Email issued 3 May 2012 - Validation of external catastrophe-models under Solvency II

In the run-up to Lloyd's IMAP, a key area of focus has been Managing Agents' use of external catastrophe-models within their Internal Models. Since October 2011, the FSA and Lloyd's have conducted separate investigative workstreams, the Association of British Insurers has published an "Industry Good Practice" guide for cat-modelling, and Lloyd's has reviewed documentation of external catastrophe-model use from all Managing Agents.

Within the larger topic of using external catastrophe-models, there has been a particular emphasis on ensuring good practice for model validation. Solvency II requires companies which use one or more external catastrophe-models within their Internal Models to perform an appropriate level of validation on the cat-models.

As a result of the review work completed to date, Lloyd's believes that there is scope for a collaborative, market-wide validation process to lessen part of the load on individual participants; that the Market may benefit from additional general guidance on validating catastrophe-models in the context of Solvency II; and that there may be further value in clarifying the extent, scope and nature of the validation that may be required for different Managing Agents, with widely differing exposures to catastrophe risk.

Lloyd's and the LMA have therefore established a new working group to investigate both the possible extent of collaborative validation, and the possible benefit in issuing guidance on what model validation does – and does not – involve. The FSA has been kept informed of this project, and has commented on its findings at the appropriate stages.

The **LMA Cat-Model Validation Group** is now pleased to announce:-

- a new policy framework for validation of external catastrophe-models, published herewith;
- illustrative examples of validation documents, for differing levels of materiality of catastrophe-risk within a portfolio, to be published by May 31st;
- a defined scope for the production of collaborative validation information, including data-sets, which will be accessible to the Lloyd's Market later this year;
- a programme of seminars and workshops to assist Managing Agents in developing comprehensive, cost-effective processes for appropriate cat-model validation, including maintaining documentation. (Please note that this programme will not affect the timing or scope of Lloyd's IMAP, and will run concurrently with it. Managing Agents are required to address all feedback about their use of external cat-models according to the timetables already communicated by Lloyd's Solvency II team.)

This collaboration will continue to bring benefits in future when Managing Agents are assessing model change as part of their business-as-usual work with cat-models.

I will write to you soon with more information about the programme of workshops. In the meantime, if you have any questions please do not hesitate to contact me or my Deputy, David Clouston.

Regards,

Trevor Maynard
Head of Exposure Management and Reinsurance
Lloyd's
020 7327 6141
www.lloyds.com

This message has been sent to Exposure Management contacts and copied to Compliance Officers at Lloyd's Managing Agents.

EXTERNAL CATASTROPHE MODEL VALIDATION CONCEPTUAL FRAMEWORK

The scope of this document is restricted to the Solvency II requirements as they apply to using an external cat-model within an Internal Model.

WHAT IS VALIDATION OF AN EXTERNAL CAT-MODEL?

In this context, model validation is **the process of assessing the extent to which an external cat-model provides a valid representation of catastrophe risk in a company's portfolio**. The materiality of the catastrophe-risk being modelled, relative to other parts of the company's overall risk, will determine the level of assessment required.

Model validation is <u>not</u> necessarily an exhaustive enquiry into the science behind the model, or an assessment of whether the model-builder has done the best possible job, or a complete deconstruction of the model's components. Nor is a company necessarily required to reach a conclusion about whether the cat-model provides a good representation of "industry" or "market" risk.

The assessment process may need to include some of these elements, but only to the extent that they help answer the question "Does this model provide a valid representation of the catastrophe risk in my portfolio, taking into account its materiality?"

MODEL VALIDATION IS ABOUT YOUR RISK

Model validation in the context of Solvency II is about establishing the validity of the external cat-model for *your* portfolio. There is no requirement to reach a conclusion about the cat-model itself, in isolation. The validation process will have succeeded when you are able to say "We are using this external cat-model because we have concluded that – perhaps with certain adjustments, or used in a certain way – it is an appropriate fit for my risk."

OPERATIONAL CONSTRAINTS

Licensing cat-models is expensive, involving contractual commitments that can last for three years or more. They also require significant operational commitments, including dedicated IT architecture and deeply embedded business-processes. Accepted market formats for exposure-data and model-outputs can vary around the world, influencing the choice of modelling platform. In short, cat-models tend to be "sticky" for legitimate operational reasons unrelated to the models themselves.

Many companies, perhaps most, therefore find themselves in the position of needing to validate cat-models they already license, rather than choosing new ones.

Model validation helps companies cope with these constraints, while maintaining full confidence in the representation of cat-risk. The requirement is to use a model that provides a *valid* representation of your risk. Validation assesses the extent to which an external cat-model provides this. This process works just as well on models that are already licensed, provided appropriate adjustments are made where highlighted by the validation process.

CONCLUSION

The validation process may be relatively simple and short, or complex and detailed, or anything in between. It may result in your using a cat-model "out-of-the box", or in significantly adjusting outputs to provide a better fit to your risk. But whether your validation process is proving arduous or easy, its purpose is to assess the extent to which an external cat-model provides a valid representation of the catastrophe risk for <u>your</u> portfolio.

PRE-VALIDATION PROCESS

1. Assessing materiality

Since you will be validating the external cat-model for <u>your</u> portfolio, and since the materiality of your catastrophe-risk dictates the level of validation required, the starting-point must be your risk-ranking.

Solvency II requires a risk-ranking as part of overall governance. Assuming that you have any degree of exposure to natural catastrophe at all, the following types of questions will be helpful:-

1. For capital-relevant return-periods, what is the materiality of cat risk within your overall risk? For example, is nat-cat 50% of overall risk? Or 20%? Or 5%? And on what basis - probabilistic? PML?

2. What is the process by which you have assessed this (e.g. historical P&L attribution, sensitivity-testing)?

Evidence: Governance and process documentation

3. Within your cat-risk, what is the relative materiality of different regions/perils? For example, is there a single predominant region/peril (e.g. US Windstorm)? Are there bands of roughly equivalent region/perils?

4. What is the process by which you have assessed this (e.g. senior-management engagement, subject-matter experts, etc.)? Have you considered alternatives?

Evidence: process documentation

5. What evidence do you have that these processes are being followed?

Minutes of meetings? Sign-offs?

6. What is the process by which you will monitor the materiality of cat-risk in future?

Evidence: process documentation

Assessing materiality of cat-risk and ranking region/perils may itself require the use of external cat-models, so there is an element of circularity here.

2. Testing Sensitivity of the internal model

Where an external cat-model is used, the relative materiality of cat-risk is likely to be reflected in the sensitivity (or otherwise) of the Internal Model to changes in the outputs of the cat-model. This should certainly be tested.

The following questions may be helpful:-

1. How sensitive is the Internal Model to changes in the output of the catastrophe-model?

What is the impact on the Internal Model if the cat-model results change by 20%? 5% 1%?

2. What is the process by which you have assessed this?

Process documentation

3. What evidence do you have that these processes are being followed?

Minutes of meetings? Sign-offs? Provide evidence of debate, challenge and decisions at a suitable level of seniority.

3. Levels of validation

Having established the materiality of catastrophe-risk, including ranking its region/peril components, and tested the sensitivity of the Internal Model, you can consider what levels of validation are required for the external cat-model(s). One size definitely does not fit all, and there is no prescribed approach.

Some useful questions include:-

1. Is your cat-risk incidental (i.e. simply a by-product of insurance exposure), or intentional (i.e. inwards catastrophe business)? If intentional, a greater degree of validation may be required depending on materiality.

2. Where there are region/perils with differing levels of materiality, can they be allocated to categories or "buckets" for the purpose of validation (e.g. region/perils that are individually less than x% get a certain degree of validation; up to y% get a higher degree, etc.)? Sensitivity-testing of the Internal Model as described in section 2 may inform this approach.

3. Are you proposing to use an Aggregate or Detailed cat-model?

NOT USING AN EXTERNAL CAT-MODEL?

SII requires material catastrophe-risk, like all other insurance risk, to be appropriately represented in a company's Internal Model. However, there is no SII requirement – or even expectation – that this representation be derived from an external cat-model.

Other things being equal, the only reason for using an external cat-model is because you believe that it is a more efficient method of representing catastrophe-risk than you can do in-house. (In other words, to achieve the same level of accuracy yourself would be more expensive or time-consuming than licensing the cat-model.)

Reasons for <u>not</u> using an external cat-model may include:-

1. cat-risk is below a threshold of materiality;

what is the threshold? what is the process for determining it? how is this evidenced?

2. in-house processes for representing the cat-risk in the Internal Model are adequate and appropriate;

model design and process document?

3. available external cat-models offer no advantage over in-house

what is the process of evaluation/consideration?

4. there is no external cat-model

Where any of these apply, there will need to be another process for representing the "non-modelled" cat-risk in the Internal Model, which must be documented and evidenced. Validation approaches for proprietary catastrophe models apply equally well in this case.

COMMON MISUNDERSTANDINGS AND QUESTIONS

Q1: Haven't the cat-model suppliers already done all the validation?

A1: No. The suppliers will have built what they believe to be a valid cat-model, but that is only half the story. The model validation task for your company is to relate the cat-model to your risk, which only you can do. Also, the models generally include options and settings which you will need to understand in the context of your portfolio.

Q2: Can I just re-use the vendor documentation for my own model validation document?

A2: Vendor documentation describes the cat-model, but does not describe the applicability or otherwise of the cat-model to your portfolio. Therefore it cannot in itself comprise a complete model validation document for your company. However, you can use extracts from vendor documents (with permission, and subject to licensing constraints) to demonstrate how you have arrived at your understanding of the cat-model.

Q3: How can I understand the cat-model without replicating all the science in it?

A3: The requirement is to understand enough about the cat-model to make decisions about its selection and use for your company. This is subject to proportionality, and will derive directly from the materiality of the relevant catastrophe-risk to your overall risk. Generally speaking, the more material the cat-risk, the higher degree of understanding you will be required to demonstrate.

Q4: I don't have the resources to do lots of model-sensitivity analysis and other work on the cat-model

A4: The purpose of model sensitivity analysis – or any other testing – is to understand the cat-model. Not everyone needs to do this level of work. See Q3 above.

Q5: The vendor documentation does not give me all the information I need to understand the cat-model at the required level.

A5: The main commercial cat-model vendors have worked extremely hard to raise the level of their documentation in the last few years. If there are gaps, contact the vendors directly to discuss what you need to know. Keep a note of conversations, meetings, seminars, etc., since they will be evidence of how you achieved your understanding of the cat-model.

Q6: My cat-model supplier is another division of my Group. Does this mean that I have automatically already done the necessary validation?

A6: No. You are required to have performed the necessary level of validation in-house. SII requirements do not distinguish between types of cat-model supplier.

Q7: Can I outsource the model validation?

A7: No. You can – of course – outsource any specific tasks that are part of your model validation process. But the validation process itself, and the understanding of the cat-model, must be "owned" in-house, and cannot be delegated or outsourced.

Q8: The cat-model we license is widely respected throughout the industry, and has been tested over many years. Do I need to do my own validation?

A8: Yes. Whatever the pedigree and history of the cat-model, your validation process requires you to understand how it represents your catastrophe risk in your Internal Model. See Q1 above.