



The University of Chicago
Department of Statistics

Master's Seminar

XIAN YU

Department of Statistics
The University of Chicago

**Statistical Analysis of Insured Hurricane Losses
in the US With Application to Industry Loss Warranties**

**TUESDAY, November 14, 2006 at 4:30 pm
110 Eckhart Hall, 5734 S. University Avenue**

ABSTRACT

Statistical analysis is performed on the insured losses from *natural catastrophes* which can produce very large liabilities for insurers. The analysis is based on two sets of data: (1) industry-wide insured losses from *hurricanes* that have been observed in the United States between 1954 and 1986 with insured loss values normalized to the 1987 US dollar and (2) industry-wide insured losses from hurricanes that have been observed in the United States between 1900 and 2000 with insured loss values normalized to the 2000 US dollar.

We firstly use the data to check the assumptions of the aggregate loss model. Independence between the number (*frequency*) of hurricanes and the total amount of the losses per hurricane (*severity*) is verified. Then, the assumption of independent and identically distributed insured losses per hurricane is confirmed. The impacts of different trending methods on model fit are compared. Various distributions (Poisson and Negative Binomial for frequency, Pareto and lognormal for severity) are considered. The *Poisson Log-normal* model, which currently is widely used in industry, works very well for the current data.

Our final goal is to estimate the value of ILW (Industry Loss Warranties) sold by reinsurers and contracted to pay the primary insurer a flat amount in the event of an industry-wide loss above an agreed threshold. The probabilities of different triggers (single event cost loss more than 5/10/20 billion) are derived.