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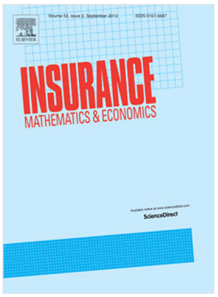

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Does hunger for bonuses drive the dependence between claim frequency and severity?

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Abstract

Auto ratemaking models have traditionally assumed independence between claim frequency and severity. With the development of insurance claim models that can accommodate dependence between claim frequency and severity, a series of recent studies has revealed that the aforementioned dependence between frequency and severity exists for auto insurance claims, demonstrating the validity of such models. However, the underlying process that creates this dependence has received little attention in the literature. Thus, we show that a rational decision-making process of drivers known as bonus hunger can systemically induce dependence between the claim frequency and severity even when the ground-up loss frequency and severity are, in fact, independent. Our model, based on the random effect model coupled with the standard bonus-malus system, successfully explains the seemingly contradictory results from the existing literature of weak positive dependence, between the claim frequency and severity for liability claims, and moderately negative dependence for collision claims. Our findings show that the seemingly contradicting dependence structures reported in the literature may be neither accidental nor sample specific. Furthermore, the bonus-hunger process also implies that the level of the claim frequency-severity dependence varies across bonus-malus classes, suggesting that a uniform dependency structure may not be appropriate for auto ratemaking modeling.

Keywords: Dependence, Generalized linear model, Bonus Hunger, Bonus-malus system, Optimal retention
JEL Classification: C6

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