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OPERATIONAL RISK: AN EMPIRICAL STUDY

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Operational Risk

- Operational risk is usually defined as the risk resulting from inadequate or failed internal processes, people, and systems or from external events.
- Usually includes legal risk

Modeling Issues

- Data was not collected historically
- Truncation of reporting, even if collected
- Severity & frequency

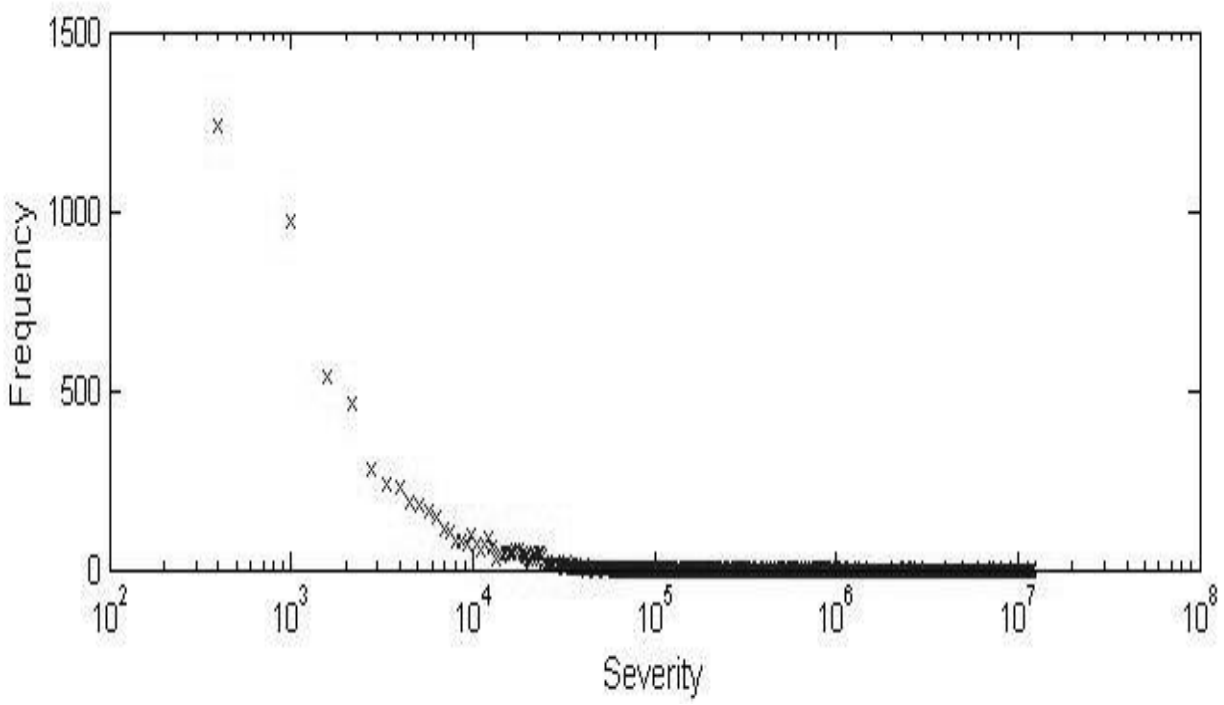
Regulatory Issues

- Banks in Australia are required by the regulator to model their operational risks and to satisfy the regulator of not only the suitability of the modelling process, but also of the appropriateness of the resultant capital required to manage the residual risk remaining to give an overall probability of survival of the bank of 99.9%
- Need to understand the purpose of the approach before jumping to conclusions

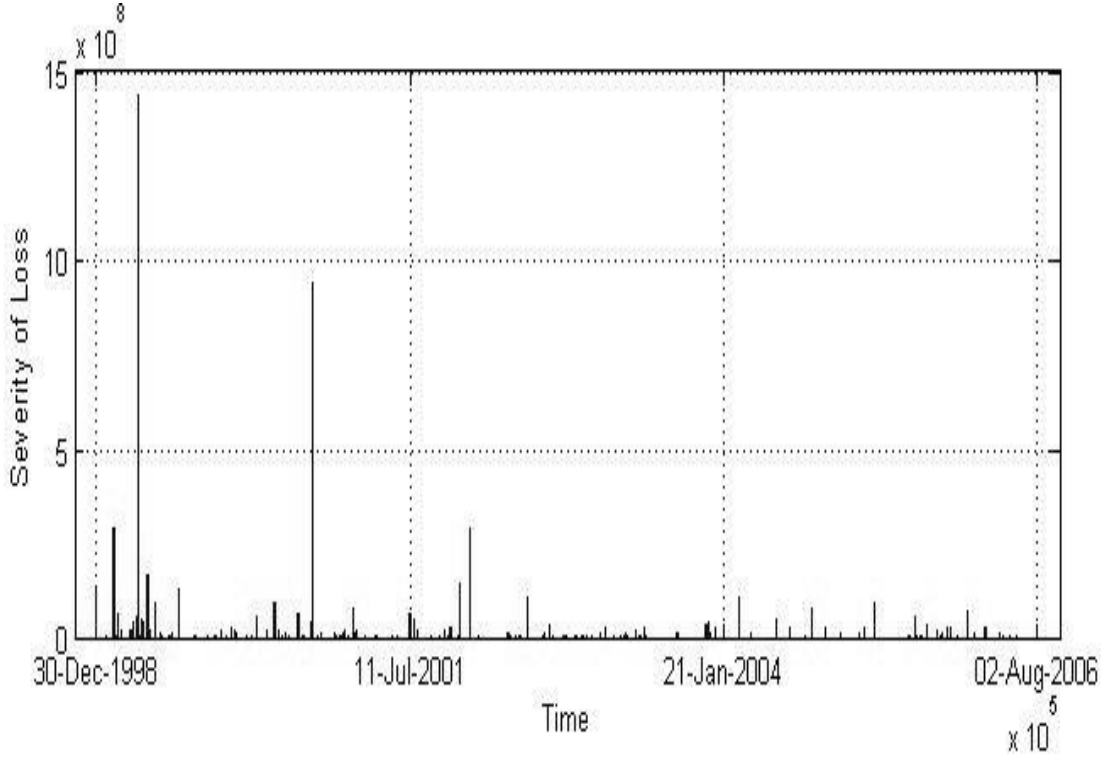
Summary Statistics

- Data period: 1998~ 1996
- Average Loss: $2 million
- Median: $360,000
- Std Dev: $2 billion
- Minimum: $12,000
- Maximum: $14 billion

Frequency & Severity



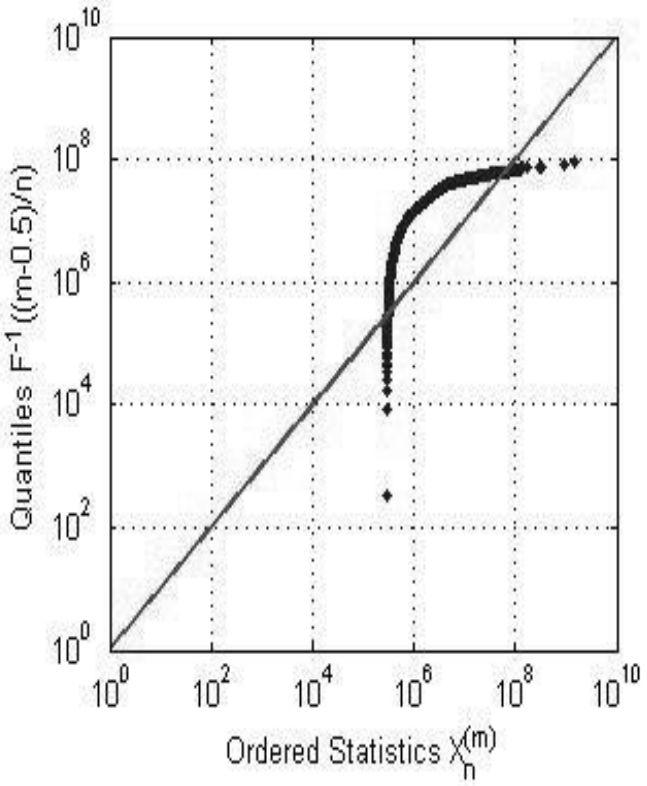
Time Series

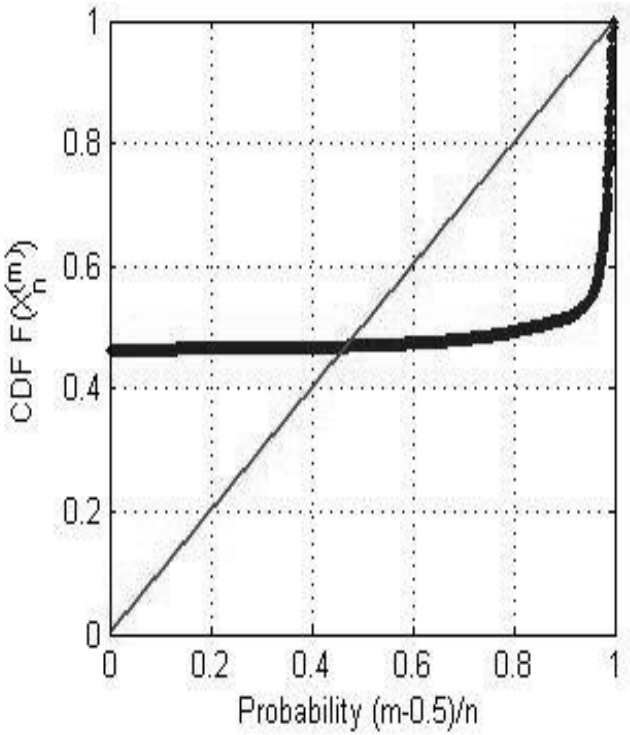

x 10^8
15
10
5
0
Severity of Loss
30-Dec-1998
11-Jul-2001
21-Jan-2004
02-Aug-2006
Time
x 10^5

Observations

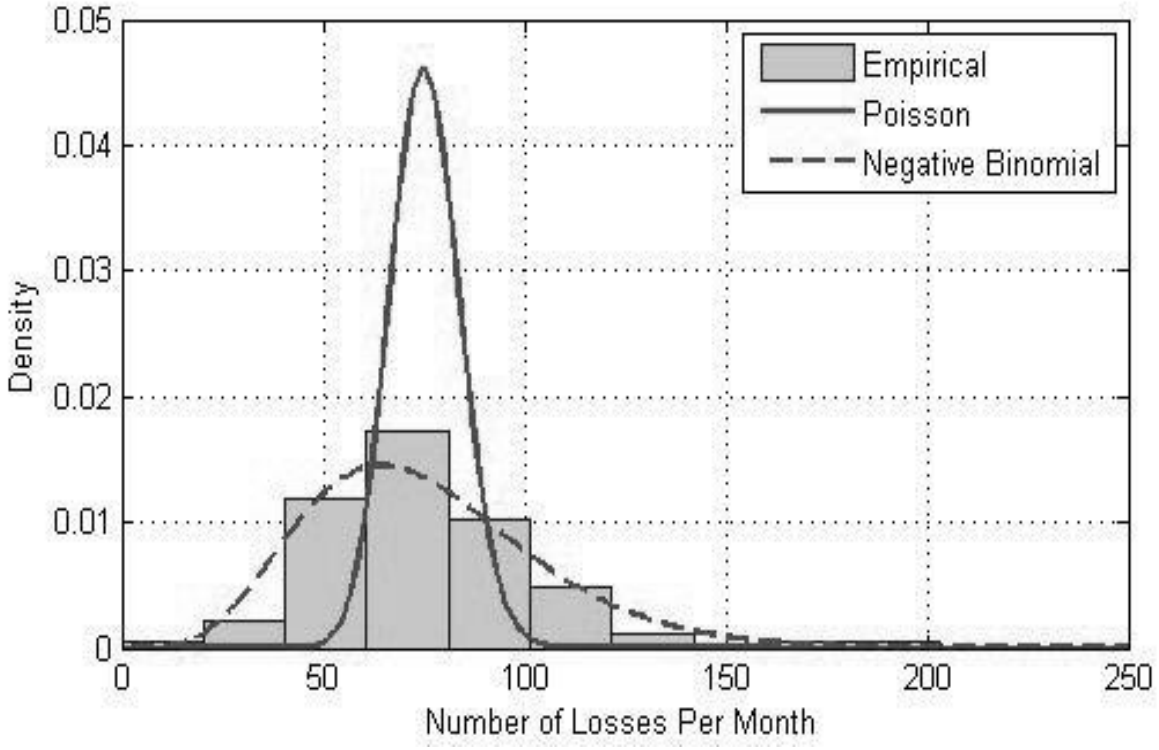
- There are a large number of small losses and a small number of large losses
- The occurrences of the losses are irregularly spaced in time, suggesting non stationarity.
- The severity and frequency of losses tend to decrease with time.
- The data is very skewed and kurtotic. The kurtosis stems from the concentration of data points in the lower losses and the skewness is due to the extreme data points with the largest loss being approximately 64 standard deviations away from the mean.

Normality Analysis

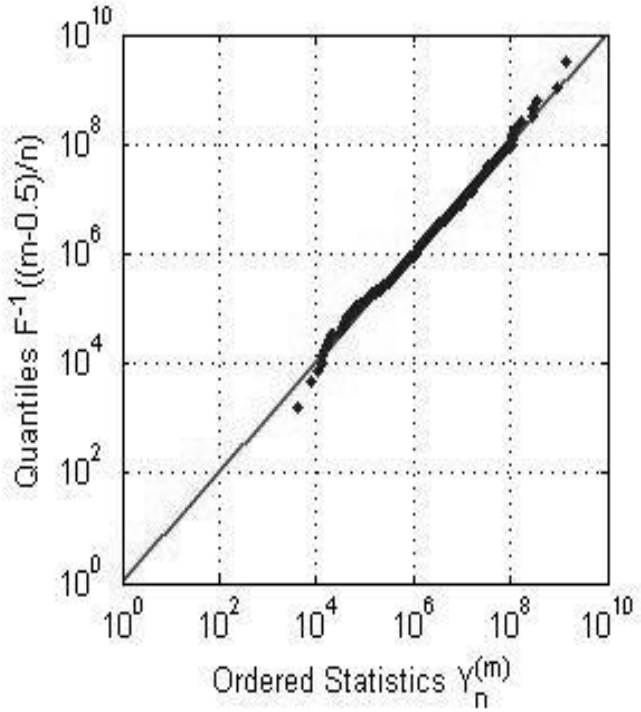


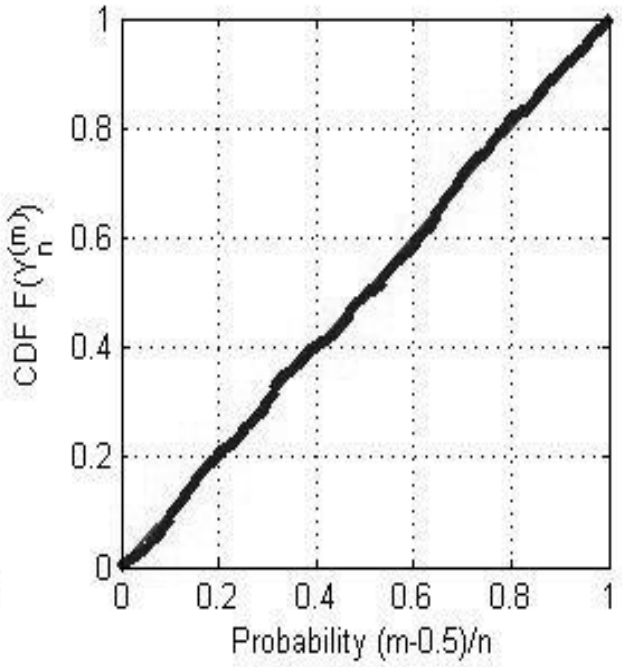


Poisson & Negative Binomial

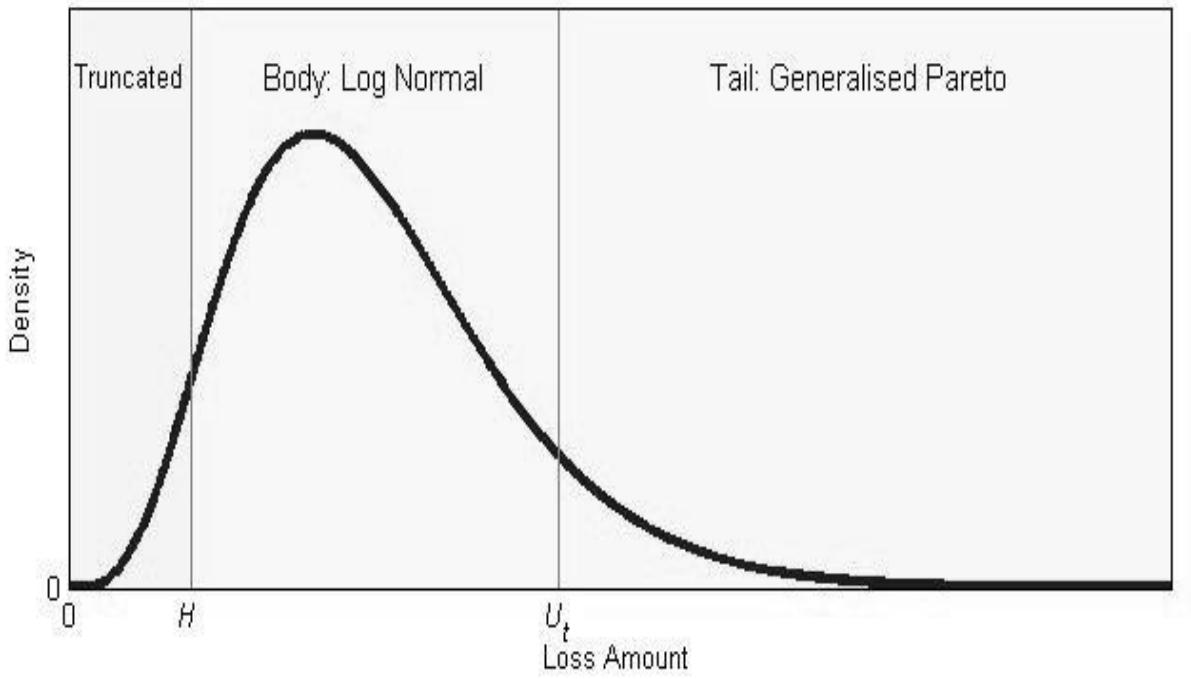


MLE Parameters





Multi Distribution Modeling



Other Research Comparisons

- VaR is smaller for our data than US Banks
- Our results are inconsistent with Fontnouvelle et al.
- The use of the Poisson distribution to model operational risks is inconsistent with our results.

Wuthrich Approach

- $F(x) = w1Fint(x) + w2Fext(x) + (1 - w1 - w2)Fexpert(x).$

Some Conclusions

- Using the Poisson distribution by itself does not seem a good idea
- Combining the internal, external and expert views shows promise