

Department of Actuarial Studies

Seminar Series

Thursday, 6 April 2006

Speaker: Emiliano A. Valdez

Title: Longitudinal Modeling of Singapore Motor Insurance

Date & Time: Thursday 6 April at 4 p.m. to 5 p.m.

Location: E4A, Seminar Room 623

Abstract: This work describes longitudinal modeling of detailed, micro-level automobile insurance records. We consider 1993-2001 data from the General Insurance Association of Singapore, an organization of insurance companies. By detailed micro-level records, we refer to experience at the individual vehicle level. The data consists of vehicle characteristics, insurance coverage (including the premium) and claims experience, by year. The claims experience consists of detailed information on the type of insurance claim, such as whether the claim is due to injury to a third party, property damage to a third party or claims for damage to the insured, as well as the corresponding claim amount.

We propose statistical models for three components, corresponding to the frequency, type and severity of claims. The first is a random effects Poisson regression model for assessing claim frequency, using the policyholder age to calibrate the model. Vehicle type and no claims discount turn out to be important variables for predicting the event of a claim. The second is a multinomial legit model to predict the type of insurance claim, whether it is third party injury, third party property damage, insured damage or some combination. Premiums turn out to be important predictors for this component.

Our third model for the severity component is the most innovative. Here, we use a Burr XII long-tailed distribution for claim amounts and also incorporate predictor variables. Not surprisingly, we show that there is a significant dependence among the different claim types; we use a t-copula to account for this dependence.

The three component models provide justification for assessing the importance of a rating variable. When taken together, the integrated model allows an actuary to predict automobile claims more efficiently than traditional methods. We demonstrate this by developing predictive distributions via simulation.