



Modelling the Epistemic Uncertainty in the Vulnerability Assessment Component of an Earthquake Loss Model

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Loss estimates have been shown in various studies to be highly sensitive to the methodology employed, the seismicity and ground-motion models, the vulnerability functions, and assumed replacement costs (e.g. Crowley et al., 2005; Molina and Lindholm, 2005; Grossi, 2000). It is clear that future loss models should explicitly account for these epistemic uncertainties. Indeed, a cause of frequent concern in the insurance and reinsurance industries is precisely the fact that for certain regions and perils, available commercial catastrophe models often yield significantly different loss estimates. Of equal relevance to many users is the fact that updates of the models sometimes lead to very significant changes in the losses compared to the previous version of the software.

In order to model the epistemic uncertainties that are inherent in loss models, a number of different approaches for the hazard, vulnerability, exposure and loss components should be clearly and transparently applied, with the shortcomings and benefits of each method clearly exposed by the developers, such that the end-users can begin to compare the results and the uncertainty in these results from different models.

This paper looks at an application of a logic-tree type methodology to model the epistemic uncertainty in the vulnerability component of a loss model for Tunisia. Unlike other countries which have been subjected to damaging earthquakes, there has not been a significant effort to undertake vulnerability studies for the building stock in Tunisia. Hence, when presented with the need to produce a loss model for a country like Tunisia, a number of different approaches can and should be applied to model the vulnerability. These include empirical procedures which utilise observed damage data, and mechanics-based methods where both the structural characteristics and response of the buildings are analytically modelled. Some preliminary applications of the methodology are presented and discussed.

References

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