C16: Property Risk And CATs Playing Together

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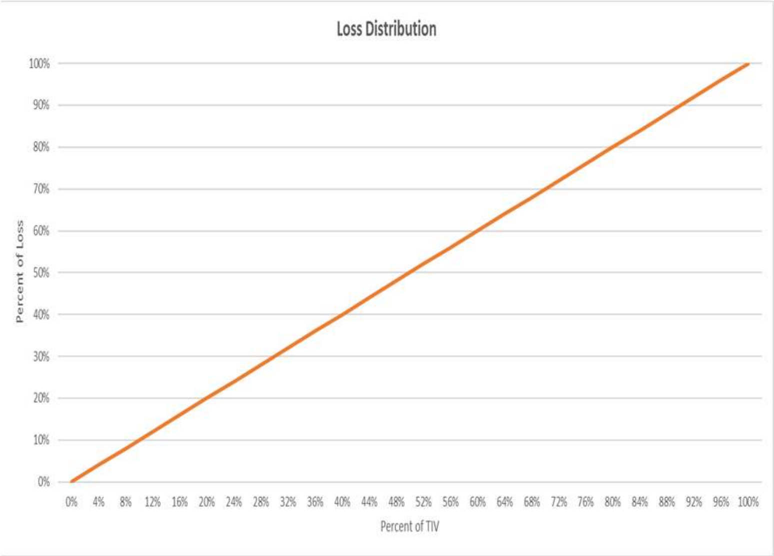
PRICING PER RISK

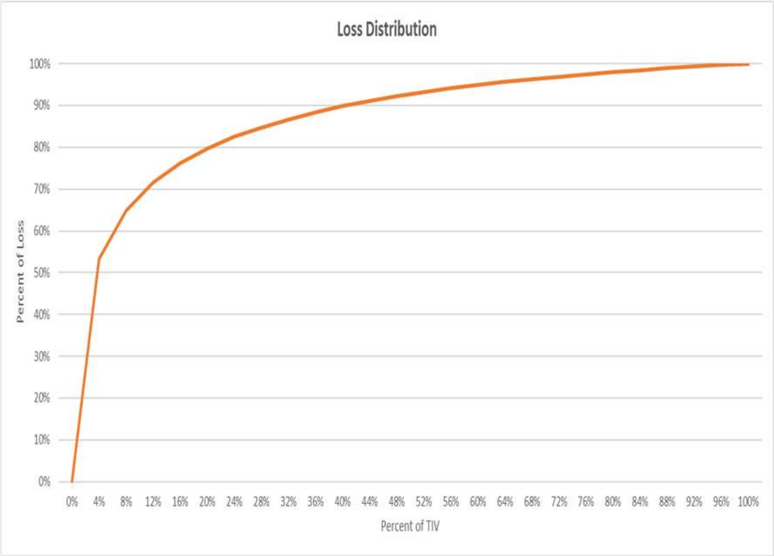
- Experience rating
- Exposure rating
  - Rating curves

PROPERTY LOSS CURVES: A HISTORY

- Lloyds
- Salzmann (1960 INA Homeowners data)
- Reinsurer Curves (Swiss Re, Munich Re, et al.)
- Ludwig (1984-1988 Homeowners and Small Commercial data
- ISO’s PSOLD and PSOLD+
- MBBEFD (Astin paper by Stephan Bernegger)

PROPERTY LOSS CURVES: SHAPES





PROPERTY LOSS CURVES: A HISTORY (cont.)

- Gasser Curves

Y1	Personal Lines
Y2	Small Commercial Lines
Y3	Medium Commercial Lines
Y4	Industrial Lines and Large Commercial

- Lloyds (Y5)
- Swiss Re (Y6)

MBBEFD: ALPHABET SOUP?

- Physics curves: Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac
- Work for property severity curves as well
- 1 > 2!

HOLY CALCULUS BATMAN!

- $G(x) = \frac{\frac{(g-1)b+(1-gb)b^x}{1-b}}{\ln(gb)}$ where $b > 0$ ^ $b \neq 1$ ^ $bg \neq 1$ ^ $g > 1$
- $b = e^{3.1-0.15(1+c)c}$
- $g = e^{(0.78+.012c)c}$
- Let c = 1.5, 2, 3, 4, or 5

AMERICAN FAMILY INSURANCE

Per Risk Rating

MBBEFD Exposure Distributions

Base Curve	
% of TIV	% of Loss
0%	0.0%
4%	24.8%
8%	36.4%
12%	44.1%
16%	50.1%
20%	54.9%
24%	59.1%
28%	62.7%
32%	66.0%
36%	68.9%
40%	71.6%
44%	74.2%
48%	76.5%
52%	78.8%
56%	80.9%
60%	83.0%
64%	84.9%
68%	86.8%
72%	88.6%
76%	90.4%
80%	92.1%
84%	93.7%
88%	95.4%
92%	96.9%
96%	98.5%
100%	100.0%

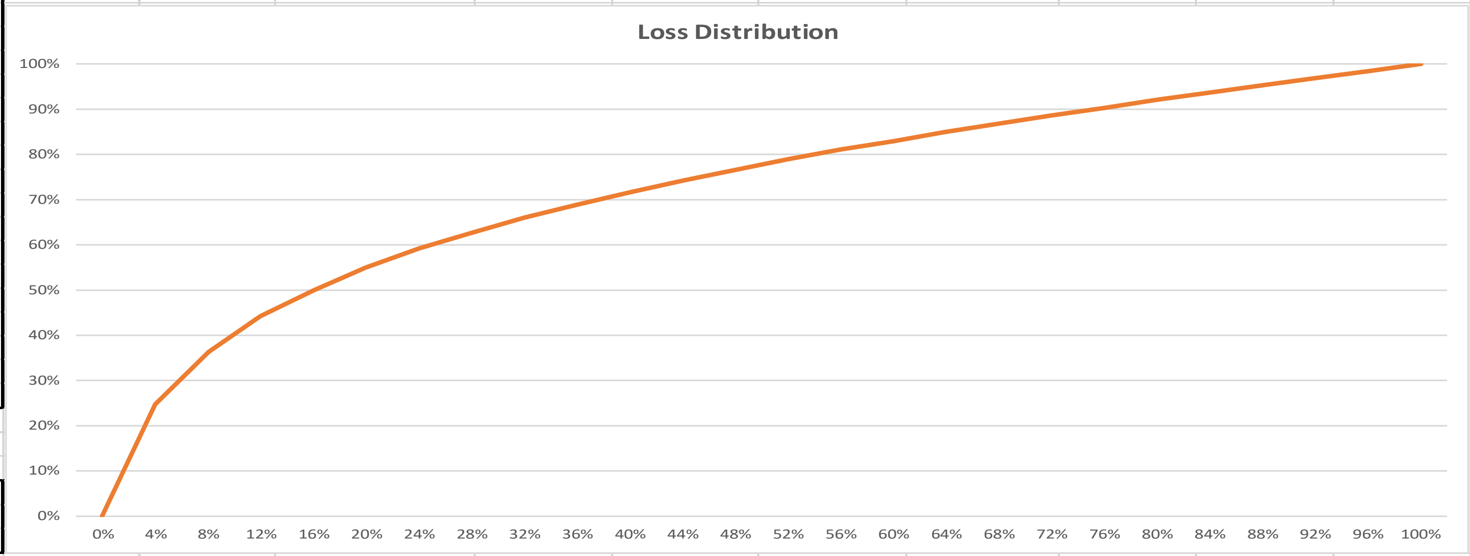
Parameters

c	3.000
b	3.669
g	30.569

Sums Insured or MPL	10,000,000
Underlying Policy Premium	750,000
Underlying Loss & LAE Ratio	60.0%
Reinsurance Retention	5,000,000
Reinsurance Limit	3,000,000
Brokerage	10.0%
Overhead Expense	5.0%
Target Profit	15.0%

Entry Ratio for Retention	50.0%
Entry Ratio for Limit	80.0%
Loss Distribution @ Retention	77.7%
Loss Distribution @ Limit	92.1%
Loss Dist in Reins Layer	14.4%

Final Reinsurance Premium	92,517



E[X] = Avg Severity	Expected Freq (per billion)
871,796	51.62

BIBLIOGRAPHY (a.k.a. REALLY SMART PEOPLE)

- Bernegger, Stefan. “The Swiss Re Exposure Curves And the MBBEFD Distribution Class.” *CAS Library*, 1999, www.casact.org/library/astin/vol27no1/99.pdf.
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