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Note: The numbers in this article were based on the tax laws in effect in 1995. The Taxpayer Relief Act of 1997 increased the unified credit exemption equivalent. The methodology and conclusions remain unchanged.

A Preview of Estate Planning in the 21st Century

by Glenn S. Daily

Estate planning is the process of accumulating and distributing wealth according to one's goals. Inevitably, it requires comparing alternative sets of numbers, and in this task, estate planners are today where pricing actuaries were 20 years ago.

The prevailing methodology in estate planning is deterministic. To project the future after-tax value of the estate for alternative plans, the adviser chooses a constant growth rate for the estate and a lifespan for the estate owner. The most common assumption is death at life expectancy, often based on government tables. Diligent planners might test a handful of scenarios to see what happens, for example, when the sequence of the spouses' deaths is reversed. Commercial estate planning software eases the burden of doing tax computations, but it still allows the user to look at only a few scenarios at a time.

Clearly, the important elements in these calculations — longevity, asset returns, and arguably even the tax laws — are random variables. Estate planning is a stochastic problem, and it invites the use of stochastic methods.

A probabilistic approach

To see what probabilistic estate planning looks like, let's examine some choices facing a married couple, both age 65. Should they pay estate taxes at the first death or the second death, and should they buy single-life or second-to-die life insurance?

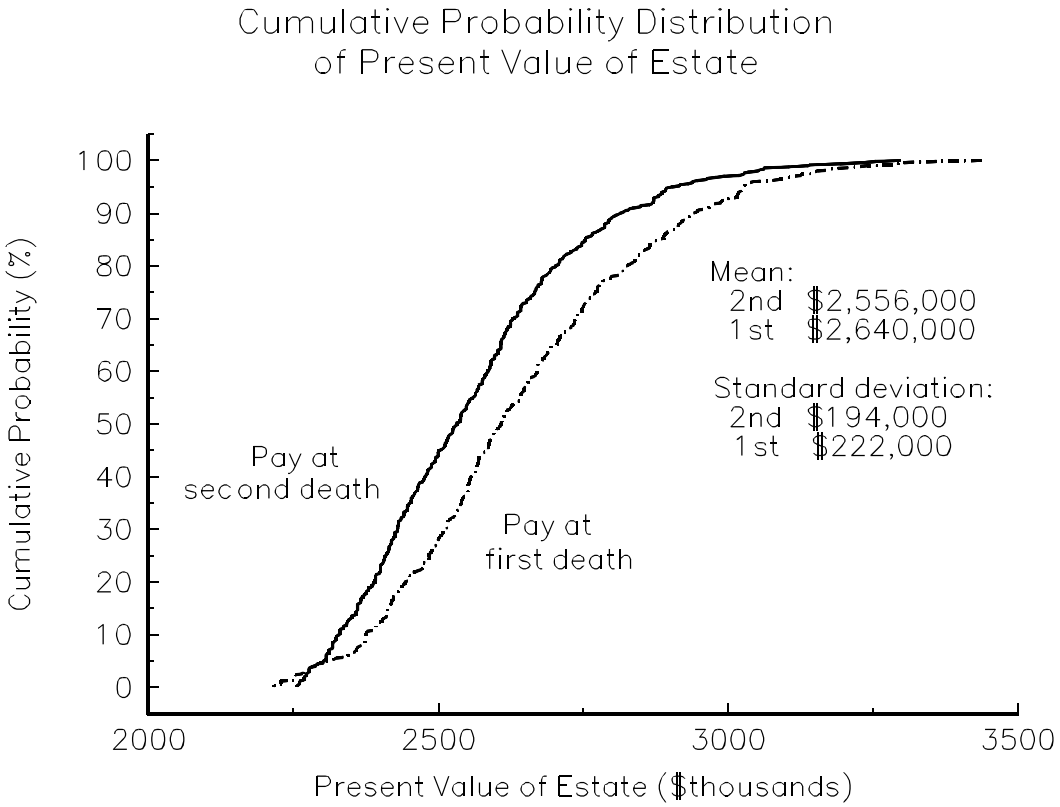
Under current law, marginal Federal estate tax rates range from 18% to 60%. There is a $192,800 lifetime credit, which effectively excludes the first $600,000 of the taxable estate. There is also an unlimited marital deduction, which allows couples to postpone all taxes until the second death.

Consider two different estate plans for a $4 million estate divided equally between the spouses. One plan is pay-me-later; at the first death, $600,000 goes tax-free into a trust and the remainder passes tax-free to the surviving spouse. At the second death, the proceeds of a $1.3 million trust-owned second-to-die policy are received, and estate tax is paid on the surviving spouse's accumulated assets.

The second plan is pay-me-now; at the first spouse's death, the proceeds of a $600,000 trust-owned single-life policy are received, estate tax is paid, and the remaining assets go into a trust. At the second death, the proceeds of a $600,000 trust-owned policy on that spouse's life are received, and the surviving spouse's assets are taxed.

In probabilistic estate planning, the outcome for each possible combination of deaths is measured by the present value of assets passing to the heirs. A Monte Carlo simulation produces a probability distribution of present values for each plan.

Assume that all assets grow at 4% after income tax and living expenses, the discount rate is 4%, the life insurance policies are held until death, and there is no state death tax. The graph below shows the cumulative probability distributions of the present value of the inherited estate for the two plans, based on a 500-trial simulation.



Which plan is preferable? Stochastic dominance can be a handy tool for inferring which of two probability distributions has the higher expected utility. It fails in this case, however, because the pay-me-now plan has a lower minimum. The popular mean–variance criterion also fails, because neither plan has both a higher mean and a lower variance.

If the heirs' utility function is known, expected utilities can be calculated directly. A quick look at the graph tells you that the heirs would have to be extraordinarily risk-averse to prefer the pay-me-later plan.

The role of life insurance

To provide some insight into the economics of life insurance in estate planning, the table on the next page shows the expected present values of the two estate plans with and without life insurance. When held until death, cash value life insurance usually has a positive expected net present value for reasonable discount rates. Given similar pricing assumptions, a second-to-die policy offers a higher return than a single-life policy for each $1 invested; in this example, the benefit/cost ratios are 1.83 and 1.44, respectively. Joint life expectancy is longer than single life expectancy, so investment earnings can grow tax-free within the second-to-die policy for a longer period on average. Because the 4% discount rate is less than the compounding rate within the policies, a second-to-die policy adds more value per $1 of premium.

Second-to-die life insurance has become a popular estate planning tool, in part because of the lower premium required per $1,000 of coverage in relation to single-life policies. There are two ways to look at the results in the table.

One view is that the the popularity of second-to-die life insurance is misguided, since pay-me-now planning produces a greater inheritance overall. Because of the steeply-rising estate tax rate structure, the tax due on the larger combined estate at the second death is greater than the combined taxes on the individual estates.

The other view is that second-to-die insurance is valuable, because it reduces the penalty for the pay-me-later planning that many people prefer. From this perspective, it is the marketing focus on a lower premium per $1,000 that is misguided, because that reduces the potential benefits of the second-to-die policy. In our example, if the same $44,000 combined single-life premiums were used to buy a $1.8 million second-to-die policy, the difference in expected present values between the two plans would narrow to only $27,000, rather than $84,000.

Expected Present Values for Two Estate Plans			
	Pay tax at first death	**Pay tax at second death**	**Difference**
Without life insurance	$2,479,000	$2,346,000	$133,000
+ Life insurance:			
Death benefits	523,000	463,000	
Premiums	(362,000)	(253,000)	
Net	161,000	210,000	(49,000)
= With life insurance	$2,640,000	$2,556,000	$84,000

Assumptions:

- Male and female nonsmoker, age 65
- $4 million initial estate value, divided equally
- Two $600,000 single-life policies with $44,000 combined 10-pay premium
- One $1,300,000 second-to-die policy with $30,000 10-pay premium
- 4% after-tax return; 4% discount rate
- Mortality rates are 75% of 1975-80 Select & Ultimate Nonsmoker table

Beyond expected utility

Most experienced estate planners know that the progressive estate tax rate structure provides an incentive to pay some tax at the first death. According to a recent survey, however, only 6% of practitioners' eligible clients opted for a pay-me-now plan (*Financial Services Review*, Vol. 2, No. 2 (1993), p. 111). Are most clients simply behaving irrationally?

The apparent superiority of the pay-me-now plan rests on a goal of maximizing the heirs' expected utility. However, research in behavioral finance has challenged the expected utility framework of rational decision-making. In many cases, people's decisions systematically violate utility maximization. Small probabilities tend to be subjectively overweighted, and the potential for regret plays an important role in choice (*Scientific American*, January 1982, p. 160). Competing non-expected utility theories now seek to replace traditional utility theory as both a descriptive and prescriptive model of human decision-making (*Journal of Economic Literature*, December 1989, p. 1622).

Returning to our example, the graph on page 2 doesn't tell you what percent of the time one alternative is better than another, because it's unlikely that the two sets of ranked outcomes correspond to the same combinations of two deaths. Pay-me-later planning actually produces more wealth about 30% of the time, and this softens the stark contrast indicated by the graph.

People may also be reluctant to risk the possibility of paying taxes unnecessarily at the first death, as would happen if estate taxes were later abolished. The intensity of regret is related to the ease of imagining doing something different. No choices, no regrets. It's easy to imagine postponing paying taxes, so fighting one's natural inclination incurs a greater risk of regret.

A third explanation, and perhaps the most likely one, is that people have multiple goals. They want to leave money to their children, but they're also worried about outliving their assets. Paying estate taxes is not high on their list of discretionary expenditures.

Obstacles to 21st century planning

Stochastic methods clearly provide a more complete description of the planning options available to estate owners and their families. Practical implementation faces several obstacles, however.

Will clients understand, and be willing to pay for, sophisticated analyses? Early feedback is mixed. "Our clients don't care about all of this statistical stuff," one financial planner complained after my presentation at a recent conference. On the other hand, I have one client who now feels comfortable looking at cumulative probability distributions of his choices. A 1987 study demonstrated that non-technical people can understand a variety of graphical formats for communicating uncertainty if adequate explanations are provided (*Risk Analysis*, Vol. 7, No. 4, p. 519). When practitioners and their clients become convinced that more sophisticated methods can lead to better decisions, acceptance will follow.

Can adequate models be built at a reasonable cost? A comprehensive model would provide for stochastically-generated asset returns and life insurance policy values, multiple estate tax laws, contagion factors, gifting strategies, qualified disclaimers, and other common estate planning techniques.

Applying stochastic methods in multi-generational planning is even more challenging. Consider the problem of preparing an estate and business succession plan for two parents, three married children, and five grandchildren. For these 13 people, there are over 6 billion possible sequences of deaths, not to mention the contingencies of disability and divorce.

That could keep probabilistic estate planners busy until the 22nd century.

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