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ARE YOU SURE ABOUT THAT?

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"AS FAR AS THE LAWS OF MATHEMATICS REFER TO REALITY, THEY ARE NOT CERTAIN; AND AS FAR AS THEY ARE CERTAIN, THEY DO NOT REFER TO REALITY."—ALBERT EINSTEIN

In the distant past of economics, Frank Knight famously defined risk and uncertainty as two separable concerns. Risk, the lesser concern, was all about statistical variability from known probability distributions. When a gambler bets upon a spin of a roulette wheel, he is taking a risk. When an investor funds a start-up company that intends to manufacture and sell a product based upon a new invention, his expected outcome is termed uncertain as there is no predefined range of potential results.

Less than 50 years after Knight's discussions, the development of modern finance started the process of displacing the idea of an intractable uncertainty with the sure knowledge of market prices. Black-Scholes-Merton (BSM) developed a process for backing into the parameters of risk, thereby totally eliminating uncertainty from discussions of finance. The practice of solving for a volatility parameter from market prices became ubiquitous. By specifying the distribution of possible future prices, the unknowable uncertainty was transformed into "simple" risk.

Actuaries, in our own way, have contributed to the elimination of uncertainty from the financial calculations that are our specialty. The actuarial price, for example, now references the best estimate price, without any load for, or necessarily recognition of, any uncertainty. In many situations where a single "fair" value is needed for accounting or to complete a transaction, using best estimate assumptions for all parameters of a calculation became the preferred practice.

There is a fundamental difference between these two processes, and that difference became a problem for actuaries. The BSM process includes an unknown, but definitely non-zero, provision for uncertainty while the actuarial process produces a value with a zero provision for uncertainty. Both come up short when extreme outcomes do not follow assumed distributions and interactions between risks act in unexpected ways.

Risk loading in actuarial pricing changed from an adjustment to each and every parameter based on the judgment of the actuary to a disciplined process. Unfortunately, this new process might ignore observed volatility and focus only on the least reliable value in the entire calculation, the estimate of extremely remote losses. Initially, actuaries saw nothing wrong with the fact that their estimates of risk loads were much lower than the "market implied" loads found in BSM or other market-price-based processes. After the severe losses of the stock market crash of 2001 showed the shortcomings of this assumption, actuarial practice shifted to incorporate market-consistent valuation of market-traded risks.

The process of modeling ALL risks in a statistical economic capital model that is the current rage in risk management involves the same transformation of uncertainty into statistical risk. It too comes up short.

The 2008 global financial crisis showed that the underlying assumptions of financial economics were not sufficient. Not only did the market not know the proper price for the mortgage securities, but they were also blissfully unaware of that fact.

My favorite explanation for the underlying cause of the problems with markets that totally mispriced risk is the Grossman-Stiglitz Paradox. The fundamental underpinning of the efficient markets postulate is that the market has processed all available

information. Grossman and Stiglitz point out that the efficient market postulate, if it were true, would make it uneconomic to actually perform any processing of information!

This leads me to a key point. As actuaries, we find ourselves working to build models and assess two types of situations: those where there IS a market and those where there IS NOT a market. In cases where a market currently exists, actuaries have deviated from existing practices of more than 100 years and are now working within the paradigm that loads for uncertainty are solely determined by markets. In the case of the non-market-traded risks, the accounting paradigm is moving inexorably toward requiring calculations from actuaries that are "market-consistent."

In both cases, the longstanding actuarial skills, talents and knowledge of fundamental analysis and modeling of uncertain future events are being largely cast aside.

The failure of financial markets to come even remotely close to properly pricing the risk and uncertainty of subprime mortgage-related securities reveals that an important place remains for a disciplined approach to identifying and assessing uncertainty independent of the market. It is a role that is presumed by the efficient markets hypothesis, but has been shown to be uneconomic in markets that participants believe are efficient. This role should return to analysts combining knowledge of quantitative and qualitative methods, common sense and behavioral biases. It is a role that actuaries could fit into very well.

Actuaries have moved forward in the field of risk management. Our fundamental approach has also become the elimination of uncertainty. We do this through a process where everything is turned into a risk, a process assumed to have a known future probability distribution of gains and losses. But another role remains open that we are well suited for, the role that illuminates all forms of uncertainty.

The processes developed for eliminating uncertainty within our risk models can be reverse engineered to make those models into engines of uncertainty analysis. Our insights into the fundamentals underlying the events we are modeling can be highlighted rather than subjugated to the "knowledge" embedded into market prices.

Dave Ingram

Actuaries can become the Gurus of Uncertainty and the Keepers of the Black Swans. This is work supporting the efficient market postulate. It is the work presumed, but not performed, by the market participants. It is new work that will require some research and development. This work has started in Europe, where they have been struggling to develop "risk margins" for very long-term, illiquid, insurance products. Perhaps the first step in resolving that log jam would be to remember Frank Knight and admit that there is no risk involved in evaluating transactions 50 or more years in the future. It is all uncertainty. $\blacksquare$

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