Article from

Risk Management

November 2019

Issue 45

A Handful of Economic Capital Model Observations

By David M. Walczak

The construction and use of economic capital (EC) models in the U.S. have certainly moved forward since the models were first propagated around the mid-2000s. The main drivers of implementation were companies with European parents but also larger companies that recognized the usefulness of such a tool in presenting a better Own Risk and Solvency Assessment (ORSA) report. More recently, rating agencies have upped the ante on the risk management parts of their assessment of a company, partly in response to the financial crisis outcomes. So what are some of the observations that have come about as companies and consultancies have become more comfortable with repeatable EC exercises? Let's first note that these are just personal observations in working with these models. The consultancies rarely let the industry down when it comes to designing and implementing surveys for studying implementation methods and assumptions or generating commentary on results that have been generated. There are some very good (and mostly granular) surveys on EC available with a web search or a phone call to your favorite industry contact.

What could you argue were the goals of EC implementation, beyond the preceding comments? Many implementers also got into the exercise because of the need for better capital allocation, risk-adjusted performance measures and strategic planning. It certainly also seems that once the computing abilities needed for high-powered projections (including "stochastic on stochastic") became available, the applications to use that power were waiting. Video gaming is another great example of this one; some of today's gamers are controlling characters that look more realistic than some old TVs. Finally, implementing economic capital at its extremes results in either (a) insufficient capital levels, which put the company at undue risk; or (b) too much capital held for risk, which drives up cost of capital allocation to product and renders possible noncompetitiveness.

Since implementation, some of the emerging goals to improve the high-level process have included the following:

- **Risk aggregation improvement.** The past 10 years have seen little improvement on setting a gold standard for the questions of (1) whether to use a copula construct or not and, (2) if yes, what the optimal type of copula construct is for a given company's basket of risk.

- **Communication and understanding of results and restriking assumptions.** It is paramount to have a senior management champion who understands the reports generated from EC exercises. Some of the reports generated by the process can resemble an encyclopedia and aren't always clear on conclusion. Showing a range of results on page 277 can be frustrating unless the reader is led by the hand.

It is paramount to have a senior management champion who understands the reports generated from EC exercises.

- **Control and governance environment.** There is no consensus on where ownership of the model should live after development. The biggest insurers and banks will develop big models in an IT-driven group and then govern the ongoing updates for reuse of the model. Many other companies will treat an EC model like a cash flow testing (CFT) model and allow the modules to live in product and corporate areas as appropriate. It is clear, however, that a framework this complex should be considered a lever to push control and governance forward.

- **Tactical and strategic use of the model.** This category considers the possible use of results to drive product mix, reinsurance or hedging. The model results just don't validate well enough to reality to function well in this regard. On one hand, this makes sense from the standpoint of spending 90 percent of validation activity in the "bad tails" of the marginal and aggregated distributions and then attempting to use the model for outcomes much closer to the mean, or a single standard deviation.

  On the other hand, some of the emerging goals to improve the granular parts of the process follow here. It is important to point out that, like CFT, the modeler has the choice of using either a real-world or a risk-neutral construct. Because probability weighting of risk-neutral results can be ambiguous and lead to nonsensical-looking intermediate results, modelers have almost universally chosen real-world assumption sets for CFT and EC modeling. One of the

downsides of the real-world construct is the introduction of unchecked subjectivity, almost always used to the company's advantage. For example, in a CFT model with corporate bonds, most companies create immediate value at time zero by assuming future assumed default levels insufficient to balance out the extra spread received above risk free. In an EC model, there is really nothing stopping the modeler from assuming a convenient distribution to reverse engineer a result that fits expectations. Like the bond defaults, there is no "magic validation bullet" to solve this conundrum.

- **Model equation.** This is simply a mathematical statement of what the model is providing. It is the highest-level "top-down" driver of what is being pursued as a result. Subjective choices of both aggregation and marginal loss distributions may or may not be roped into the equation description. In addition, the projection horizon (usually one year), runoff method use or not, and severity (e.g., 1 in 200 year, 2,000 year, other) are not necessarily standardized. Understanding the need to define the model equation up front and tailoring the definition to possible uses doesn't always happen.

- **Making and validating assumptions.** In addition to the aggregation of risk challenge already mentioned, some of the methods of judging "best fit" for aggregated results can involve eyeballing the results, hence more room for subjectivity. Most key, however, is the subjectivity involved in developing a marginal single-factor loss assumption. For instance, a "1 in 200 year" mortality assumption could lead the actuary to an influenza case, which is a workable example but may not be realistic based on today's medical science advances.

  Let's use the following example, which is subjective by necessity: "The severe case making up the tail is x percent of the influenza epidemic case." The rest of the distribution is credible enough to validate. The tail is the key metric and yet it is the most subjective point in the marginal distribution and produces the biggest difference from a similar and "credible up to 95th percentile" distribution. Again, the need to standardize to produce comparable results raises its head (Table 1).

Table 1
Volatility of Loss in the Tail of Possible Distributions

Percentile	Mean	90.0%	95.0%	99.5%
Distribution A	–26.0	–32.0	–47.0	–76.0
Distribution B	–26.0	–32.5	–47.3	–69.0
Value difference	0.0	–0.5	–0.3	7.0
Percentage difference	0.00%	1.56%	0.64%	–9.21%

- **Untapped risk management uses.** There are so few holistic-type models available to insurers that pushing the EC framework toward more credible applications is a big goal. It would be great to use the framework for calculating capital needed to meet capital ratios at a 95 percent level. Or to fulfill liability cash flows and/or fixed income payments at a 90 percent level. Most would agree that a company planning model or CFT model is not robust (or granular) enough to answer these questions. This raises a question that we've seen before: Can we trust an EC model at the 90 percent level to a considerably higher degree than at the troublesome tail risk levels previously noted?

Because of the unique possible power of an economic capital model, we should expect to see notable improvements over the next 10 years. But without further standardization, don't be surprised to see the subjectivity-related issues still here as well. ■

David M. Walczak, FSA, MAAA, is a consulting actuary based in Minneapolis and specializes in risk management and financial reporting. He can be reached at *david_m_walczak@yahoo.com*.