



Institute
and Faculty
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A Bluffer's Guide to London Market Pricing

Matthew Evans



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How to talk about First Loss Curves and Increased
Limit Factors with Underwriters and Management

ertise
ponsorship
Thought leadership
Progress
Community
Sessional Meetings
Education
Working parties
Volunteering
Research
Shaping the future
Networking
Professional support
Enterprise and risk
Learned society
Opportunity
International profile
Journals
Support

Agenda

- Welcome, would-be bluffers!
- Scope – wider techniques versus FLC's and ILF's
- What are they and how are they used?
- Common problems
- Communicating on FLC's and ILF's with underwriters
- Questions and Comments



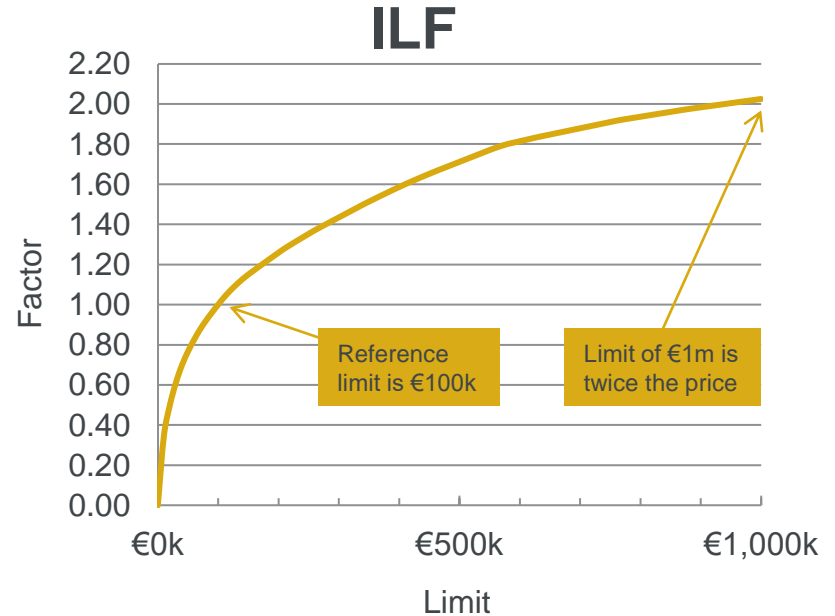
Scope and wider London Market techniques

- Pricing techniques commonly used in London Market
 - Experience rating
 - Catastrophe rating using vendor models
 - Legacy/market rating schedules
 - GLM's where data permits
 - Simulation
- ***Our scope: First Loss Curves and Increased Limit Factors***



What is an Increased Limit Factor?

- Used in Casualty rating
- ILF shows premium for different limits relative to a reference layer
- It is only a means of expressing a claims severity distribution
 - $LEV[x]/LEV[r]$
- Severity range *unlimited*, just like liability claims (in theory)



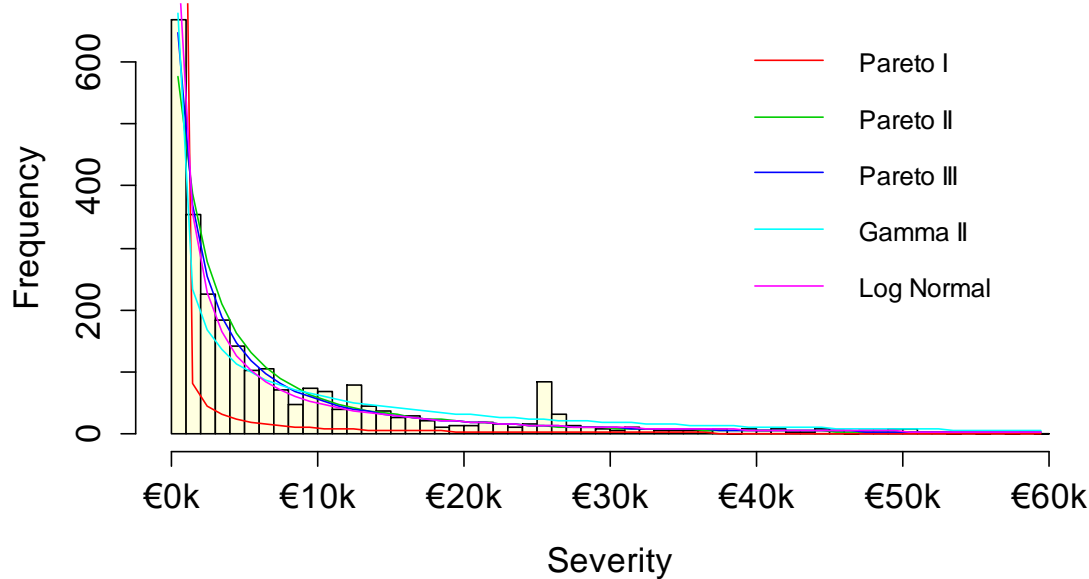
Characteristics of Increased Limit Factor curves

- $Premium_{Reference\ Layer} * \frac{dy}{dx} = Rate\ On\ Line$
- $\frac{dy}{dx} \geq 0$ Rate on line can't be negative so neither can gradient.
- $\frac{d^2y}{dx^2} \leq 0$ Second differential cannot be positive as rate on line can't *increase* at higher layers.
- $0 \leq x$ Range is positive



Increased Limit Factor Derivation

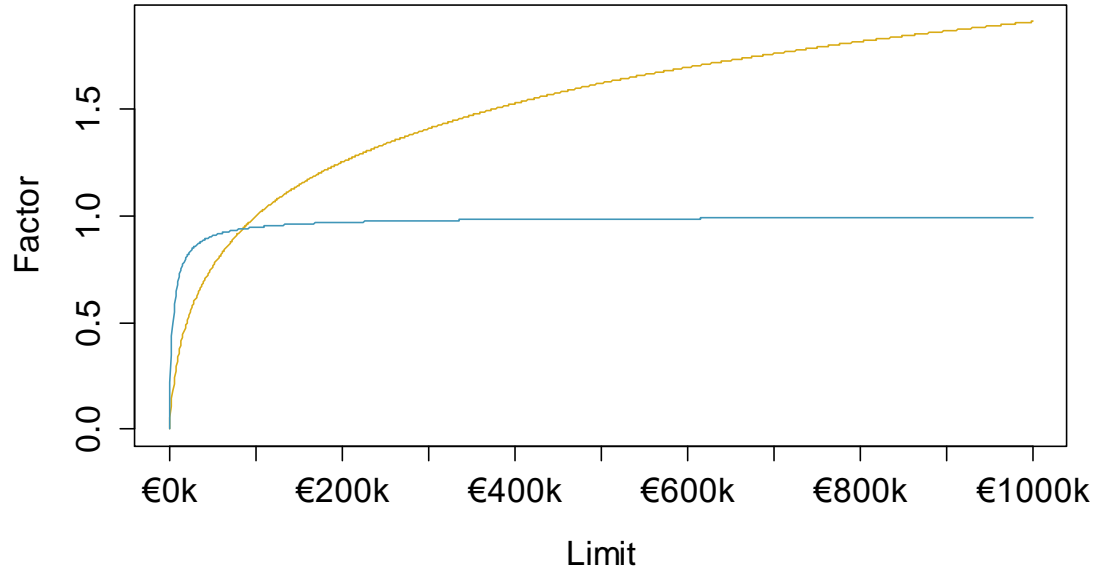
Claims Distribution and fits



- Various curves fitted to adjusted data
- Pareto III preferred fit for body & tail characteristics
- ILF derived by sampling from fitted distribution

Pareto ILF and CDF

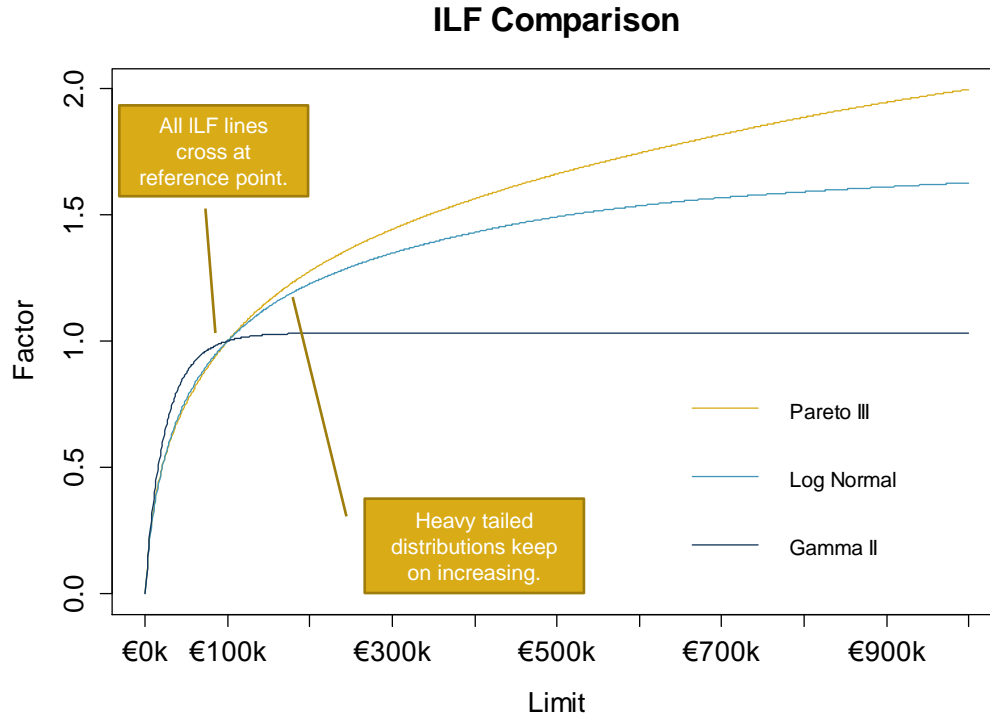
Pareto ILF and CDF



- Some confusion about distinction here
- Note how much faster CDF tails off
 - ILF keeps on increasing because large claims still represent material proportion of total



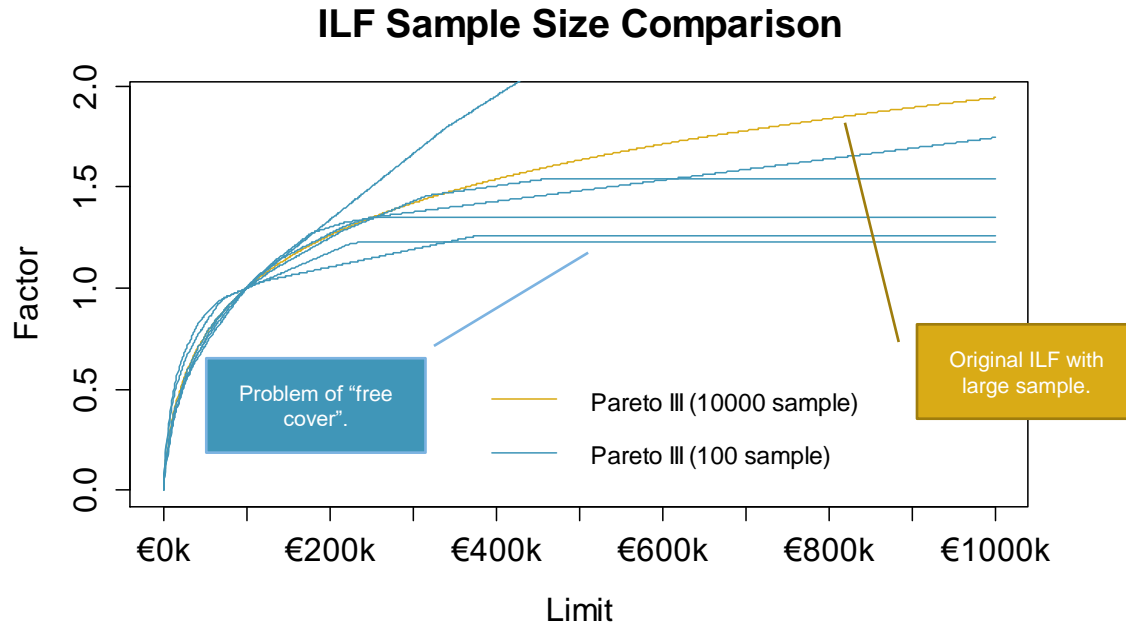
ILF Comparison



- Heavy-tailed distributions show marked difference in ILF
- Curves fitted to the same claims data
- Wrong tail means higher layers *grossly* mispriced.



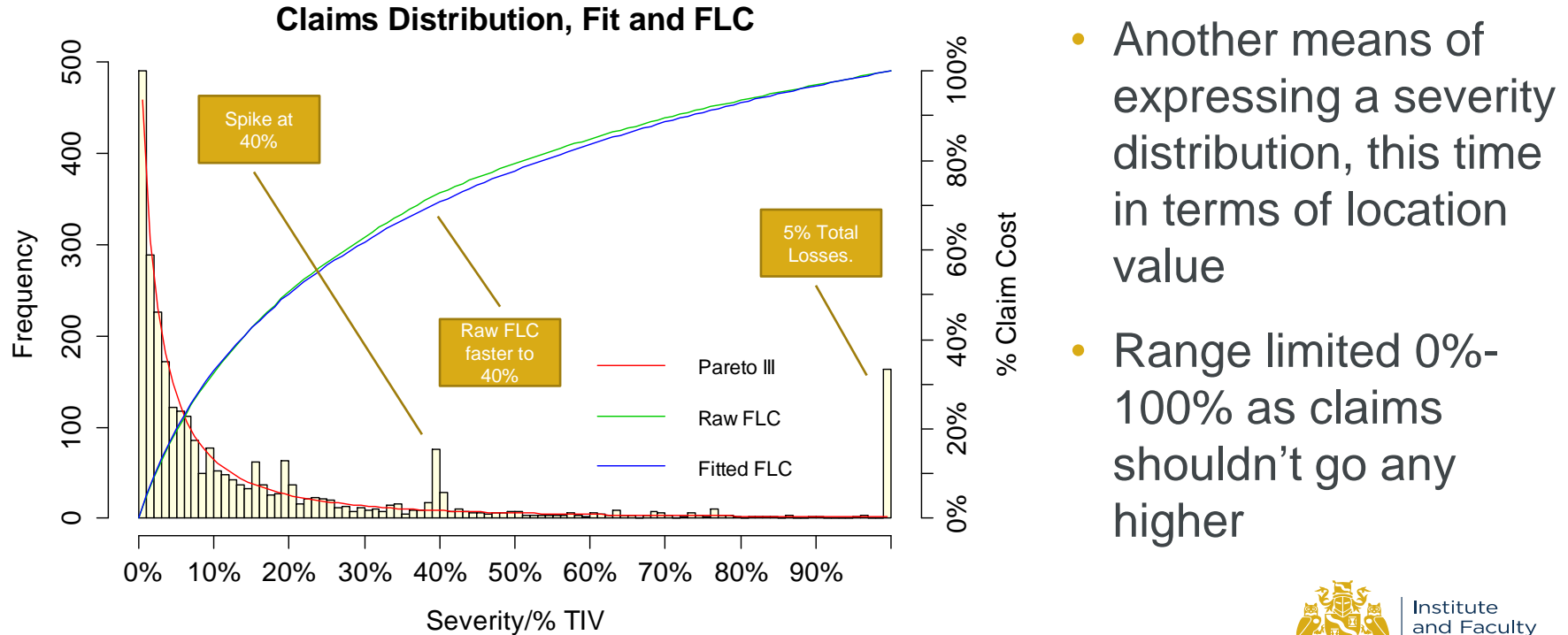
ILF Sample Size Comparison



- Small sample sizes give problems in tail
 - Free cover where “experience” benign
 - Over-priced cover where “experience” is heavy



What is a First Loss Curve?



- Another means of expressing a severity distribution, this time in terms of location value
- Range limited 0%-100% as claims shouldn't go any higher



Characteristics of First Loss Curves

- $\frac{\text{Premium}_{\text{Full value}}}{TIV} * \frac{dy}{dx} = \text{Base Rate} * \frac{dy}{dx} = \text{Rate On Line}$
- $\frac{dy}{dx} \geq 0$ Rate on line can't be negative so neither can gradient.
- $\frac{d^2y}{dx^2} \leq 0$ Second differential cannot be positive. Rate on line can't *increase* at higher layers.
- $0 \leq x \leq 1$ Range is 0% to 100%



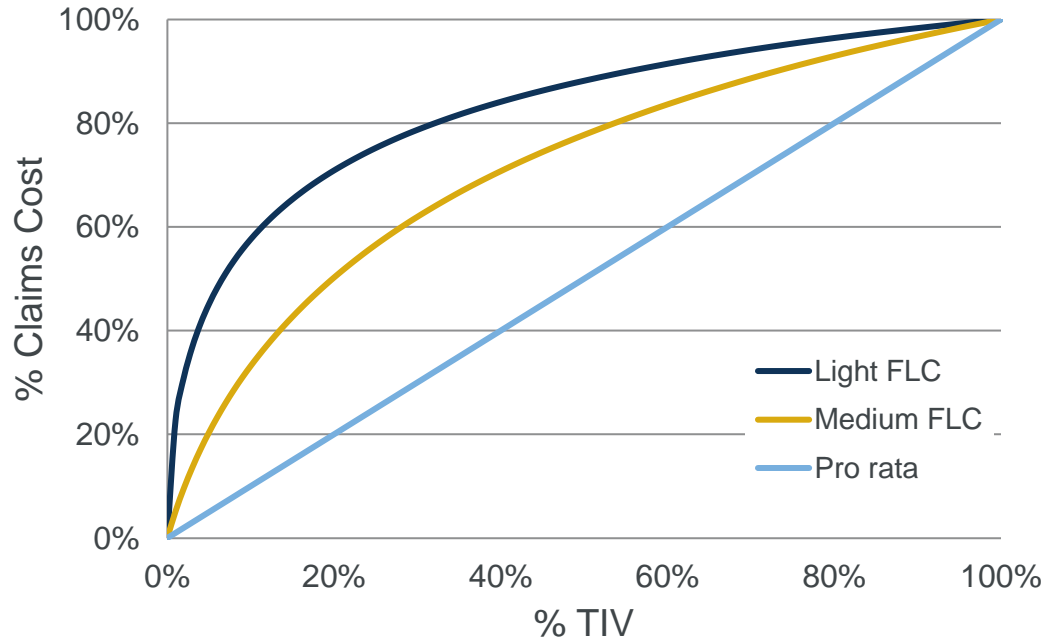
First Loss Curves for varying Sum Insured

- Compare a block of flats to small house
 - Fire can spread across building, just as for single dwelling
 - Severity should be similar in terms of value, *all else being equal..?*
- Maybe, but in the real world all else is not equal...
 - Fire protection better for higher values, construction, sprinklers, fire doors etc.
 - Higher values have *less severe* curves, as shown in PSOLD



First Loss Curve Severity

Different curve severity



- Light curve has lowest average severity
- Medium is more “severe”, with higher average
- “Pro rata” curve has maximum 100% severity



Risk rates for varying Sum Insured

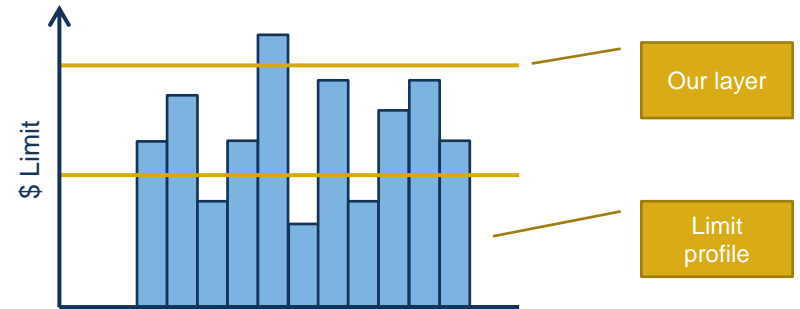
- Compare a block of flats to small house
 - Frequency will be higher than for small house
 - More people, more electrics, more chip pans..?

- Frequency *is* higher in general but...
 - Severity effect dominates
 - Rates for higher values tend to be *lower*.




How are techniques used in practice in the London Market?

- Property D&F
 - First Loss Curve applied to “limit profile” of risks to price our layer
- Casualty Treaty
 - In combination with experience rating, an Increased Limit Factor used to price higher layers with scant experience



Common problems

- ILF claims on-levelling and other adjustments
- Obtaining TIV/Limit data for FLC derivation
- Treatment of outliers, sparse data and free cover
- Provenance of curve data for “market” curves
- Curve selections often crude
- Curves used to set *rates* in models
 - Decoupling from claims costs and confusing variation in margin by layer
 - Curves subject to “manual” adjustment



Technical
“hygiene”
issues



Appropriate-
ness of data



Communicating with underwriters and management

- Clear understanding of derivation – to inform judgement/challenge
 - Base premium might be inadequate
 - An ILF or FLC alone tells us *nothing* about frequency
 - Curves are often based on scant or unsuitable claims information
 - Claims information may not be appropriate for rate setting – *margins vary*
 - Curve basis can vary: Value, Limit or PML; Contents & BI
- The importance of *TESTING*
 - Reviewing rates by layer, ideally using *risk rate on line*
 - Implied total loss proportion and average severity



References and further reading

- Clarke Basics of Reinsurance Pricing paper
 - <https://www.casact.org/library/studynotes/clark6.pdf>
- Bernegger ASTIN paper MBBEFD First Loss Distributions
 - <https://www.casact.org/library/astin/vol27no1/99.pdf>



Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

