Computing tight bounds for insurance payments with nonlinear risk

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Extreme events occur rarely, but these are often the circumstance where an insurance coverage is demanded. Given the first, say, n moments of the risk(s) in these events, one is able to compute or approximate the tight bounds for certain risk measures (typically of the form $E(\psi(x))$ through semidefinite programmings (SDP). Existing literatures have already shown this technique when $\psi(x)$ is linear or piecewise linear. In this paper, we will extend the technique for $\psi(x)$ being polynomials or fractional polynomials. It is worthy noting that SDP is an optimization model, and a special case of conic programming. It can be efficiently solved by interior point methods. In practice, upon we succeeding in forming our model into an SDP, the numerical solutions can be obtained with existing toolboxes.