

Conditional Law of Risk Processes Given that Ruin Occurs

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A risk process that can be Markovised is conditioned on ruin. We prove that the process remains a Markov process. If the risk process is a PDMP, it is shown that the conditioned process remains a PDMP. We discuss in particular the classical risk model, the renewal risk model, the dual model, the Markov modulated risk model, the Björk–Grandell risk model, and the risk process perturbed by diffusion. For the small claim case we prove that as the initial capital tends to infinity, the risk process converges weakly to the associated model; i.e., the model obtained by the exponential change of measure using the Lundberg coefficient. For the large claim case, we show that the model converges weakly to the unconditioned model. The latter result seems strange since the local drift of the process becomes negative, whereas the limiting model has a positive drift.

Key words: Markov process; generator; absorbing state; ruin; diffusion process; jump process; weak convergence; piecewise deterministic Markov process (PDMP); change of measure; Cramér condition; subexponential distribution.

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