

Who validates the validators?

A framework for validating your Economic Capital Model

In the last several years, economic capital models have become ubiquitous for larger, complex insurers and now a broader swath of the industry is beginning to examine the potential benefits.

These models are commonly used to:

- Inform the process for managing risks and optimizing returns on risk
- Allow management to determine an appropriate level of capital to hold for their retained risks
- Satisfy regulatory and/or rating agency requirements

These three uses overlap to greater and lesser extents in different territories. But all the stakeholders involved will want to have confidence that the economic capital model is fit for the uses to which it is put.

What is validation?

Fundamentally, an economic capital model seeks to consistently use exposure information and limited actual experience to estimate the impact of remote events that may or may not have ever happened in the past. So the users of model outputs need assurance that the economic capital model adheres consistently to its own guiding conceptual principles, aligns logically with previously validated editions of the same model, and conforms to standards and tests imposed by the regulator. Model validation is the process of confirming these qualities.

Why validate?

Model validation is required for a many overlapping reasons. If regulators or senior managers base decisions on the output of risk management models, then they have to understand the models' assumptions, limitations and output. They need to ensure (validate) that the model is suitable for a

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specific application. Since there are few commonly accepted standards for model validation, the typical process is that the validating party receives an overwhelming amount of documentation. The complexity of models requires a more structured validation process which can readily communicated to executives who are not directly involved in modeling.

A framework for validation

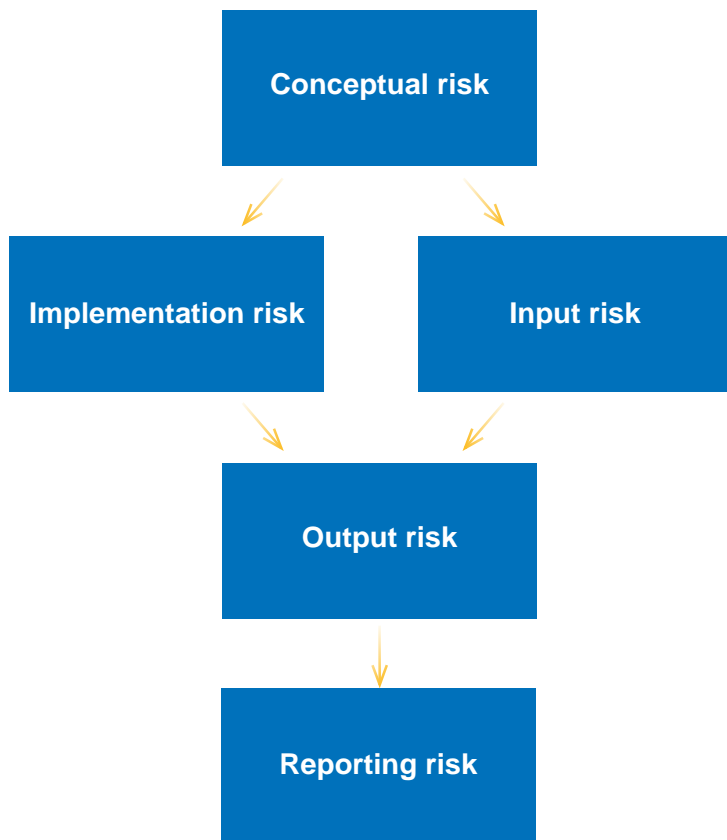
A white paper on model validation has been jointly developed by the Willis Economic Capital Forum (WECF), housed at Georgia State University, and Willis Re Analytics.

In that paper, model validation is discussed as a process to review the model risks, which can be described as:



- **Conceptual risk:** The risk that the modeling concepts are **not suitable** for the purpose of the application. In the following discussion, we will use the terms “appropriate / inappropriate” to denote instances that are “suitable / not suitable for the purposes of the application.”
- **Implementation risk:** We subsume two sources of risk in this category:
 - The risk that the modeling concepts are **not implemented appropriately**, i.e. the wrong algorithms were chosen to implement the modeling specified modeling concepts
 - The risk that the **implementation contains errors**, i.e. appropriate algorithms were chosen, but they contain coding errors, bugs
- **Input risk:** The risk that the **input parameters** are inappropriate, incomplete or inaccurate
- **Output risk:** The risk that the key figures and statistics which can be produced by the model are **too sensitive** with respect to the provided input parameters or **do not support the business purpose**

- **Reporting risk:** The risk that the **representation of the output for the business users** is incomplete or misleading. This is related to what is called the “use test” under Solvency II. In a use test the firm has to prove to the regulator that reports obtained from the model are used in a business process. Some people consider this to be outside the scope of a model validation, but we believe it is a vital step of the process.



The white paper provides detailed discussion of how to approach each of those risks in general as well as specific issues for underwriting, natural catastrophe, reserve, credit and market risk sub model validation. A sample checklist of considerations is shown in the box at the right.

This work will be presented at the GIRO meeting in Edinburgh, Scotland later this year. Ideally, a more standardized validation process will:

- Create a more objective and less people-dependent result
- Allow more stakeholders to understand the model’s capabilities and restrictions
- Improve the efficiency of the validation process, and
- Lead to more concise and useful documentation. ◆



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Examples of validation checkpoints for the Natural Catastrophe Submodel:

- ☑ Is the internal modeling team familiar with the catastrophe modeling concepts?
- ☑ Is the cat model provider choice well-documented and linked to the intended use?
- ☑ Does the modeling team document the rationale for choosing to update a catastrophe model or stay with an older version?
- ☑ Check whether the model covers all major risks in the insurance company’s exposure, e.g. flood following hurricane.
- ☑ How rigorous and transparent is the provider in communicating software bug fixes and improvements?
- ☑ Is there a process to check the influence of bug fixes with test cases which are meaningful with respect to the portfolio?
- ☑ Calibration: check whether observed and the modeled events appear to be reasonably overlapping.
- ☑ Check that the selection of historical events is appropriate.
- ☑ Check whether the key drivers to insured loss generation are in line with management assessment of the portfolio’s key loss drivers.
- ☑ Exposure data: check whether the risk descriptors which are used by the catastrophe model (e.g. building structure type / commercial occupancy type / floor level, cellar, occupancy types) are captured in the source systems or whether they were estimated.
- ☑ Check whether the policy conditions on sums insured are calculated correctly to match contracts.
- ☑ Was the model run with or without loss amplification?
- ☑ Have the modeled results been compared with industry losses, company claims history or multi-model results?

Excerpt from the WECF/Willis Re white paper on Economic Capital Model Validation to be published soon.