	\$176,126	\$72,805	\$1,784,345	\$146,772	\$60,671	\$1,489,760
2019	28	\$180,401	\$70,684	\$1,855,030	\$150,335	\$58,903	\$1,548,663
2020	29	\$184,780	\$68,625	\$1,923,655	\$153,983	\$57,188	\$1,605,851
2021	30	\$189,265	\$66,627	\$1,990,281	\$157,721	\$55,522	\$1,661,373
2022	31	\$193,859	\$64,686	\$2,054,967	\$161,549	\$53,905	\$1,715,278

person will live and that any non-annuity fund to provide life care will run out if the plaintiff lives longer than either side in the litigation has projected. Likewise, there is a possibility that the plaintiff will die almost immediately after an award has been made and almost none of the funds will be needed to provide life care, leaving parents or guardians with a large sum of money not needed for the purposes originally intended by the trier of fact.<sup>15</sup>

#### **Advantages and Disadvantages of Annuity Payments for Providing Life Care Needs**

A primary advantage of the annuity contract approach for providing a stream of periodic payments for life care is that it takes the issue of the plaintiff's annual survival probabilities off the table as an issue between the litigating parties. With an annuity contract approach, the defendant gets bids from life insurance companies for the costs of providing for the life care needs of the plaintiff on a life contingent basis through a life annuity. In effect, the responsibility for determining how long the plaintiff will live is shifted from the medical experts for the plaintiff and the defendant to the life insurance company. (In actuarial terms, the company encumbers the mortality risk associated with a severely injured plaintiff.)

For a price, the premium, the life insurance company guarantees to provide specified periodic payments that can be used for life care, increasing at the rate of increase projected by the experts, for as long as the plaintiff remains alive and needs life care. With a lump sum award the responsibility for provision of periodic payments remains with the plaintiff or the plaintiff's guardians and shifts to the state if the money runs out. With an annuity contract, the responsibility to provide money to pay for life care is assumed by the life insurance company and payments will continue as long as the plaintiff continues to live and the life insurance company remains viable. As a result, the degree to which the injury will reduce annual probabilities for the plaintiff's survival is no longer an issue for the litigating parties. The other advantages of an annuity contract approach are the tax and money management advantages discussed above for lost earnings and/or life care when annual survival probabilities have not been affected.

The disadvantages of an annuity contract approach parallel those discussed earlier with respect to lost earnings. The first disadvantage is that the plaintiff's life care becomes dependent on the guaranty

arrangements in the annuity contract. If the life insurance company that has issued the annuity contract went into bankruptcy, it could happen that the payments guaranteed in the annuity contract would stop, shifting the responsibility for payment back to the plaintiff and the state. To date, there have been no instances of individuals being losing life care coverage in this fashion, but some insurance companies have failed and other guarantee operations have had to preserve the annuity payments.<sup>16</sup> In this sense, just as a lump sum award for life care could be mismanaged and squandered, an annuity contract could be placed with an insurance company that later failed. For that reason the reliability of the life insurance company that issues the annuity contract and the guaranty arrangements made in the contract are very important.

The second disadvantage of an annuity contract approach in comparison with a lump sum award is that an annuity contract locks in the rate of increase in costs of life care. This removes some of flexibility in how the funds can be used. With a lump sum award, if special needs existed in a given year, adjustments could be made in investments so that more money was made available at the time it was needed. With an annuity contract, extra money that might be needed in a given year would not be available unless the annuity contract was coupled with one of the many kinds of trusts designed to address this issue, such as a Special Needs Trust, as will be discussed below. The periodic payment in an annuity may not turn out to be sufficient in any given year for one of two reasons: (1) The amount life care needed is greater than projected by the life care planning expert; or (2) The rate of cost increase for ordinary life care needs is greater than projected by the economic expert. The first problem is often addressed by additional revenue that may be available through a Special Needs Trust. The second problem could be partially addressed by building in a safety margin in the rates of cost increase that have been projected. These mechanisms will be discussed below. Before doing so, however, it will be useful to detail the role of life insurance companies in determining premiums that will be charged for life care.

### **How Life Insurance Companies Provide Annuities for Life Care**

Life insurance companies make money by providing the service of pooling the risks of living and dying for large groups of people. What is called *term life insurance* is actually the insurance that a sum of money will be paid for the benefit of an individual's survivors if an

individual dies. If every individual knew when born exactly how long he or she would live, there would be no market for term life insurance. Individuals might hire investment counselors to better plan how their financial resources should be spread over the known life span, but would not need insurance to prevent the impact of unexpected death. Life insurance companies are able to offer guarantees of available cash for death benefits payments. From previous records, life insurance companies are able to project how many people in various categories will die at specific ages. They do not know which individuals will die, but they can be reasonable confident that predictable percentage of them will die.

As a result, if life insurance companies invest prudently and price life insurance premiums correctly, they will be able to guarantee to pay specified amounts to those individuals who die earlier than would ordinarily be expected. This is because there are an equal number (in dollar terms) of individuals who will live longer than expected. If enough individuals purchase correctly priced life insurance policies, life insurance companies will make more money from the policies of persons who live longer than expected than they will pay out on policies of those who do not live as long as expected. However, like any other businesses, life insurance companies can make incorrect business decisions and fail.

In a certain sense, life annuities (straight life), as defined above, are the opposite of term life insurance. With a term life insurance contract, the policy holder makes periodic payments of specified amounts, typically increasing with age, to maintain a guarantee that if the policy holder dies, the life insurance company will pay a specified amount of money to named beneficiaries of the policy holder. The contract states that no money is paid unless the policy holder dies. A life annuity contract reverses each of those conditions. The policy owner pays a single premium at the time the annuity is purchased. The life insurance company makes the periodic payments of specified amounts to the annuitant as long as the annuitant remains alive, but no money is paid after the annuitant dies. If the reader looks back to some of the other types of annuities that were discussed above, one will find reversed parallels in various types of *whole life* options that life insurance companies offer as variations that include some aspects of term life insurance.

If term life insurance is insurance against dying with insufficient liquid assets to allow one's survivors to have adequate finances, a life annuity (Life Annuity/Straight Life) is, in a sense, insurance that covers

the potential of living longer than expected without sufficient finances. In that sense, life insurance and a life annuity are mirror images of each other. Living longer than expected is a risk of concern in catastrophic injury situations because of the importance of life care expenditures. Any lump sum award for life care will prove to be inadequate if the injured person lives long enough and needs the care that was projected throughout that longer than expected life. With an annuity approach, the person cannot outlive the provision of money for life care. As long as the insurance company remains in business and continues to fully meet its obligations, the payments will continue to come even if the individual, predicted to live for ten years, ends up living to age 100. In that sense, an annuity contract is ideally suited for providing life care. Life insurance companies can provide guarantee that premium because they are relying on large pools of invested premiums. For every one person who was expected to live ten years, but lives forty years more, there are many other individuals who were predicted to live ten years, but end up living 3, 4, 5, 6, 7, 8 or 9 years instead of the predicted ten years. The life insurance company may effectively "lose money" on the first individual, but will "make money" on the others in such a way that it can live up to its guarantees to all of them.

### **Age Rating and How Life Insurance Companies Price Annuity Premiums**

Life insurance companies have no magic way of determining how long an individual will live. Actuarial science is not a way of predicting what cannot be predicted. Thus what life insurance companies can work with is historical data regarding mortality to make their estimate about how long any one individual will live. They review medical reports in conjunction with general information about the mortality statistics for individuals with specific physical or health conditions. Medical underwriting guidelines may indicate that quadriplegics generally have higher annual mortality probability than individuals without physical limitations, but there is a great range in how long quadriplegics live. Although medical underwriters employ numerous guidelines to determine the degree to which an injured person's mortality is increased, every situation is somewhat different. Thus no medical underwriters can come up with a mortality distribution that is exactly right for the given injured plaintiff.<sup>17</sup>

Even given these uncertainties, however, life insurance underwriters

can and do make determinations regarding the amount to which a severely injured plaintiff's mortality distribution probability has been altered. In real world situations where annuity premium quotes are sought for given individuals, there is often significant variability in the premium quotes received. Part of this reflects different appraisals of the medical and physical condition of the annuitant, but part of it relates to how badly the life insurance company wants to sell the annuity. The standard form for pricing annuity premium quotes involves what is called the *age rating* of an individual. In the example above, which will be continued below, John Green is a catastrophically injured 11 year old boy. In a given insurance companies premium quotation, he might be age rated at age 50. That would mean that he was assumed, for purposes of the premium quote, to have the same mortality distribution as a 50 year old man. From the 1998 life table used in this paper, an 11 year old boy has a life expectancy of 64.6 years. A 50 year old man has a life expectancy of 27.6 years. Thus, by age rating the boy at 50 years, the life insurance company is pricing the annuity as if the boy were 50 years of age.

How this works will be shown in table 4 below. Before proceeding to that discussion, however, it is important to stress that different life insurance companies will base their premium offers on different age ratings for John Green. In a recent case involving one of the authors, the lowest premium quoted for a child was based on a age rating of 65 years. However, there were also bids from 15 other life insurance companies that ranged from age ratings of 25 years to 59 years. On the surface, this would appear to suggest tremendous differences in their appraisals of how long the child is likely to live, but the life insurance companies with very low age ratings were more likely to be signaling that they were not interested in seriously competing for the contract than that their ratings were reflections of their estimates that the child would live as long as would be implied by their age ratings. There are important business elements in why specific life insurance companies age rate individuals as they do. With that qualification, we show in table 4 how a age rating of age 50 for John Green would affect the cost of providing an annuity for his life care.

In table 4, the column "R Age" shows the rated age based on the decision to age rate John Green as if he was 50 years of age instead of 11 years of age. The 91616 value shown in table 2 is the same as the figure shown in table 1 for a 50 year old male, with the following numbers those shown for ages 51 and thereafter to age 100. The "% Living" numbers are now obtained by dividing 91104 by 91616 for the

Table 4. Present Value of John Green's Life Care at Age Rating to Age 50

Year	Age	R Age	Living	%Living	Life Care	PVActuary	Actuary Cum
2002	11	50	91616	1.0000	\$320,000	\$316,830	\$316,830
2003	12	51	91104	0.9573	\$122,913	\$108,589	\$425,419
2004	13	52	90556	0.9516	\$125,896	\$104,792	\$530,212
2005	14	53	89968	0.9454	\$128,952	\$101,080	\$631,291
2006	15	54	89334	0.9387	\$132,082	\$97,444	\$728,735
2007	16	55	88646	0.9315	\$135,287	\$93,877	\$822,612
2008	17	56	87899	0.9237	\$138,571	\$90,375	\$912,987
2009	18	57	87084	0.9151	\$141,934	\$86,929	\$999,916
2010	19	58	86197	0.9058	\$145,379	\$83,537	\$1,083,454
2011	20	59	85232	0.8956	\$148,908	\$80,196	\$1,163,650
2012	21	60	84188	0.8847	\$152,522	\$76,907	\$1,240,557
2013	22	61	83056	0.8728	\$156,224	\$73,663	\$1,314,220
2014	23	62	81829	0.8599	\$160,016	\$70,461	\$1,384,680
2015	24	63	80502	0.8459	\$163,900	\$67,299	\$1,451,979
2016	25	64	79075	0.8309	\$167,878	\$64,181	\$1,516,160
2017	26	65	77547	0.8149	\$171,953	\$61,107	\$1,577,267
2018	27	66	75926	0.7979	\$176,126	\$58,087	\$1,635,355
2019	28	67	74211	0.7798	\$180,401	\$55,122	\$1,690,476
2020	29	68	72392	0.7607	\$184,780	\$52,204	\$1,742,681

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Table 4 continued

Year	Age	R Age	Living	%Living	Life Care	PVActuary	Actuary Cum
2021	30	69	70450	0.7403	\$189,265	\$49,324	\$1,792,005
2022	31	70	68375	0.7185	\$193,859	\$46,477	\$1,838,482
2023	32	71	66170	0.6953	\$198,564	\$43,668	\$1,882,150
2024	33	72	63850	0.6710	\$203,384	\$40,910	\$1,923,060
2025	34	73	61423	0.6455	\$208,320	\$38,209	\$1,961,269
2026	35	74	58899	0.6189	\$213,376	\$35,571	\$1,996,840
2027	36	75	56288	0.5915	\$218,555	\$33,004	\$2,029,845
2028	37	76	53600	0.5632	\$223,860	\$30,513	\$2,060,358
2029	38	77	50847	0.5343	\$229,294	\$28,103	\$2,088,460
2030	39	78	48024	0.5047	\$234,859	\$25,769	\$2,114,230
2031	40	79	45121	0.4741	\$240,559	\$23,506	\$2,137,736
2032	41	80	42127	0.4427	\$246,398	\$21,307	\$2,159,043
2033	42	81	39032	0.4102	\$252,379	\$19,167	\$2,178,210
2034	43	82	35846	0.3767	\$258,505	\$17,090	\$2,195,300
2035	44	83	32606	0.3426	\$264,779	\$15,092	\$2,210,392
2036	45	84	29377	0.3087	\$271,206	\$13,202	\$2,223,594
2037	46	85	26219	0.2755	\$277,788	\$11,439	\$2,235,033
2038	47	86	23135	0.2431	\$284,531	\$9,800	\$2,244,833
2039	48	87	20167	0.2119	\$291,437	\$8,294	\$2,253,127

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Table 4 continued

Year	Age	R Age	Living	%Living	Life Care	PVActuary	Actuary Cum
2040	49	88	17351	0.1823	\$298,510	\$6,928	\$2,260,055
2041	50	89	14723	0.1547	\$305,756	\$5,707	\$2,265,762
2042	51	90	12310	0.1294	\$313,177	\$4,633	\$2,270,395
2043	52	91	10133	0.1065	\$320,778	\$3,703	\$2,274,097
2044	53	92	8204	0.0862	\$328,564	\$2,910	\$2,277,008
2045	54	93	6528	0.0686	\$336,539	\$2,248	\$2,279,256
2046	55	94	5100	0.0536	\$344,708	\$1,705	\$2,280,961
2047	56	95	3910	0.0411	\$353,074	\$1,269	\$2,282,231
2048	57	96	2938	0.0309	\$361,644	\$926	\$2,283,157
2049	58	97	2163	0.0227	\$370,422	\$662	\$2,283,819
2050	59	98	1558	0.0164	\$379,412	\$463	\$2,284,282
2051	60	99	1098	0.0115	\$388,622	\$317	\$2,284,598
2052	61	100	757	0.0080	\$398,054	\$212	\$2,284,810

year 2003, 90556 by 91616 for 2004 and so forth through age 100 in the "R Age" column. The values in the "Life Care" column remain the same as those shown in table 1. The "PV Actuary" values are calculated in the same way as the values in the "Actuarial Present Value" column of table 1, but now with a the survival probability distribution based on the 50 year old age rating assumption. It is the smaller annual probabilities of survival that result in the smaller present value of \$2,284,810, compared with the \$3,526,894 shown in table 2. While other important factors would be involved, such as investment portfolio earnings projections and administrative expenses, a hypothetical comparison may be made here based solely on increased mortality. On this basis and using a age rating of age 50 for John Green, an insurance company could offer a premium of \$2,436,000 for the payment stream in table 4,<sup>18</sup> which would represent a savings of \$1,090,864 to the defendant, compared with lump sum payment of \$3,526,894.

### **The Role of State Legislatures in Dealing with Life Care Needs of Injured Persons**

In recent years, much of the emphasis on tort reform has been focused on medical malpractice. Because of high medical malpractice premiums, some medical specialties are understaffed in some states and medical doctors have gone on strike to induce state legislatures to take corrective action. In addition, business groups generally are concerned about very large awards that are made to provide life care, both in terms of what it costs to provide medical insurance for their own employees and in terms of liabilities for life care that they will face from personal injury torts. In addition to political pressures, state legislatures have been under very tight budgetary pressures. If an individual is injured badly enough to require life care and that individual's funds to pay for life care run out, the financial burden of that individual's care falls back on state budgets. For both reasons, state legislatures have been concerned with how life care plans are funded and managed when injured persons win tort awards. This primer will not provide comprehensive coverage of the reasons for and against various tort reform proposals, but will consider two general issues of concern. One is to reduce the chances of windfall gains to heirs of an injured person whose award for life care is in excess of the amount needed because of an individual's increased mortality risks resulting from an injury. The second is to reduce the chances of life care needs falling back onto state



budgets. Because of political pressures, state legislatures have an interest in avoiding unnecessarily high awards for life care. Because of budget containment needs, they have an interest in avoiding circumstances in which the costs of an individual's life care falls back on state budgets.

State legislators also have a third interest relating to the protection of the assets of minor children and adults with guardians from possible misuse of life care funds by family members. Special laws exist in most states to provide extra layers of protection to avoid misuse of funds by guardians. Issues of this sort are best handled in Special Needs Trusts, as will be discussed below. The interest of state legislators arises both from equity responsibilities to protect children and adults who cannot protect their own interests and from preventing misuse of funds from resulting in states providing life care of last resort if funds run out.

### **Why Windfall Gains to a Plaintiff's Heirs May Occur**

Individuals who need life care plans often have severe injuries that reduce their annual survival rates. While it is imprecise to say it this way, their life expectancies are significantly reduced. This reduction, however, is unlikely to be introduced by plaintiff attorneys, whose reward for winning cases is usually specified as a percentage of the amount awarded for life care. If an injured plaintiff is projected to have a normal life expectancy, the total present value projected by an economic expert will be significantly larger than if the projection was based on the individual's probable life expectancy after the injury. Thus plaintiff attorneys will gain a financial benefit if the amount awarded for life care is based on a normal life expectancy rather than a reduced life expectancy. The defense is put into an awkward position by this situation in that its claim to owe less for life care than projected by the plaintiff's experts is based on having injured the plaintiff so badly that the plaintiff will die sooner than projected by the plaintiff's experts and thus not as much money will be needed to provide for the plaintiff's life care. Explaining why this is the case may entail making juries even more aware of the degree of harm that has been caused by an injury. Thus, defendants may not try to argue convincingly that the amounts projected by the plaintiff's expert is too large.

If an award for life care is too large because juries have assumed a normal life expectancy when the individual has a significantly reduced life expectancy because of the injury, a lump sum award for damages in the form of future life care costs will be larger than it needs to be. Since

severely injured individuals have relatively few ways to spend money, it is likely that the result will be a windfall gain to the plaintiff's heirs when the plaintiff eventually dies, leaving part of the award unspent on life care, but available for other uses by the injured plaintiff's heirs (Riccardi and Ireland 2000).

### **Periodic Payment Provisions in Tort Reform**

The first mechanism in Judge Oberdorfer's set of alternatives for dealing with uncertainties about how long an injured person will survive was periodic payments provided by defendants to be used for life care for the plaintiff. As a solution for the problem of survival uncertainty, this is probably not a workable solution, given that most defendants would not want to take on the functions of a life insurance company. However, tort reforms enacted by a number of states include provisions for periodic payments by defendants to provide for life care in medical malpractice cases. Under these periodic payment provisions, if a plaintiff dies before all payments have been made, payments from the defendant, or the annuity contract purchased by the defendant, will be terminated.

How such procedures are to work is not always made clear. In Missouri, for example, Section §538.220 of Missouri Statutes authorizes periodic payments in medical malpractice cases and makes it clear that payments may be terminated if the plaintiff needing life care dies. However, neither Section §538.220 nor case law interpreting that section have developed guidelines for trial court judges who must make decisions under that section (Ireland 2001). Under Section §538.220, however, any agreement between the parties would be likely to be accepted by trial court judges.

### **Special Needs Trusts**

Prompted by the courts, law makers have encouraged the growth of structured annuities in tort litigation at both federal and state levels. Much of this appears to rise above partisan issues into consideration of the best economic interests of both injured claimants and defendants, though some of the plaintiff's bar resists the loss of attorney fees with lower life care costs. In compensating for injury-related encumbrances, such as life-care costs, courts have voiced the ostensible belief that periodic, life-contingent annuity contract payments address the problem

of making a claimant as whole as is possible, without an excess of such periodic payments. Thus, annuity contracts seem to be viewed by both the courts and legislators as an effective solution for the problem of crafting equitable<sup>19</sup> settlements.

As suggested earlier, however, there are problems that an annuity contract cannot solve. One key problem is that special life care needs cannot be predicted with specificity. Injuries can create needs whose timing cannot be predicted. This could include hospitalizations and equipment that did not exist at the time a life care plan was prepared, new therapies that might be developed and so forth. Problems of this sort can often be handled by Special Needs Trusts that have trustees whose authorizations are needed before special expenditures can be made in cases involving minor children or adults who cannot manage their own affairs. The flexibility of this mechanism is such that, within Special Needs Trusts, annuity contracts can exist that take care of regular life care needs, while special need expenditures by family guardians require the authorization of trustees who look out for the interests of the injured person. It is not the purpose of this primer to go into how Special Needs Trusts can be set up and operate, but this is a versatile institutional arrangement that can help solve a number of problems.<sup>20</sup>

It should also be noted that because there are savings to a defendant when annuity contracts are employed, it is often possible to reduce the chances that sufficient funds will not be available by projecting rates of cost increase that are one percent higher than those actually expected and then also funding a Special Needs Trust. Suppose, for example, that a five year old male child's life care costs are projected to be \$100,000 per year in the current year, most of which will go for attendant care. Assume that the plaintiff economist has projected that this sum will increase at 3.0% per year for a normal life expectancy of 70 additional years to age 75, discounted to present value at 5%. That amount would be \$3,883,801. Assume further a top rated insurance company has age rated the child such that he has a mortality distribution that can be point estimated at 25 years. A life expectancy certain projection at 4% per year instead of 3% per year for that period is \$2,234,097. Thus the insurance company could offer to provide a life annuity for the child that increases at 4% per year for perhaps \$2,100,000 in cost to the defendant. Since the cost of the plaintiff's economist's projection is \$3,883,801, the life insurance company could also offer to set up a special needs trust of \$250,000 that would be available if special medical costs arose. If the parents or guardian of the child were prudent in their expenditures and the plaintiff's economist's projections are correct, there would an extra

\$1,000 per year after year one of the payout period. That could be used either to increase the amount in the special needs trust or to allow the parents or guardian to set up their own rainy day fund for the child's needs.

Note that the cost of both the life annuity and the special needs trust is \$2,350,000 to the defendant. If the attorney's fee is one third, the amount needed to fund this plan plus the attorney fee based on the present value would be \$3,525,000. That amount is \$358,801 less than the \$3,883,801 projected by the plaintiff's economist. If a jury had awarded \$3,883,801, and agreement was reached between the parties, this would result in a savings of \$358,801 to the defendant.<sup>21</sup>

### **Concluding Observation**

The previous example is just one among many possible ways life annuities can be used to increase the well-being of plaintiffs while reducing costs confronting defendants. Forensic economists will increasingly need to understand how such mechanisms work as time goes on. This is a case in which "too good to be true" happens to be true.

## Endnotes

1. Currently, at least 35 states have provisions for periodic payments. See the Appendix for listing of provisions that were taken from the American Tort Reform Association web site, <http://www.atra.org/show/7338>. The authors added reference in that appendix to recent legislative enactments in Mississippi and Pennsylvania not shown in the ATRA list, but the authors suspect that other states may also have added periodic payment provisions, particularly in the area of medical malpractice law. Provision for periodic payments is a part of the package of tort reforms being recommended by ATRA and medical groups seeking ways to contain the size of medical insurance premiums.
2. If no other agreement between the parties is reached, New York's structured settlement laws specifically stipulate that the defendant must purchase an annuity contract to distribute the plaintiff's share (net of attorney fees) of a jury's future damages award larger than \$250,000. The authors are not aware of other states with such specific requirements.
3. The term *fixed* is used here only to establish that the annuity concepts being discussed may not necessarily apply to variable annuity contracts.
4. See I.R.C. Section 401.
5. For additional reading in the area of annuities, the authors recommend Atkinson and Dickson (2000) and Brown, Mitchell, Poterba and Warshawsky (2001).
6. Until about 1990, *Vital Statistics in the United States* life tables for all demographic categories went to age 85 rather than 100 or 120. This was a serious limitation because as of the 1998 life tables, 26,219 of 100,000 males who were born 85 years earlier were still alive. That was still 26.22% of all males originally born. That is a significant percentage. At age 100, this number had dropped to 757, significantly less than 1%. The percentage does not drop to precisely zero until all 100,000 have died (or are projected to have died in a cohort table). Nevertheless, little accuracy is lost by ignoring the 100 to 120 tail of the frequency distribution for survivors. Some states mandate specific life tables that must be used for calculating damages or periodic payments. Forensic economists should be aware of state requirements regarding life tables before preparing calculations based on annuities. Likewise, life insurance companies rely on their own life tables when determining premiums for annuities.
7. See the National Structured Settlement Trade Association website; [www.nsstta.com](http://www.nsstta.com).

8. *M & P Stores, Inc. v. Taylor*, 1958 OK 123; 325 P.2d 804; 1958 Okla. LEXIS 422.

9. Although the statutory exemption on income taxation cited here applies only to federal income taxes, generally individual states have also granted similar exemptions of periodic payments from structured settlement annuity contracts.

10. See the website of the national structured settlement Trade Association at [www.nsstta.com](http://www.nsstta.com).

11. For more background on this matter refer to the website of the national structure settlement Trade Association; [www.nsstta.com](http://www.nsstta.com).

12. This is only partially true in Canadian law, where consumption during *lost years* has been subtracted from an award for lost earning capacity in some instances. See Bruce (1999), pages 30-32 on "lost years". This concept is also discussed in *Overly v. Ignalls Shipbuilding*, 74 Cal. App. 4th 165 (1999), but without specific adjustment being made for consumption during lost years. The logic of a lost years consumption reduction is that if an individual will live fewer years following an injury, he or she will not need to spend part of income for basic consumption items that would be needed with a personal injury that did not reduce life expectancy. Thus, it has been successfully argued in some Canadian cases (but unsuccessfully in others) that personal consumption costs during lost years should be subtracted from the amount of an award for lost earning capacity. Such a calculation, if done properly, would involve many of the same actuarial issues we discuss below for provision of life care plans.

The actuarial considerations for a lost years consumption calculation would be as follows: It cannot be known in the present exactly how long the injured person will live any more than would have been the case before the injury. A statement that an individual has lost "ten years of life expectancy is almost meaningless without consideration of the annual changes in survival probabilities underlying that statement. What has happened, assuming the validity of the ten year estimate, is that the annual mortality probability distribution of the individual have been increased by an amount which, when summed on the basis of fractional years of probable survival, would add up to a number ten years smaller than that person's life expectancy before the injury. There is an infinite set of altered annual probabilities of survival that could produce that result, no one of which is, a priori, any more likely than any other to be the specific set involved in the current case.

To accurately make such a calculation, a forensic economist would have to assume some specific distribution of survival probabilities for the individual

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after the injury, which could then be multiplied by consumption expenditures expected for each year to determine an annual reduction in consumption for all years from the date of the injury to the end of work life probabilities, however those were being handled in the forensic economist's calculations. This has almost certainly not been done in Canadian cases.

13. It is obviously not correct that the probability of the individual surviving through the first year is 100%. For simplicity of computational illustration, the survival rate in the first year is assumed to be 100%. Normally, the survival rate would be based on the midpoint (one half) of the year. For simplicity, we have assumed that the person would live through the whole first year in the future, with year to year increments based on year end survival rates.

14. Purists would use a life table that extended to age 120, but as noted earlier the values are insignificant after age 100.

15. See, *Medical Risks, Trends in Mortality by Age and Time Elapsed*, Volumes 1 and 2, Life Insurance Medical Directions of America and Society of Actuaries (1990).

16. In spite of the failure of a number of insurance companies in recent years, state reinsurance requirements have resulted in all payments being ultimately made. There were instances of delays in annuity payments during periods immediately failures of some companies.

17. Life carriers generally employ life tables for annuity underwriting which have an additional amount of survivorship 'cushion' over life tables used in life insurance underwriting, such that the mortality rates are unilaterally lower in the annuity tables than they are in the life product table.

18. From Charles E. Larned, Settlement Consultant, EPS Settlements. Phone: 401/431-6205.

19. As used here, the term *equity* implies that continuing life-contingent payments are best able to guarantee that life care needs will be provided for as long as they are needed at the same time that the reduce the settlement costs to defendants through purchase of annuity contracts. No non-life contingent arrangement can absolutely guarantee that an injured plaintiff will not outlive the amount awarded for life care, but, at the same time, a structured annuity will cost less to the defendant. The only potential losers in this process are heirs of the plaintiff, who lose the potential of windfall gains if the plaintiff dies sooner than provided for in traditional lump sum awards and plaintiff attorneys who receive lower attorney fees.

20. The most important function of many Special Needs Trusts is to enable the injured persons to preserve their entitlements to government benefits

(typically Social Security Disability and Medicaid benefits). Without a Special Needs Trust, the plaintiff winning a tort award would risk being disqualified for any government entitlements for which he or she would normally qualify.

21. This paper has not considered the process of negotiation that can go on between representatives of the parties. The legal system allows many opportunities for the parties to make private agreements to include annuities. Settlements can be arrived at before or after verdicts that would maintain the tax advantage discussed in this paper as long as the plaintiff has not taken *constructive receipt of a lump sum payment*, in accordance with the Revenue Ruling #79-220. Since a right to appeal exists after any trial court decision, a winning plaintiff has some incentive to and can legally arrive a settlement with the defendant on different terms than the verdict. The tax benefits discussed above would still apply.

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## Appendix – Periodic Payments in the 50 States

The descriptions in this appendix were taken from a summary of state laws on medical liability provided by the American Tort Reform Association at [www.atra.org/show/7338](http://www.atra.org/show/7338). The site warns that all legal descriptions should be checked before being relied upon.

**Alabama:** 1987 (Ala. Code Sec. 6-5-543) Mandatory periodic payment of future damages in medical injury in cases in excess of \$150,000.

**Alaska:** 1986 (Alaska Stat. Sec. 09.17.040) Mandatory periodic payment of future damages of all personal injury actions at the request of the injured party. 1976 (Alaska Stat. Sec. 09.17.548) Discretionary periodic payment of future damages for medical injury actions only.

**Arizona:** 1989 (Ariz. Rev. Stat. Ann. Sec. 12-581 to -594) Mandatory periodic payment of future economic damages where there has been an effective election by a party. Applies to court verdicts, settlements and claims subject to arbitration by law or contract.

**Arkansas:** 1979 (Ark. Stat. Ann. 15-114-208) Discretionary periodic payment of damages over \$100,000.

**California:** 1975 (Cal. Civ. Proc. Sec. 667.7) Mandatory periodic payment of future damages award exceeding \$50,000, upon request of party; payments to continue after death of plaintiff to parties to whom judgement creditor owed a duty of support. California Supreme Court upheld constitutionality of the scheduled payment rule. *American Bank and Trust Co. v. Community Hospital of Los Gages - Saratoga, Inc.*, 683 P.2d 670 (1984).

**Colorado:** 1988 (Colo. Rev. Stat. Sec. 13-64-203) Mandatory periodic payment of future damages exceeding \$150,000.

**Connecticut:** 1987 (Conn. Gen. Stat. Sec. 52-225d) Discretionary periodic payment of damages in excess of \$200,000. The parties have 60 days to reach payment terms for damages over \$200,000. If no agreement is reached, a lump sum is awarded.

**Delaware:** 1976 (Del. Ann. Tit. 18, Sec. 6864) Discretionary periodic payment of future damages in medical injury actions only. Compensation for future pain and suffering and future expenses

deducted from balance of payments on death of plaintiff.

**District of Columbia:** No provision listed.

**Florida:** 1986 (Fla. Stat. Sec. 768.78) Mandatory periodic payment of future damage award exceeding \$250,000, at the request of a party. Defendant may elect to pay lump sum for future economic losses and expenses reduced to present value. 1988 (Fla. Stat. Sec. 766.207 (7)(c)) Damages for future economic losses awarded by arbitration payable on a periodic basis under 766.202 (8).

**Georgia:** No provision listed.

**Hawaii:** No provision listed.

**Idaho:** 1987 (Idaho Code Sec. 6-1603) Discretionary periodic payment of future damages exceeding \$100,000.

**Illinois:** 1985 (Ill. Rev. Stat. Ch. 100 Sec. 2-1705-1718) Mandatory periodic payment of future damages awards over \$250,000. The Illinois Supreme Court upheld this statute as constitutional in *Bernier v. Burns*, 497 N.E. 2d 763 (1986).

**Indiana:** 1985 (Ind. Code 16-9.5-2-2.2) Discretionary Periodic Payment.

**Iowa:** AMENDED 1986-1984 (Iowa Code 668.3) Discretionary court-ordered periodic payment of future damages.

**Kansas:** SUNSET 7-1-1993 AMENDED 1988-1986 (Kan Stat. Ann. 60-3407) Mandatory periodic payment of future economic damages where the sum of damages awarded for noneconomic loss and current loss is less than one million dollars and the verdict results in an award for future economic loss which exceeds the difference between one million dollars and the sum of such amounts.

The Kansas Supreme Court struck down this statute as unconstitutional in *Kansas Malpractice Victims Coalition v. Bell*, 757 P.2d 251 (1988). Repealed 1988-1976 (Kan. Stat. Ann. 40-3403) Mandatory periodic payment of damages for future medical care and related benefits where the total amount of the judgement is \$500,000.

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**Kentucky:** No provision listed.

**Louisiana:** 1984 (La. Rev. Stat. Ann. 40:1299.43) Mandatory periodic payment of damages for future medical care and related benefits where the total judgement is \$500,000 or more.

**Maine:** 1967 (Me. Rev. Stat. Ann. tit.24 2951) Mandatory periodic payments of future economic damages exceeding \$250,000 at the request of a party.

**Maryland:** 1986 (Md. Cts. & Jud. Proc. 11-109) Discretionary periodic payment of future economic damages.

**Massachusetts:** No provision listed.

**Michigan:** 1986 (Mich. Comp. Laws sec.600.6303) Mandatory periodic payment of future economic damages excluding future medical, other health care costs and collateral source benefits. Future non-economic damages reduced to gross percent cash value determined by statutory formula. 1975 (Mich. Comp. Laws 600.5056) Where there has been a medical malpractice arbitration award, unless parties stipulate awards in excess of \$50,000, there shall be at least one-third of award paid in lump sum..

**Minnesota:** 1988 (Minn. Stat. 549.25) Discretionary periodic payment of future damages in excess of \$100,000.

**Mississippi:** No provision listed. However Mississippi passed a tort reform act at the end of 2002 that included periodic payments.

**Missouri:** 1986 (Mo. Rev. Stat. 538.220) Mandatory periodic payment of future damages over \$100,000.

**Montana:** 1987 (Mont. Code Ann. Sec. 25-9-4-3) Discretionary periodic payment of future damages in excess of \$100,000.

**Nebraska:** No provision listed.

**Nevada:** No provision listed.

**New Hampshire:** 1977 (N.H. Rev. Stat. Ann. 507 C:7) Discretionary

award of periodic payment of future damages at request of either party, where damages exceed \$50,000. The New Hampshire Supreme Court struck down the statute as unconstitutional in Carson v. Maurel, 424 A.2d 825 (1980).

**New Jersey:** No provision listed.

**New Mexico:** 1976 (N.M. Stat. Ann. 41-5-7) Mandatory periodic payment of damages for future medical care.

**New York:** 1985 (N.Y. Civ. Prac. Law 5031-5039) In medical injury claim, mandatory periodic payment of future damages in excess of \$250,000. Parties may agree to a lump sum payment.

**North Carolina:** No provision listed.

**North Dakota:** 1987 (N.D. Cent. Code 32-03.2-09) Discretionary periodic payment of future economic damages for continuing institutional or custodial care for a period of more than two years; adequacy of payments subject to continuing court review.

**Ohio:** 1987 (Ohio Rev. Code Ann. 2323.57) Mandatory periodic payment of future damages over \$200,000.

**Oklahoma:** No provision listed

**Oregon:** No provision listed.

**Pennsylvania:** No provision listed, but the Pennsylvania legislature enacted a periodic payment provision in medical malpractice this year.

**Rhode Island:** Amended 1987-1986 (R.I. Gen Laws 9-21-12; 13) Mandatory conference on periodic payment where judgement exceeds \$150,000.

**South Carolina:** 1976 (S.C. Code Ann. 38-79-480) Discretionary periodic payment of damages paid from the Patient Compensation Fund where liability exceeds \$100,000.

**South Dakota:** Effective July 1, 1988-1986 (S.D. Codified Laws Ann. 21-31-1 to 013) Mandatory periodic payment of future damages in

excess of \$200,000.

Tennessee: No provision listed.

Texas: No provision listed.

Utah: 1986 (Utah Code Ann. 78-14-9.5) Mandatory periodic payment of future damages that exceed \$100,000.

Vermont: No provision listed.

Virginia: No provision listed.

Washington: 1985 (Wash. Rev. Code 4.56.260) Mandatory periodic payments in personal injury actions of future economic damages of \$100,000 or more.

West Virginia: No provision listed.

Wisconsin: 1975 (Wis. Stat. 655.015) Mandatory periodic payment from Patient Compensation Fund where future medical expenses exceed \$25,000 for a wards or settlements made before June 14, 1986. The Wisconsin Supreme Court upheld the statute as constitutional ground in State ex re. Strykowski v. Wilkie, 261 N. W. 2d 434 (Wisc. 1978). 1975 (Wis. Stat. 655.27(5)(d) Mandatory periodic payments where the PCF liability exceeds one million dollars. IN such cases the fund will not pay more than \$500,000 per year.

Wyoming: No provision listed.

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## Valuing a Small Business: Implications of Different Income Tax Models

### Introduction

A common method used to value a small business<sup>1</sup> involves applying an aftertax discount rate to future aftertax returns (See, for example, Fishman, Pratt, Griffith, and Wilson 2003, chapter 5). The reason for using an aftertax discount rate is simply that it is aftertax discount rates that are observed (Bowles and Lewis 2000). To be consistent, aftertax discount rates must be applied to aftertax returns.<sup>2</sup> Of course, estimating future aftertax returns requires an estimate of future average tax rates. This paper presents three different methods of modeling taxes in applying the discounted future returns method and compares the accuracy of each. These methods are outlined below:

1. Forecast aftertax returns based on a historical aftertax growth rate. In this instance, the future average tax rate is forecast implicitly.

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