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Reducing Risk in Risk Assessment Models

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Complex actuarial models are becoming increasingly important to the management and financial reporting of life insurance companies in North America, elevating the scrutiny placed on those models by regulators, ratings agencies, auditors and company stakeholders. While a key use of such models is risk assessment, the models themselves pose risks. A new report released by the Canadian Institute of Actuaries in August 2008 provides useful guidance to actuaries who are charged with designing, implementing and using advanced models as well as to those who oversee such work.

The report is titled *Risk Assessment Models* and was written by the Solvency Framework Sub-Committee Model Working Group of the Committee on Risk Management and Capital Requirements of the Canadian Institute of Actuaries, as part of the larger project of developing a new framework for capital assessment of insurance companies in Canada. This initiative is being led by the MCCSR Advisory Committee (MAC), which includes representation from the Canadian insurance industry, the actuarial profession in Canada and the supervisory authorities.

The regulators (OSFI and AMF in Quebec) accepted and posted the MAC vision paper on their Web sites in 2007 inviting comment. Both have subsequently communicated their intent to continue working in the direction described in the vision paper, while preparing for the pending adoption of IFRS in Canada for public reporting.

The framework proposed for Canada follows a principle-based approach to solvency regulation. Consistent with capital assessment trends around the world, this framework provides the opportunity to incorporate results of advanced internal models of an insurer's business, which may depend on stochastic analysis.

Internal models offer the opportunity to tailor capital assessment to the specific circumstances of each insurer, including the risk characteristics of their business in force and the risk mitigation strategies they adopt. Internal models can also be more adaptable to changes in the environment while providing useful information on the relative significance of different risks and the potential impact of management decisions and actions. The use of internal models could thereby lead to more appropriate levels of capital held by individual companies and support optimal risk-based business decisions.

However, internal models are challenging to develop and implement as the technology and modeling techniques involved are still relatively new. This approach poses risks to both the insurance companies and the regulatory bodies assessing capital needs based on their results. Accordingly, there is a generally acknowledged need for guidance on how such models should be designed and governed to help assure the accuracy of results, comparability between companies, consistency between valuation dates and between risks, transparency of models, reliability of results and practicality of the model's implementation and use.

This is a daunting set of objectives for any guidance paper. The report of the CIA Working Group has attempted to address them in a thorough document running 68 pages including appendixes. The report is a comprehensive summary of things to consider, rather than a prescriptive modeling guide. The body of the *Risk Assessment Models* report addresses the objectives noted above in five main sections. A few highlights from each section are provided below.

Model Design: It is of course critical to carefully design a model to ensure it is appropriate for its intended use, and a number of key considerations are discussed in the re-



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continued on page 28

Reducing Risk in ...

▶ continued from page 27

port. Risk and capital assessment models have a number of unique calculation requirements, according to the framework being supported, and may differ from more familiar planning and reserve calculation models. They will be run under more extreme scenarios, may need more approximations to practically implement, and will tend to measure risks individually rather than in combination, thus requiring an aggregation process. Stochastic analysis, if required, will depend on risk element scenario generators as input. These generators will in turn entail their own selection and design considerations.

Model Implementation: Given a model design, the implementation of a working model involves its own set of considerations. Input processes for assumptions, parameters and business data must be planned and developed. Information technology decisions must be made and acted on which anticipate the operational demands of the model, the resources available and other constraints such as transparency, validation and control. These constraints are of course exacerbated by the likely need for stochastic processing components.

Validation and Calibration: Complex models are difficult to check and validate, but the validation process is that much more critical because of that complexity. The validation should address both the design and its implementation. A variety of general model validation processes are described, and the issue of calibration of model parameters to historic data or current conditions is also considered.

Governance: With the critical importance of these models within the risk management function and the regulators' potential reliance on the results of the models for capital assessment and supervision, model governance is a key issue. The responsibilities of senior management and the board of directors with respect to the development, use, review and validation, documentation and approval of the model need to be well understood and accepted. Key positions must be adequately staffed and supported.

Reporting: Reporting considerations include not only the reporting of results but also internal reporting on model development, implementation progress and all review and approvals. Risk analysis reports must be flexible yet robust and controlled, and must meet prescribed specifications. External disclosures of model design, methodology and key assumptions may also be necessary for transparency and to ensure comparability across the industry.

While the need for a new solvency framework in Canada has guided and inspired the creation of this report, many of the principles and considerations discussed are entirely applicable to complex actuarial models used for any purpose. In fact, a key requirement which regulators will look for is the pervasive use of the model within the insurance organization, which reinforces the commonsense notion to make the model flexible and adaptable to multiple purposes.

The *Risk Assessment Models* report is comprehensive and informative. The Working Group benefited from the variety of perspectives and experience of its members, bringing together actuaries representing regulators, consulting firms, insurance companies and software providers. They also exchanged opinions and shared draft copies of the report with several workgroups preparing similar documents on behalf of the International Actuarial Association (IAA) and the International Association of Insurance Supervisors (IAIS).

And, finally, this report is just a start. The future solvency framework is still evolving; the skills, practices and technologies required are being developed; and the appropriate guidance must grow and change over time. Hopefully this report will stimulate discussion and be considered a worthwhile addition to the list of resources available to actuaries planning and developing risk assessment models. ♦