UNCERTAINTY

WHAT'S CERTAIN? DEATH AND TAXES—that's about it. The outcome of every other event that might affect your life or business is floating in an unfeeling, unsympathetic ooze of uncertainty—influenced, perhaps, but not entirely persuaded by your thoughtful steering.

BY TOM BAKOS

We learn that from an early age, when our parents first let us experience disappointment. Even capturing a lightning bug, which announces its presence in the night sky, is a more difficult task than we had ever imagined it would be before we tried. As we grow up, our young minds are quickly disabused of the idea that we are in control. We learn about fate and destiny, which, though it may be preordained in some belief systems, is nevertheless unknown to us. Therefore, the future remains uncertain.

It's only in adulthood that the terrible truth about death and taxes is finally revealed and we are left to ponder why those two must be the exception to the rule of uncertainty.

The Difference Between Risk and Chance

In the real world, life's outcomes are not entirely random. There are choices we can make to manage our exposure to life's uncertainties—avoiding some and minimizing others.

When you reach for the firefly, you either get it or you don't. The likelihood of capturing something else entirely is rather slim because you have positioned yourself where the fireflies are. It's precisely because the probability of catching a firefly is so high that, for fear of inadvertently setting it free, you're reluctant to open your hand to check.

Risk is one side of uncertainty. A contingent event may be described as an event that's uncertain with respect to one or more of the following: its occurrence, its timing, or its severity. A focus on risk requires severity to be part of the definition because risk is most usually associated with adverse outcomes—a house fire, auto accident, sickness or disability that prevents one from working, even the timing of death (which, otherwise, is certain to occur).

The other side of uncertainty is chance. If we substitute abundance for severity in our definition of a contingent event (e.g., it's uncertain with respect to its occurrence, timing, or abundance), we have defined chance. Chance (as in games of chance) is generally something we venture anticipating a favorable outcome—however remote it may be.

Because we live in an organized universe that is subject, as far as we can determine, to rules, the contingent events we encounter in life can result in one of a finite number of possible outcomes—not an infinite, random spread. Games of chance are good examples of how mathematics can be used to calculate the probabilities of each of the many outcomes. If you roll two standard dice, you will find at the end of your roll that you have two face-up pips totaling from 2 to 12 You can't get 0, or 1, or any other number.

We always enter games of chance hoping to win—not fearing to lose. A sensible person avoids the game altogether if the risk of loss overpowers his or her hope of winning. We all know, or at least should know, that games of chance are rigged against us. It's not the winners who paid for the bright lights of Vegas. Yet even when the odds of winning are stupendously low, millions of people play. The chance of winning at least a portion of the grand prize in the Powerball multistate lottery (picking five numbers out of 55 plus the Powerball number, which is one of 42) is 1 chance out of 146,107,962. (For more on this, see Page 60). Yet even if the exact odds for winning in a lottery aren't known by every player, it's intuitively clear from the description of the game that they aren't high. But it's only a dollar wagered against potentially millions in return, and, after all, you've got to be in it to win it.

Here's the interesting thing—the odds of winning typical casino games or state-run lotteries are well-publicized. And, if your company is using a sweepstakes-type promotion, state law requires that you disclose in some fashion the odds of winning. This serves to point out the notable differences between risk and chance. Risk relates to adverse outcomes, chance to positive ones. In today's world, only the probabilities associated with favorable outcomes of chance either are or must be disclosed.

Hedging Against Uncertainty

Insurance thrives in an environment of uncertainty. It has no impact on the uncertainty of the event being insured, except so far as it may encourage risk management to lower the cost or

PUNCHSTOCK

Do you take a chance, or do you hedge your bet? Either way forces you to admit that life is uncertain.

doubt

Oh, firefly, why do you fly
so far away from me?
I've got a jar to make your home,
if you'd only come and see.

At night, I see your yellow light
come tripping through the sky,
the closer I come, the faster you run,
I reach, but you're much too high.

I reach, but as I reach
your yellow light goes out.
You wait until I'm almost there,
Then fill my hand with doubt.

—Tom Bakos

need for the insurance. What insurance does is address the adverse financial consequences resulting from the occurrence of an insured contingent event. It effectively transfers to the insurance company the financial consequences of a given risk (but only the financial consequences) from the person who is insured.

Insurance is a risk-pooling arrangement in which insurance companies manage the pool. Insured individuals pay premiums into the pool, the insurance company deducts expenses incurred in managing the pool and adds interest earned as appropriate, and the balance is used to pay claims to those in the pool who suffer losses.

The risk associated with an insured contingent event (death, for example) can be expressed as a probability over a period of time. Typically, the probability is relatively low. For example, the probability that a reasonably healthy 45-year-old man who doesn't smoke will die within one year is something like 15/10,000. So in a pool of 10,000 insured lives, only 15 can be expected to die by the end of the year—leaving their beneficiaries to grieve, suffer the adverse financial consequences of their untimely deaths, and receive the insurance proceeds designed to offset them.

The people who chose to participate in this life insurance pool had the foresight to realize that while the ultimate occurrence of death is inevitable, its timing is uncertain. Their need for life insurance was driven by the fact that they were exposed to the contingent event (death), even though the probability that it would affect any one of them in the next year was quite low—.0015.

It's important to note that although it might appear that the insurance company is paying death benefits on the insurance policies it issues out of its own funds, it really isn't. Insurance company funds are generated directly by policyholder premium payments and indirectly by the investment income that a well-managed insurer generates from those policyholder revenues. It's also helpful to remember that insurance companies are merely more formalized versions of the fraternal societies formed centuries ago to address the adverse financial consequences of risk within their memberships.

If a contingent event is more likely to occur in a given time period, it will be more costly to insure. For example, if the probability of death for a 45-year-old man is 60/10,000 (that is, four times higher than in my first example), the insurance company could expect to pay out four times the number of death benefits in a given year—60 expected claims rather than 15. Obviously, that would require it to collect four times the premium from members of the insured pool.

In fairness—and to encourage participation—it's important that voluntary insurance programs group together into one pool individuals (or other insured entities with like risks) with like risks when it calculates required contributions or premiums. In addition, the nature of the risk being insured must be identical. It would be impractical, for example, to do anything but segregate life, health, homeowners', and auto insurance risks into separate, distinct, independent pools. It's fundamental to the principle of fairness that the level of risk or probability of the insured contingent events occurring be reasonably comparable. Clearly, young people who are generally healthy wouldn't voluntarily agree to be pooled together with older, less healthy people if that meant their health insurance premiums would be higher.

A higher probability of occurrence associated with a contingent event means that it's more certain to happen. For example, a standard pair of dice will produce snake eyes, on average, one time in every 36 throws. However, if one die is replaced with a die with one pip on each of its six sides, the odds of snake eyes increases to one out of every six throws—six times higher. If both dice have one pip on each face, all uncertainty is removed and there is a 100 percent chance of getting snake eyes on every roll.

An event that's certain to occur is uninsurable since there's no uncertainty and there's no risk associated with it. Similarly, a contingent event that has already occurred, regardless of how uncertain its occurrence may have been, is also uninsurable precisely because it has already occurred.

People who believe that insurance is available only to people who don't need it (and, conversely, not available to those who do need it) understand neither risk nor insurance. A person has a potential need for insurance if he or she is exposed to risk. Once a contingent event has caused adverse financial consequences, while there may be a need for some benefit, it's too late to consider insurance.

Risk can exist even though it may be small (i.e., of low probability). People tend to ignore exposure to risk that is very small. In effect, they are choosing to chance the favorable outcome that they will be unaffected adversely. However, since uncertainty exists, they also risk losing that bet. It's exposure to a risk with burdensome adverse financial consequences that signals the need for insurance.

The Insurance Process

Standing behind every insurance benefit is a process—a kind of financial security system. Essentially, insurance companies guarantee the payment of a financial benefit upon the occurrence of an insured contingent event in exchange for the timely payment of premiums. These premiums (together with any interest earned on them) must be sufficient to cover any benefits plus the insurer's expenses and profit. Premium levels are a function of many things, but a significant component is the probability that the insured contingent event will occur during the period of insurance coverage. High probabilities require high premiums, and low probabilities require low premiums. Other systems involving risk may be financially managed in similar ways (e.g., retirement funding or any type of financial planning, emergency planning, or other budgeting process).

In order to manage the financial impact of risk and uncertainty, insurance companies employ the principles of actuarial science. Through observation, actuaries develop a statistical framework that allows them to surmise the probabilities of the occurrence of contingent events. Based on what they learn, actuaries develop models that reflect this statistical behavior and identify the variables that may influence the financial outcomes of risk and uncertainty. Actuaries use these models to approximate future realities by inputting appropriate assumptions for the variables. Pricing systems, valuation methods, asset/liability testing methods, predictive modeling, government health and retirement programs, and hedging models are all examples of actuarial models that have been developed to

financially manage risk and uncertainty.

As helpful as they are, actuarial methods also introduce a new risk and uncertainty into the process—the accuracy of the model and the reasonableness of the assumptions that feed it.

"Actuarial science is concerned with the development of models which approximate the behavior of reality and have a degree of predictive power, not the truth," wrote J.M. Pemberton in a paper, "The Methodology of Actuarial Science," that was presented to the Institute of Actuaries in October 1998. Deviation from the so-called truth is inevitable since we cannot predict the future and since, to be usable, models must be kept relatively simple and can only approximate reality.

Any financial framework that insurance companies or others create to manage risk is embedded with its own risk and uncertainty. In fairness, financial security systems are typically managed in a very conservative way so that any failure to provide guaranteed benefits is extremely unlikely. But it's still true that the level of risk isn't communicated because there's no requirement that it be communicated.

It's often said that no life insurance policyholder has ever lost the guarantees provided in a life insurance policy as a result of the failure of the insurance company providing them. However, insurance companies do promise, and financial security systems may imply, the availability of benefits in excess of any guarantees they make—dividends and excess interest, for example. Methods exist for determining a probability of receiving these non-guaranteed benefits. Stochastic models, for example, run thousands or hundreds of thousands of scenarios that effectively predict a wide range of equally likely possible future outcomes. From this spread, outcomes centered on a mean can be used to develop a probability that an actual future outcome will fall within a certain range of expected values. And, perhaps, other methods exist that can be used to provide the same kind of probability data.

The Bottom Line

Human beings, even those without actuarial training, have an innate ability to roughly manage risk. We cross at the corners and with the traffic lights to minimize the risk of being hit by a car, and we establish traffic laws (that we mostly observe) to minimize travel risk. We make assumptions based on observation. We assume that if the light is green for us, it's red for others.

But most people, even company managers, don't understand financial security systems and the level of security that they provide. Only those of us with formal training know that these systems are established to manage the financial uncertainty associated with risk—not eliminate it. We know that financial security systems themselves carry embedded risk. Our clients may only see guarantees.

Society has sensed the need to disclose the chance of any favorable outcome, probably because winning is a desired result that only a few will realize. Since dreams may be dashed by a loss (which, after all, is the most likely result), it's considered important to emphasize the uncertainty of a favorable outcome. By emphasizing the relatively low probability of winning, players who enter games of chance have a reasonable and realistic expectation that they will lose. They will never be disappointed, only happily surprised.

Risk, on the other hand, is focused on an adverse outcome, something no one wants. Financial security systems (like insurance) transfer the consequences of these adverse outcomes away from the individual or entity that is exposed to them (usually, quite effectively). Since there's a low probability of occurrence in the first place and financial security systems further reduce any adverse consequences associated with that risk, the odds of a favorable outcome are overwhelming (ignoring the nonfinancial aspects of the risk).

Consistent with our practice of disclosing the most likely outcome (a loss) that is associated with games of chance, it seems that we focus only on the most likely outcome associated with risk (that it won't happen, but if it does happen, insurance will cover it). But this doesn't eliminate all uncertainty. Wouldn't it make sense if we took things one step further and tried to quantify and disclose that uncertainty?

No one, after all, likes a nasty surprise. ●

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Reference

The principles of actuarial science are articulated in "Principles Underlying Actuarial Science," a paper published in the August 2008 *Actuarial Practice Forum*, www.soa.org/library/journals/actuarial-practice-forum/2008/august/apf-2008-08-allaben.pdf