An INAR(1) model with dynamic heterogeneity for claim counts in automobile insurance

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Bonus-malus systems in automobile insurance describe how the past claim counts determine the future insurance premiums. The potential risks of the policyholders vary due to differences in driving behavior, which leads to the unobserved heterogeneity in individual average claim counts. This work proposes an integer-valued autoregressive (INAR) process with dynamic heterogeneity for claim counts to reflect the stochastic effect of past count variables as well as the fluctuation and correlation of the time varying heterogeneity. Numerical comparisons with Poisson-Gamma credibility model are provided on the estimated heterogeneity and the predictive premiums based on past claim history.