Model Risk Management for Insurance
Model risk and the insurance industry

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As technology advances, the ability to analyse massive amounts of data is driving up the requirement within the insurance industry for well governed models that can be quickly deployed. Insurers recognise the opportunity that large quantities of structured and unstructured data from new sources bring to develop AI and Machine Learning models. The benefits of this scale of modelling can include improved pricing, offering more tailored and relevant products, better fraud detection and improvements in customer service.

At the same time, regulatory requirements are looming. In his recent keynote address to the ABI Prudential Regulation Seminar[1], David Rule spoke about the higher level of complexity and scope of capital models in insurance regulation to those used in banking regulation. This has already driven an increased focus by regulators on independent model validation, model documentation and model governance for internal model approval for Solvency II.

The PRA are increasingly focusing on stress testing and the exercises conducted by general insurers in 2015 and 2017 have been extended to life insurers in 2019. The PRA's objective in conducting this exercise is to inform a view of sector risks, and it will assist in the supervision of individual firms. It will be essential that firms have a central and robust framework in place, and be able to manage, control and understand their own stress testing activities, including the associated model risk. In 2018 the PRA issued their Supervisory Statement on Model Risk Management Principles for Stress Testing to banks. As this is regarded as best practice, it is probable that this level of governance will be extended to insurance companies in the future.

Model risk is the risk inherent in using models to predict requirements, forecast demand and inform decision making; the possible adverse consequences of decisions based on models that have fundamental errors or the misuse of those models. Any new regulation for banks or insurers is likely to place direct responsibility for group wide model risk management onto a senior director.

Why do models go wrong?

1. Fundamental flaws

There are notorious cases of missed errors and miscalculations causing catastrophic results in the financial services industry. In the report on its 'London Whale' multi-billion dollar losses, JP Morgan Chase cited an 'error-prone risk modelling system', including a volatility calculation that required employees to cut and paste data into a spreadsheet.[2] Knight Capital's disastrous trading system meltdown in 2012 was linked to an operator deploying a trading model without sufficient testing, in the context of a catalogue of risk management failures.[3]

> For the insurance industry, relying as it does on the effective use of models to stay competitive and profitable as well as compliant, a robust approach to model risk is becoming more important than ever.

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[1] 'Model use and misuse' speech by David Rule, given at the Association for British Insurer's Prudential Regulation Seminar 2019 www.bankofengland.co.uk/speech/2019/david-rule-british-insurers-prudential-regulation-seminar

[2] www.bloomberg.com/news/articles/2013-01-16/jpmorgan-halves-dimon-pay-says-ceo-responsible-for-lapses-1-

[3] medium.com/@bishr_tabbaa/the-rise-and-fall-of-knight-capital-buy-high-sell-low-rinse-and-repeat-ae17fae780f6

As Rule pointed out: "The risk is not that the model is imperfect – that is inevitable. Rather it is that errors are so fundamental that the model produces inaccurate or undesirable outputs when viewed against design objectives and intended business uses."[1]

Having a strong model risk management framework reduces the risk of errors in models. An independent model validation process ensures that assumptions and decisions made during model development are questioned. Performance tracking alerts management to model drift and potential inaccuracies. Risk assessment identifies the models that are most critical to the business and need more frequent review. Good model risk management ensures you can understand your entire organisation's model risk story, including reports that can be delivered to the board, and visually show how all the firm's models are connected, allowing you to track context and interconnectedness risk.

2. Misuse of models

Misuse can arise when decisions are made without fully understanding or accepting the level of uncertainty around, or limitations of, a model. When a problem is complex and dynamic, it will be more difficult to model than a simple problem and will bring a higher level of uncertainty. The model will likely also be constrained for usage under defined conditions. This is especially relevant in the insurance industry where there is a high level of complexity to models used. With the increased focus the regulators are putting on stress testing, there is more scope for misuse of models with stress scenarios shocking macro-economic factors outside the defined range for a model.

The IFoA (Institute and Faculty of Actuaries) Model Risk Working Party has classified organisations according to their concern for model uncertainty and the legitimacy of modelling. Rule's position – and a firm steer for insurers looking at their approach to model risk management– is that he "would feel more comfortable if insurers fell into the category of conscientious modellers, with modelling having high legitimacy but management also having a high concern for model uncertainty."[1]

Confidence in models should always be balanced with an understanding of their limitations, scope and the assumptions they employ. Outputs should be challenged using simpler models, rules of thumb, expert judgement and recent experience.

The model risk management framework should link the review and validation of a model to its usage with clear documentation on the usage constraints. Model risk management in banking is starting to see an increasing use of AI to automate monitoring and reporting of where models are used and with what data.

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Why is it important?

For insurers, what might it mean when a model goes wrong? Products may be under-priced, or customer groups may be treated unfairly, or the organisation might under-reserve against risks. Questions around ethics and conduct are also going to be asked: when designing a pricing algorithm, what behaviours are acceptable to include? How transparent do insurers need to be to their customers?

If any errors lie within internal models used to calculate regulatory capital requirements, organisations could be failing to protect policyholders.

SAS Opinion

"As the use of models continues to expand, organisations need a thorough understanding of why each model exists. They need to use models appropriately and regularly monitor their quality. It is essential to limit the potential risk associated with the use of models because this affects business decisions and, therefore, efficiency."[4]

Lukasz Libuda
Customer Advisory Manager for the South EMEA Risk Practice at SAS

A robust approach to model risk management can mitigate many of these risks and provide significant business advantage. Reliable models that operate in a transparent and robust way can have a direct impact on results. Model risk management can help to identify flaws, improve quality and reduce misuse resulting in improved business decisions with a direct positive effect on profits.

What can we learn from other industries?

The experience of banks in countries already subject to model risk management regulation has shown that compliance creates a significant burden and additional costs for an organisation. Many banks thought that they could achieve compliance by upgrading model risk management policies. Most have now recognised that they need a new policy, a central model risk management team and systems to support them.

SAS Opinion

"Model risk management is becoming a fundamental part of risk management in financial services organisations precisely because model risk continues to increase."[5]

Tony Cartia
Principal Business Solution Manager for the South EMEA Risk Practice at SAS

[4] https://blogs.sas.com/content/hiddeninsights/2019/03/06/the-continuing-challenge-of-managing-model-risk/

[5] https://blogs.sas.com/content/hiddeninsights/2019/04/11/stepping-up-from-model-governance-to-model-risk-management/

Several leading banks are now developing model risk management operating models that deliver both low cost, compliant processes and improvements in the efficiency of the underlying model development process.

These organisations have simultaneously upgraded the model risk management and model development processes, enabling delivery of compliance at a low net cost.

A recent poll[6] by SAS looking at the future priorities for organisations implementing a model risk management framework showed that the highest priority in the next one to two years is the automation of model validation and monitoring. The biggest challenge is seen to be the increasing complexity of models, as banks show concern that AI models will be more difficult to review, manage and validate.

By setting up the right approach early, organisations can avoid the rework, lack of transparency and subsequent compliance failures associated with a manual, short-term plan. Ensuring transparency and a future-proof model risk management system will lead to ease of compliance and create an approach that informs strategic and business decisions.

SAS Opinion

"Model risk management evolves over time and will continue to do so. It is, therefore, essential that 'front-runners' in model risk management continue to share their experiences. Everyone can learn from each other, including customers, SAS experts and consultants."[7]

Carsten Krah
Senior Business Solutions Manager for the North EMEA Risk Practice at SAS

Conclusions

The ability to manage model risk is an existential challenge. With the advent of new regulations and new technology driving complexity within models, as well as organisational challenges such as risk and finance integration, the old approach – using multiple shared files and spreadsheets together with generic governance solutions – simply doesn't scale.

McKinsey recognises that: "systematic cost reduction can only be achieved with an end-to-end approach to model risk management. Such an approach seeks to optimize and automate key modelling processes, which can reduce model-related costs by 20 to 30 percent."[8]

Enterprise model risk management requires firms to go beyond a checklist approach toward understanding model risk dynamically and in context. Any model risk solution also needs to manage a wide range of model types, including open source, multi-vendor and AI and Machine Learning models.

SAS is working with 50 organisations who have implemented the SAS® Model Risk Management solution, supporting their model risk management projects and developing ecosystems that support all model types across their lifecycles. In our experience successful model risk management system roll-outs have two distinct phases:

Phase 1
Initial rapid roll-out for (basic) model risk management compliance.

Phase 2
Internal programme of model risk management process efficiency.

To find out more about how SAS helps insurance organisations with a low cost, efficient approach to model risk management, visit: **www.sas.com/mrm**

or contact Liz Dudley: **Liz.Dudley@sas.com**

[6] www.sas.com/sas/events/18/mrm-customer-connection/proceedings.html

[7] blogs.sas.com/content/hiddeninsights/2019/03/05/can-model-risk-management-combine-business-and-glamour/

[8] www.mckinsey.com/business-functions/risk/our-insights/the-evolution-of-model-risk-management

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