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How Scenario Aggregation Can Improve Risk Management

Balancing conflicting interests can make risk management a challenge for organizations. Damir Filipovic and Mathieu Cambou show how external views on risk scenarios can be combined, and then used to fine-tune internal risk models, providing a better perspective on risk.

When the global banking system almost unraveled in 2008, governments vowed to take new measures and strengthen the existing regulatory framework to help prevent a financial meltdown occurring in the future. Some of those measures involved better risk management, including—for example—the use of risk modelling to gauge the ability of financial firms, such as banks and insurers, to withstand losses arising from specific events and allow them to put in place adequate capital buffers accordingly. Yet, despite the best intentions of governments and regulators, this kind of risk management is only as effective as the risk modelling methodology it is based on.

It is essential, therefore, that these models are tested and their methodology challenged. For example, the risk models used are often concerned with circumstances at the extremes (the tail) of both potential losses and probability. Analyzing and understanding these extremes is difficult and any improvement in our ability to do so is welcome. *Model Uncertainty and Scenario Aggregation*, a paper by Damir Filipovic and Mathieu Cambou from the École Polytechnique Fédérale de Lausanne, offers an innovative take on this challenge.

“Imagine a scenario in which a fall of 30 percent in the S&P500 is combined with a major earthquake in California, while interest rates go up by 5 percent.”

Regulators demand a rigorous approach to risk management. Firms may be required to calculate capital solvency margins with 99.5 percent confidence, in other words factoring in the worst possible situation likely to occur in a 200-year period. Yet the ability of financial firms to adequately factor in the complexity of the potential risks they face is limited. Looking back into the past to help anticipate the future is problematic, for example. Historical records are unlikely to cover such an extensive period. Plus, even if the data was available, the world is changing: risk profiles and probabilities alter over time.

About the Authors



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The full paper can be found at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2441328.

Key Words

Risk management
Scenario aggregation
Risk model uncertainty
Swiss Solvency Test

One approach that can help fine-tune risk models is scenario aggregation. Imagine a scenario in which a market risk, such as a fall of 30 percent or more in the S&P500, is combined with another risk, such as a major earthquake in California, while at the same time interest rates go up by 5 percent. Using the appropriate expertise, adopt a view on the probability of the events in this scenario occurring. Stack some scenarios up and compare the external view on these scenarios against a firm's internal risk model view on these scenarios. Then adjust the internal model accordingly.

“This model blends the qualitative external aggregate scenario approach with the internal quantitative risk model and balances the differing incentives of the regulator and the firm.”

While this may seem a sensible approach, one obstacle to its success is the difficulty of blending the more qualitative external aggregate scenario approach with the internal quantitative risk model. Filipovic and Cambou, however, have created a methodology that allows them to do just that and, in addition, to satisfy a number of important criteria in the process.

One such criterion concerns the differing incentives of the regulator and the firm. While it is in the firm's interest to remain solvent and to maintain adequate financial buffers against potential losses, it also wants to create value for its shareholders and where possible maximize profits. The regulator, however, is concerned with protecting a variety of stakeholders from potential losses and with managing systemic risk and preventing contagion. The regulator, then, is more likely to take a conservative view.

Filipovic and Cambou ensure that their method does not penalize models with additional capital requirements if a scenario aggregation exercise reveals that the existing internal risk model is already sufficiently conservative. The method also keeps any increases in the capital requirement to the minimum necessary to reflect any discrepancy between the external view and the results produced by the internal risk model.

For the authors' approach to be useful it must be relatively easy for firms to implement the method they propose. Internal risk models are highly complex: it can take days, for example, to run such a model and produce the appropriate capital requirement number. The external scenario aggregation is a simpler exercise. Filipovic and Cambou's method ensures that any modification of the internal model to account for the views on the scenarios is kept to a minimum. The method is also designed in a way that allows firms to implement it relatively easily with minimum disruption.

“A valuable addition to any firm's risk management toolkit, it may well help us to avoid a future global financial crisis.”

Finally, the impact on firms brought about by different scenarios will vary according to a number of factors. In the case of an insurance company, for example, (while the authors' research focuses on insurance it is equally applicable to banking and other corporate risk management situations) it may be influenced by the type of insurance the company underwrites, and by where those risks are located. Rather than assuming the potential impact on each firm will be identical, the approach presented in *Model Uncertainty and Scenario Aggregation* distinguishes between companies based on their particular vulnerability to specific external risks.

Taken together, these qualities make Filipovic and Cambou's method a valuable addition to any financial firm's robust risk management toolkit. When setting capital safeguards, the method allows regulators and firms a more precise view of the optimal balance between the interests of shareholders and of society as a whole. And, hopefully, if the approach is widely adopted, it may well help us to avoid a future global financial crisis.

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