Verisk

IT2: Property Exposure Rating

CARe Seminar, June 4-5, 2018
Brooklyn, NY

Kevin Hilferty
Using materials prepared by Steve White Guy Carpenter

SERVE | ADD VALUE | INNOVATE

PROPERTY Exposure Rating

- **Commercial Property**
- Residential Property
- Ocean Marine
- Inland Marine

Property Rating – In case I use any of these terms…

A bit of vocabulary

TIV: Total Insured Value

TSI: Total Sums Insured

Basically the value of the building or the policy limit, whichever is smaller

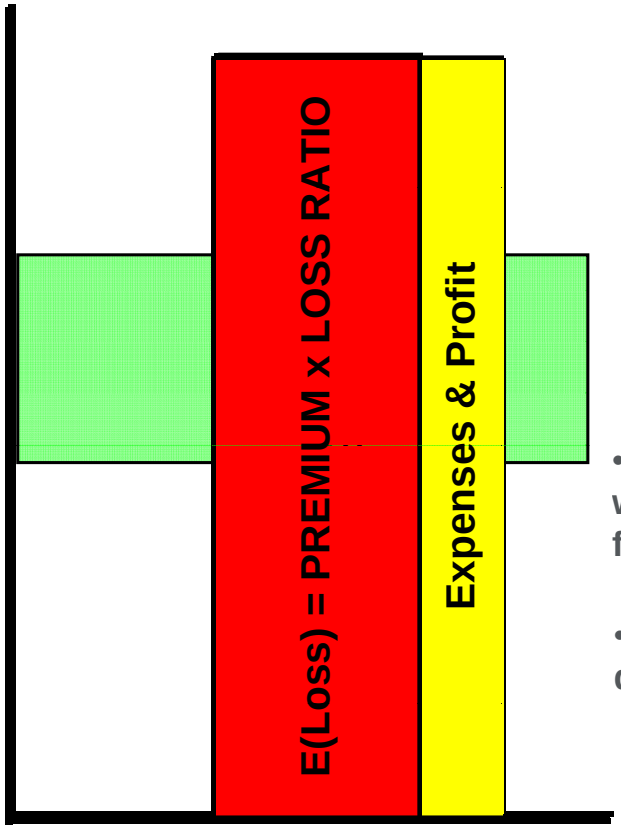
PML: Probable Maximum Loss

MFL: Maximum Forseeable Loss

The largest loss that seems reasonable to expect (this is almost always less than TIV/TSI)

Shades of meaning, or a real difference?

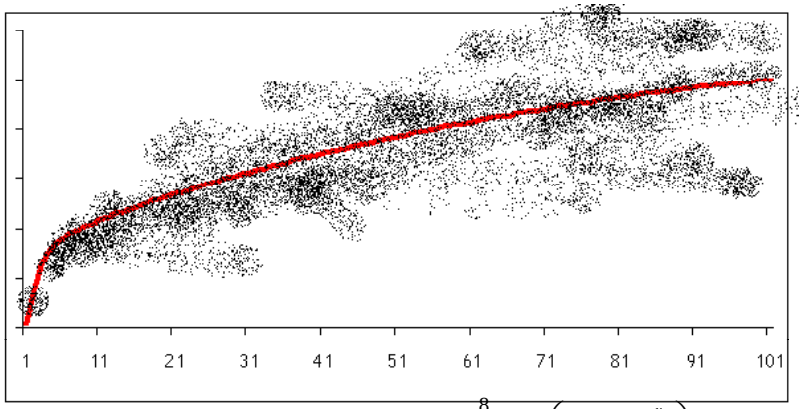
Exposure Rating Overview



- We always start with the subject premium
- The loss ratio determines the expected ground–up loss
- Exposure Rating simply tells us how much of the expected loss will fall into a given layer
- Once we have expected loss to the layer, we can break it up into its component frequency and severity
- The mechanics of how we do this is different depending on the curve we use

Reinsurance Exposure Rating

- Allocation of Premium/Loss to Layer through use of some generated curve/equation (model of loss)
  - Based on Industry
  - Based on Company Data
  - FLS Based on ????



$$CDF\_ME(x;\overline{\mu},\overline{w}) = \sum_{i=1}^{8} w_i \left(1 - e^{-\frac{x}{\mu_i}}\right)$$

Wrinkles to Using First Loss Scales

- Appropriate First Loss Scale
  - Over 50 First Loss scales
  - Some are more popular with reinsurers
  - Different scales are used differently

- TIV vs PML vs Other
  - Salzmann Curves - Bldg losses for Bldg TIV
  - Ludwig Curves - All losses but Bldg TIV
  - Some curves apply to PMLs
  - No consistent definition of PML

Property Rating – First Loss Scales

% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

Interpretation:

A layer from 0-10% of TIV should see 25% of the total losses

A layer from 0-50% of TIV should see 70% of the total losses

Property Rating – First Loss Scales

% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

TIV = $100,000

10% (= 50% - 40%) of losses are expected to fall in the layer between $20,000 (20% of TIV) and $30,000 (30% of TIV).

This also means that if you have a loss, there is a 30% chance more than 50% of the building will be lost.

If a there's a 30% chance that half of a $1M building can get wiped out, does this also mean that there's a 30% chance that half of a $100M building will be lost?

First Loss Scales - Example

What premium is needed for a 40K x 10K fac cert?

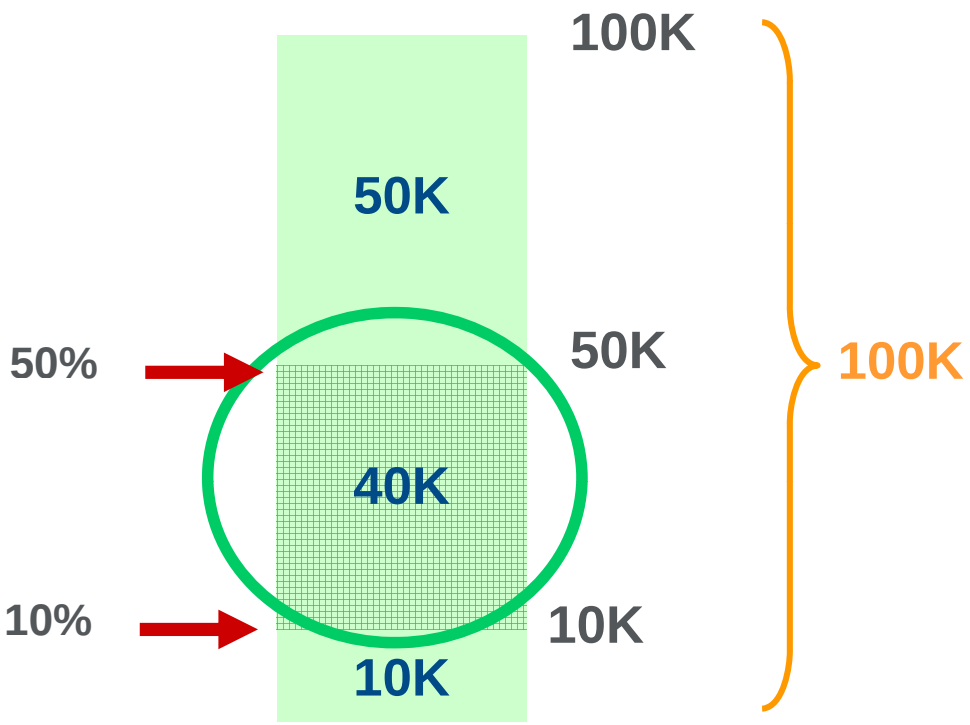
% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

TIV = 100K

Prem = 1,000

Loss Ratio = 60%

Reins. Expenses = 20%



Step 1: We need to know what the retention and the top of the layer are as a % of TIV

First Loss Scales - Example

What premium is needed for a 40K x 10K treaty?

% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

Prem = 1,000

Loss Ratio = 60%

Reins. Expenses = 20%

Step 2: Calculate Expected Loss

1000 * 60% = 600

Step 3: Look up Ratios on Table

10% → 25% of loss

50% → 70% of loss

Step 4: Multiply E(Loss) by Ratio Difference

$E(Loss)_{40x10} = (70\% - 25\%) * 600 = 270$

Step 5: Gross Up for Reins. Expenses

$Reins.\ Prem_{40x10} = 270/(1 - 0.2) = 338$

So insuring 40% of limit for 33.8% of premium

First Loss Scales – Example With SIR

What premium is needed for a 500K x 500K treaty?

% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

Policy Limit = 1M
SIR = 250K
TIV = 1.25M
Prem = 10,000
Loss Ratio = 55%
Reins. Expenses = 20%

100% of TIV

100% of Loss

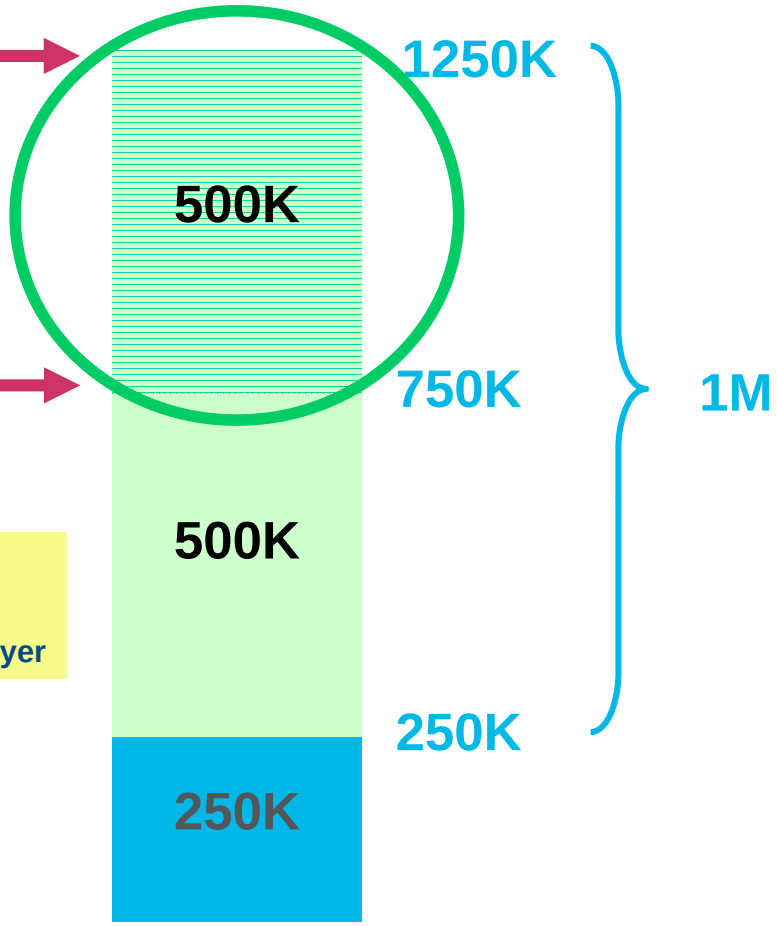
60% of TIV

(750/1250)

75% of Loss

100% - 75% = 25%

25% of Total Loss Expected in the Layer



First Loss Scales – Example With SIR

BUT WHAT IS THE TOTAL LOSS?

First Loss Scales – Example With SIR

Policy Limit = 1M
SIR = 250K
TIV = 1.25M
Prem = 10,000
Loss Ratio = 55%
Reins. Expenses = 20%

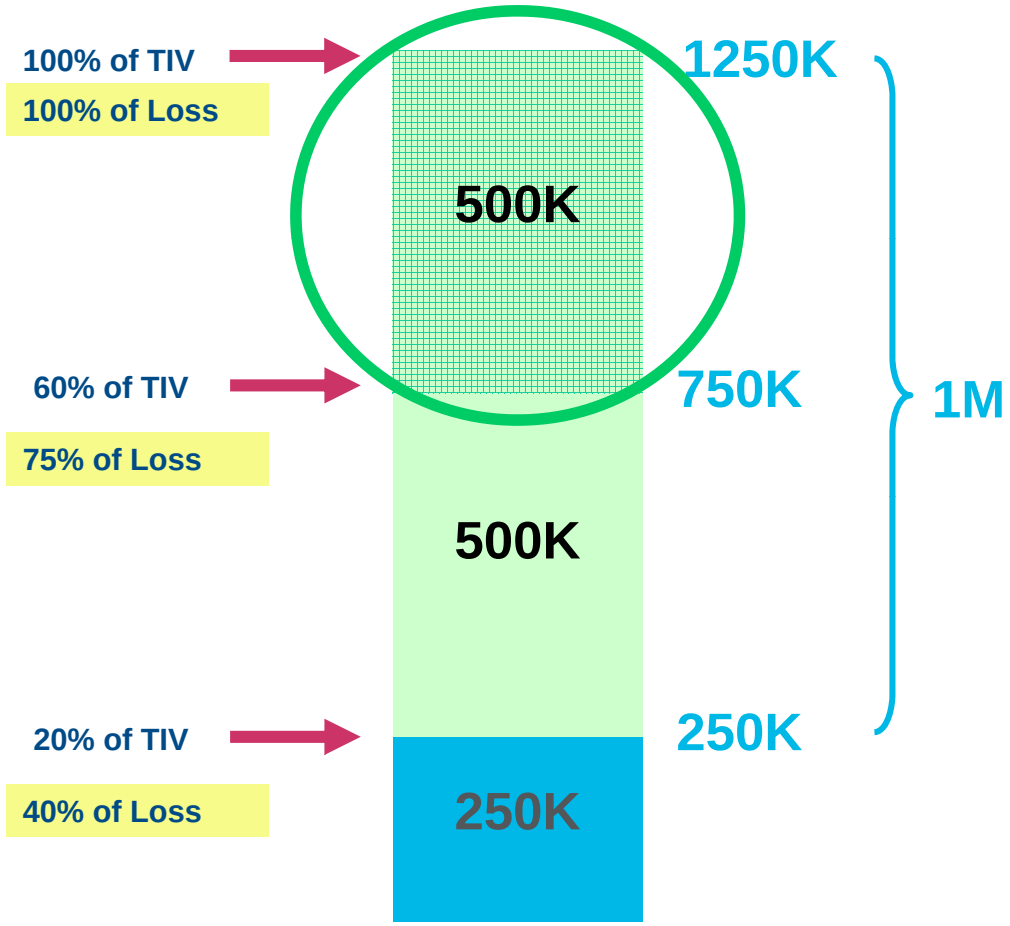
E(Loss) = Premium * Loss Ratio
= 10,000 * 0.55 = 5,500

BUT THIS IS ONLY FOR LOSSES ABOVE 250,000!

If 40% of losses are below 250,000, then

5,500 = Total Loss * (1-40%)

5,500/(1-40%) = 9,167



First Loss Scales – Example With SIR

What premium is needed for a 500K x 500K treaty?

% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

Policy Limit = 1M
SIR = 250K
TIV = 1.25M
Prem = 10,000
Loss Ratio = 55%
Reins. Expenses = 20%

Calculate Expected Loss in the Layer

9,167 * 25% = 2,292

Gross-up for Reinsurer Expenses

2292 / (1 – 0.2) = 2,865

So insuring 40% of limit for 28.7% of premium

First Loss Scales
Calculations - Detailed Policy Limits

Policy Limits Profile Information			Loss&ALAE	
Limit	Sir/Ded	Prem.	Ratio	TIV
3,000,000	50,000	100,000	60.00%	**3,000,000**

Layer Limit	1,000,000
Layer Retention	1,000,000

Entry Ratio	Actual FLS
0.0%	0.00%
1.0%	32.70%
1.7%	36.70%
5.0%	48.68%
10.0%	58.71%
20.0%	70.41%
30.0%	77.78%
35.0%	80.65%
40.0%	83.14%
50.0%	87.32%
60.0%	90.72%
68.3%	93.12%
70.0%	93.57%
80.0%	96.00%
90.0%	98.13%
100.0%	100.00%

$$\%Exposed = \frac{FLS\left(\frac{Min(PolLmt, LayLmt + Lay\,\mathrm{Re}t + PolDed)}{TIV}\right) - FLS\left(\frac{Min(PolLmt, Lay\,\mathrm{Re}t + PolDed)}{TIV}\right)}{FLS\left(\frac{PolLmt}{TIV}\right) - FLS\left(\frac{PolDed}{TIV}\right)}$$

$$\%Exposed = \frac{FLS\left(\frac{2{,}050{,}000}{3{,}000{,}000}\right) - FLS\left(\frac{1{,}050{,}000}{3{,}000{,}000}\right)}{FLS\left(\frac{3{,}000{,}000}{3{,}000{,}000}\right) - FLS\left(\frac{50{,}000}{3{,}000{,}000}\right)}$$

$$\%Exposed = \frac{FLS(68.3333\%) - FLS(35\%)}{FLS(100\%) - FLS(1.6667\%)} = \frac{93.12\% - 80.65\%}{100\% - 32.70\%} = 19.7113\%$$

$$ExpectedLosses = 19.7113\% \times \mathrm{Pr}\,em \times LR = 19.7113\% \times 100{,}000 \times 60\% = 11{,}827$$

First Loss Scales
Frequency Calculation

Policy Limits Profile Information			Loss&ALAE	
Limit	Sir/Ded	Prem.	Ratio	TIV
3,000,000	50,000	100,000	60.00%	**3,000,000**

Layer Limit	1,000,000
Layer Retention	1,000,000

Entry Ratio	Actual FLS
0.0%	0.00%
1.0%	32.70%
1.7%	36.70%
35.000000%	80.64518298%
35.000033%	80.64520074%
100.0%	100.00%

$$LayerCount = \frac{\frac{FLS\left(\frac{Min(PolLmt, Lay\,Ret + PolDed + \Delta)}{TIV}\right) - FLS\left(\frac{Min(PolLmt, Lay\,Ret + PolDed)}{TIV}\right)}{FLS\left(\frac{PolLmt}{TIV}\right) - FLS\left(\frac{PolDed}{TIV}\right)} \times Premium \times LR}{\Delta}$$

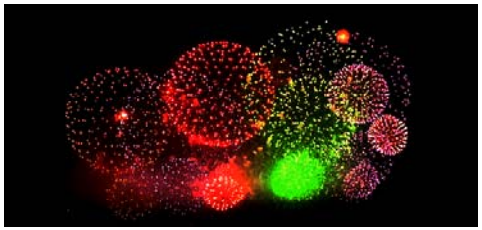
$$LayerCount = \frac{\frac{FLS\left(\frac{1{,}050{,}001}{3{,}000{,}000}\right) - FLS\left(\frac{1{,}050{,}000}{3{,}000{,}000}\right)}{FLS\left(\frac{3{,}000{,}000}{3{,}000{,}000}\right) - FLS\left(\frac{50{,}000}{3{,}000{,}000}\right)} \times 100{,}000 \times 60\%}{1} = \frac{FLS(35.000033\%) - FLS(35\%)}{FLS(100\%) - FLS(1.6667\%)} \times 60{,}000$$

$$LayerCount = \frac{80.6451829842499\% - 80.6452007428335\%\%}{100\% - 32.70\%} \times 60{,}000 = 0.0168$$

$$AveSev = ExpectedLosses / LayerCount = 11.827 / 0.0168 = 702{,}608$$

PSOLD Curves

- 1998 – PSOLD Curves Released, updated every 2 years thereafter
- Created to fix assumption of constant loss-to-value ratios across all value ranges
- Calculates average severity of loss given policy limit rather than % of value
- Separate curves for each of:
  - 60 value ranges
  - 38 commercial occupancy classes
  - Homeowners
  - Buildings + Contents (with and without BI)
  - Contents Only!!!



First Loss Scales
Calculations - Detailed Policy Limits

Policy Limits Profile Information			Loss&ALAE	
Limit	Sir/Ded	Prem.	Ratio	TIV
3,000,000	50,000	100,000	60.00%	3,000,000

Layer Limit	1,000,000
Layer Retention	1,000,000

$$\%Exposed = \frac{LAS\left(\frac{Min(PolLmt, LayLmt + Lay\,Ret + PolDed)}{}\right) - LAS\left(\frac{Min(PolLmt, Lay\,Ret + PolDed)}{}\right)}{LAS\left(\frac{PolLmt}{}\right) - LAS\left(\frac{PolDed}{}\right)}$$

Entry Ratio	Actual FLS
0.0%	0.00%
1.0%	32.70%
1.7%	36.70%
5.0%	48.68%
10.0%	58.71%
20.0%	70.41%
30.0%	77.78%
35.0%	80.65%
40.0%	83.14%
50.0%	87.32%
60.0%	90.72%
68.3%	93.12%
70.0%	93.57%
80.0%	96.00%
90.0%	98.13%
100.0%	100.00%

PSOLD Curves – Example Calculations

Loss Amount	Cumulative Probability	Limited Average Severity
1,000	0.300911	833
5,000	0.69665	2,635
10,000	0.827319	3,765
50,000	0.957497	6,887
100,000	0.978202	8,388
500,000	0.996166	11,734
1,000,000	0.998266	13,007
1,500,000	0.998964	13,675
2,000,000	0.999301	14,101
3,000,000	0.999617	14,618
4,000,000	0.999753	14,925
5,000,000	0.999822	15,134
10,000,000	0.999932	15,676
50,000,000	0.999998	16,288
100,000,000	1	16,322
200,000,000	1	16,329
250,000,000	1	16,329

Subject Premium = $75M

Loss Ratio = 60%

Reinsurer Expenses = 15%

What premium is needed for a $3M xs $2M treaty?

Expected Loss = $75M x 0.60 = $45M

Portion of loss in layer = (15,134 – 14,101) / 16,329

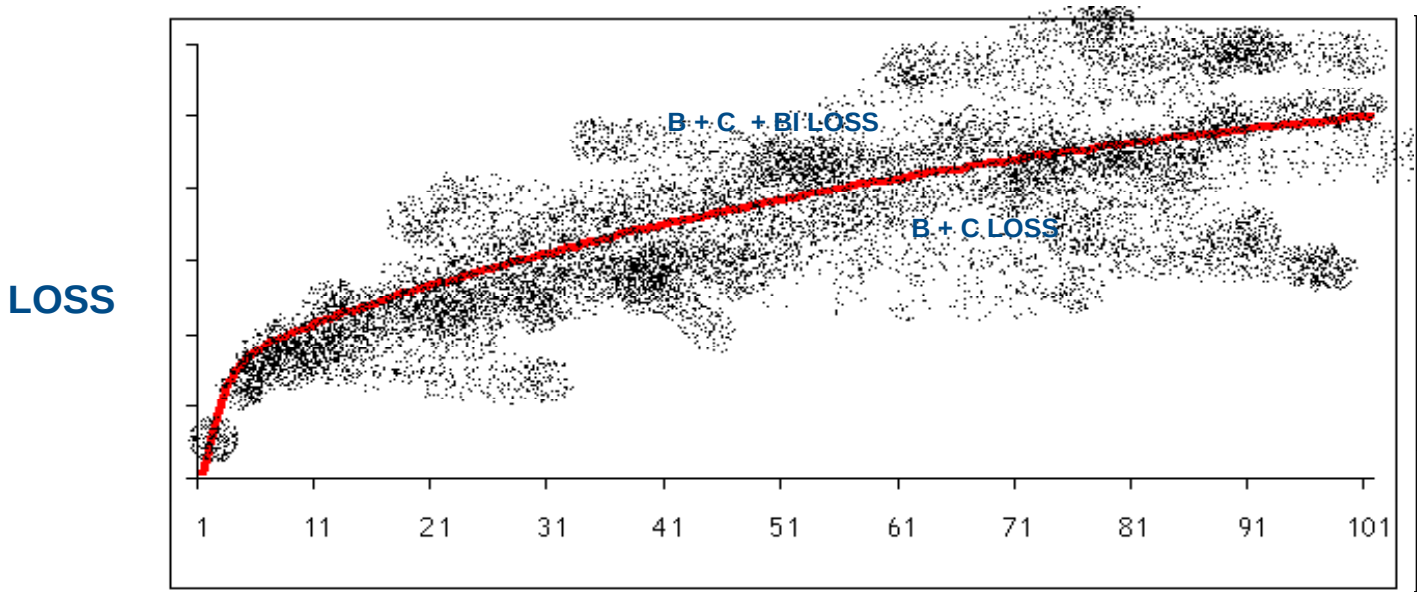
= 0.06326

($45M x 0.06326) / (1 – 0.15) = $3,349,148

$$LAS_{ME}(x) = \sum_{i=1}^{\#Lags} w_i \mu_i \times \left(1 - e^{-\frac{x}{\mu_i}}\right)$$

PSOLD Curves

- Buildings and Contents – not an issue
- B + C + BI - Watch your Limit Profiles!



PSOLD Curves

- DO NOT INCLUDE BI IN LIMITS PROFILES WHEN RATING WITH PSOLD (Most US Markets)
  - Overstates Severity of Loss
- First-Loss Scales rely on Total Limits Profile (incl. BI)

Property Exposure Rating
Required Data

- **Per-Location**
  - Bldg vs Cnt vs BI Limit
  - Deductible
  - Premium
  - TIV
  - Participation
  - Account ID
  - Location ID
  - Policy ID
  - Occupancy

Stacking

For Premium Allocation to Location, we need premium by account along with all this other stuff…

ALL THIS BY TYPE OF BUSINESS

Property Exposure Rating
Required Data

- **Per-Location**
  - Bldg vs Cnt vs BI Limit
  - Deductible
  - Premium
  - TIV
  - Participation
  - Account ID
  - Location ID
  - Policy ID
  - Occupancy

Stacking

By-Band

Limit Range (excl. BI)
Average SIR
Premium Min & Max TIV (or average)
Average Participation
Occupancy Distribution

Other Data Used

Company Specific First-Loss Scales
Perils Covered
Protection, Construction (HO)

ALL THIS BY TYPE OF BUSINESS

Exposure Rating Issues

Limit Profiles with no Premium

% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

What premium is needed for a 300K x 200K treaty?

Loss Ratio = 60%
Reins. Expenses = 20%

Total Premium = $500,000

Layer	# Risks	Lower	Upper
A	100	0	100K
B	50	100K	200K
C	20	200K	300K
D	10	300K	500K
Tot	180		

Limit Profiles with no Premium

% of TIV	% of Loss
0.0%	0.0%
10.0%	25.0%
20.0%	40.0%
30.0%	50.0%
40.0%	60.0%
50.0%	70.0%
60.0%	75.0%
70.0%	80.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

What's wrong?

a) TIV?

b) Deductible/Sir?

c) Need prem, not # of risks – fatal?

Layer	# Risks	Lower	Upper
A	100	0	100K
B	50	100K	200K
C	20	200K	300K
D	10	300K	500K
Tot	180		

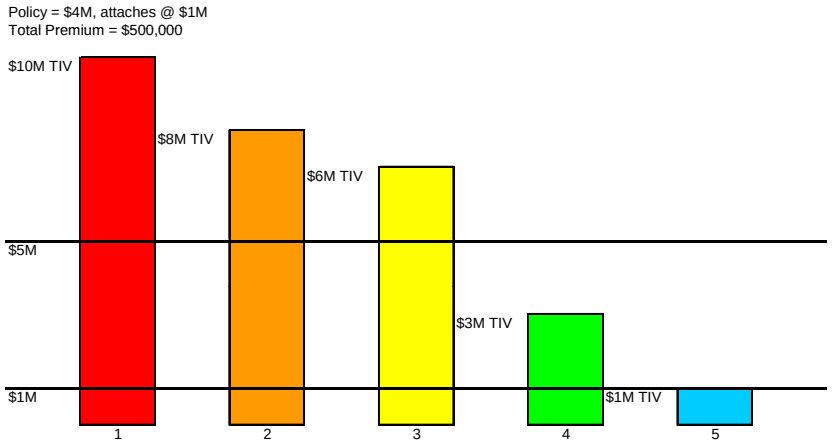
Policy Level Data

POL_NO	Written Premium	Number Locs	LIMIT 1	LAYER LIMIT 1	ATTACHMENT POINT 1	LIMIT 2	LAYER LIMIT 2	ATTACHMENT POINT 2	TIV
6599182	$30,474	1	$84,000,000	$84,000,000	$250,000,000	$0	$0	$0	$484,000,000
79535844	$240,000	1	$200,000,000	$200,000,000	$250,000,000	$0	$0	$0	$1,471,225,556
35786837	$880,000	81	$10,000,000	$25,000,000	$25,000,000	$0	$0	$0	$6,320,730,646
6611960	$116,640	2	$80,000,000	$80,000,000	$70,000,000	$0	$0	$0	$3,401,777,525
35860524	$750,000	1430	$5,000,000	$50,000,000	$0	$5,000,000	$47,500,000	$110,000,000	$18,027,069,919
35843371	$900,000	406	$5,000,000	$50,000,000	$0	$1,000,000	$50,000,000	$50,000,000	$8,727,379,032
6599796	$2,282,942	71	$100,000,000	$200,000,000	$0	$0	$0	$0	$2,016,541,672
35860533	$1,012,500	8519	$5,000,000	$100,000,000	$0	$0	$0	$0	$29,348,103,869
35843374	$421,230	174	$5,000,000	$5,000,000	$0	$5,000,000	$10,000,000	$10,000,000	$1,403,505,210
35843355	$240,000	15	$5,000,000	$50,000,000	$50,000,000	$0	$0	$0	$4,923,117,407
35800255	$230,023	62	$5,000,000	$75,000,000	$25,000,000	$0	$0	$0	$7,403,854,331
6607494	$423,388	89	$290,000,000	$290,000,000	$10,000,000	$0	$0	$0	$4,755,041,643
35860558	$150,000	2962	$3,750,000	$3,750,000	$0	$3,750,000	$125,000,000	$125,000,000	$12,417,484,051
35843360	$480,000	60	$6,000,000	$15,000,000	$25,000,000	$0	$0	$0	$4,409,150,884
35829556	$50,000	1	$100,000,000	$100,000,000	$740,000,000	$0	$0	$0	$6,600,408,296
6659395	$63,750	1	$75,000,000	$75,000,000	$655,000,000	$0	$0	$0	$728,564,505
35769415	$359,040	32	$10,000,000	$125,000,000	$60,000,000	$0	$0	$0	$7,803,683,906
6620216	$305,000	0	$100,000,000	$100,000,000	$1,325,000,000	$0	$0	$0	$3,164,670,759
6613493	$16,503	5	$16,816,068	$16,816,068	$1,000,000	$0	$0	$0	$17,223,039
6638205	$80,000	1	$100,000,000	$250,000,000	$1,100,000,000	$0	$0	$0	$3,121,457,630
35810724	$7,034	0	$5,000,000	$5,000,000	$5,000,000	$0	$0	$0	$6,300,000
35860556	$335,719	54	$5,000,000	$5,000,000	$5,000,000	$0	$0	$0	$734,191,122

- What do you do when your data looks like this?
- Need LOCATION LEVEL data
- Does every location have the same value and represent the same amount of risk?

Allocation of Premium to Individual Location

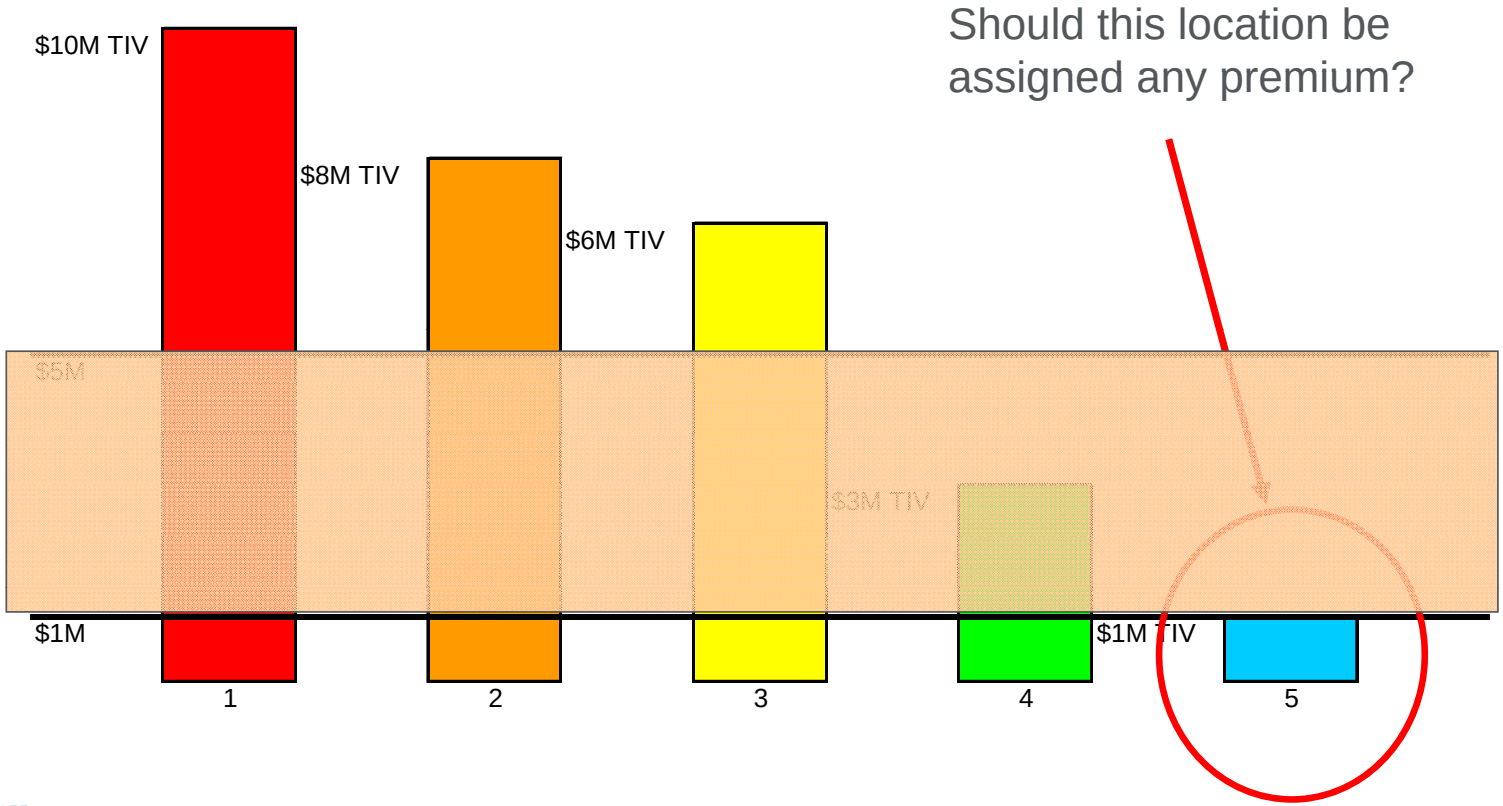
- When policies cover multiple locations, it is necessary to allocate the premium to each individual location before exposure rating techniques can be properly applied.
- Traditional Methods
  - By TIV
  - All Premium Slotted to Highest Limit
  - By Exposed TIV



Allocation of Premium to Individual Location

BY TIV???

Policy = $4M, attaches @ $1M
Total Premium = $500,000



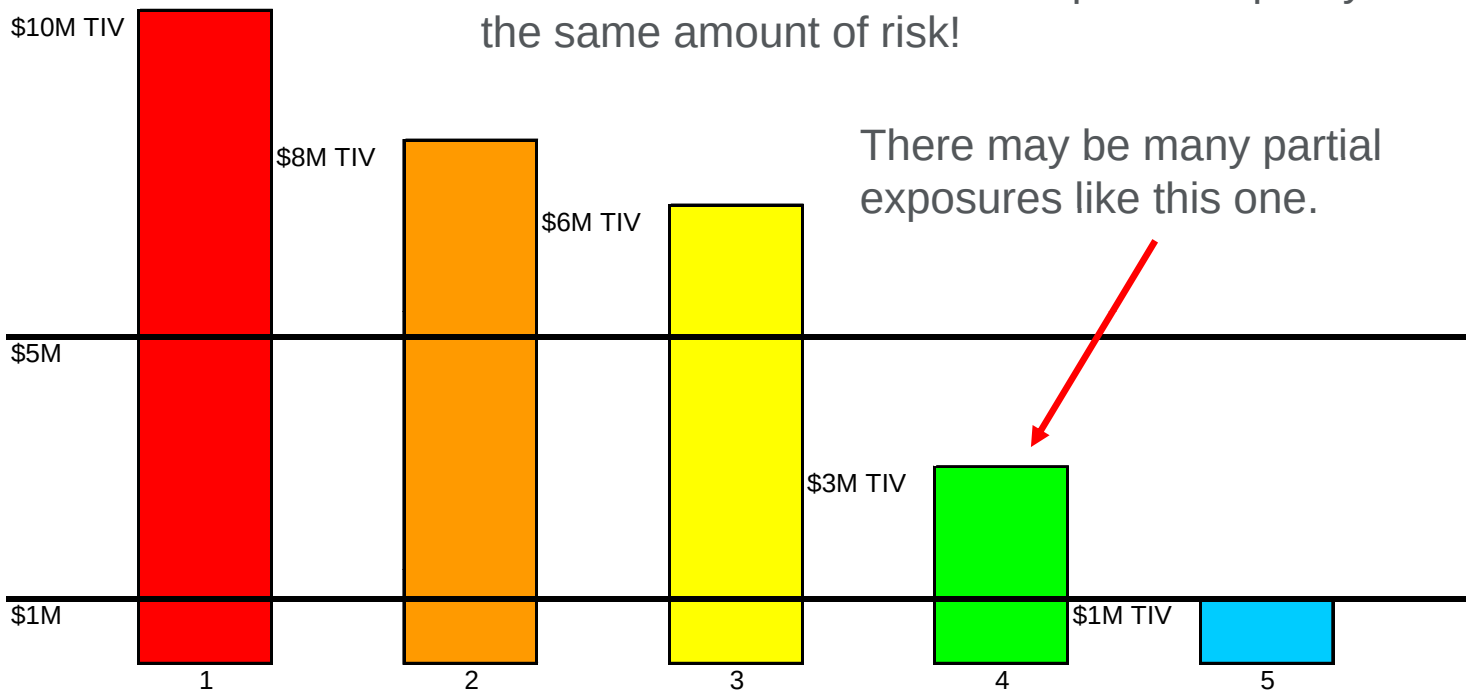
Allocation of Premium to Individual Location

ALL PREMIUM SLOTTED TO HIGHEST LIMIT???

Policy = $4M, attaches @ $1M
Total Premium = $500,000

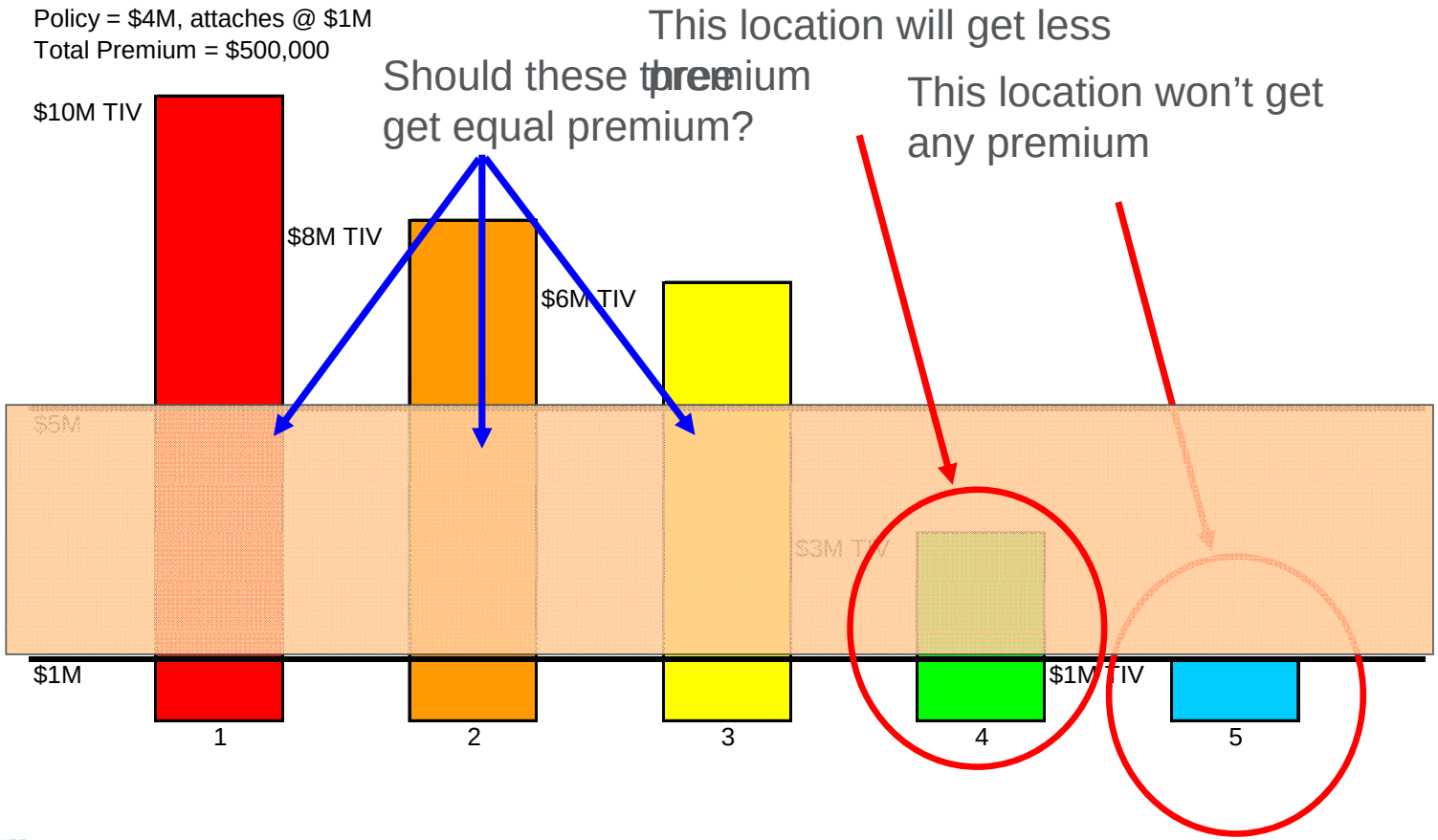
Would assume all locations expose the policy to the same amount of risk!

There may be many partial exposures like this one.



Allocation of Premium to Individual Location

BY Exposed TIV???

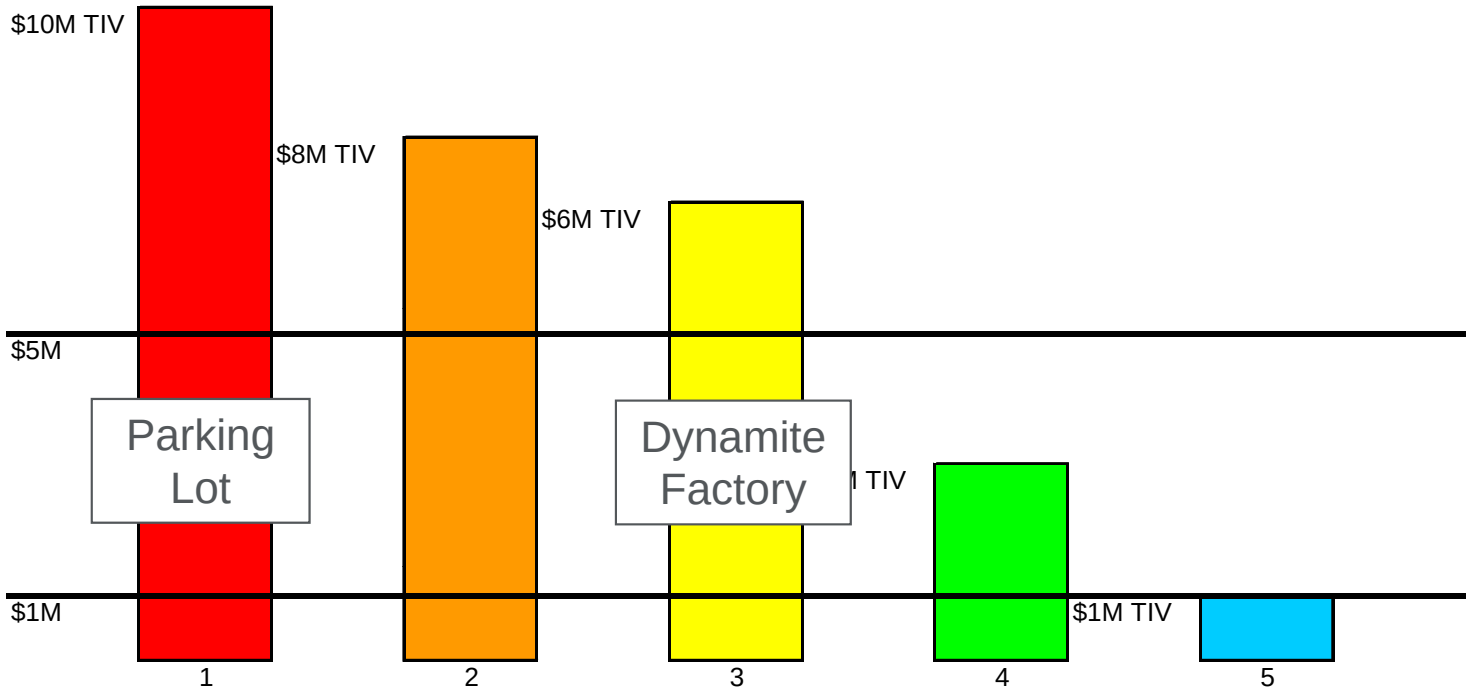


Allocation of Premium to Individual Location

BY Exposed TIV???

Policy = $4M, attaches @ $1M
Total Premium = $500,000

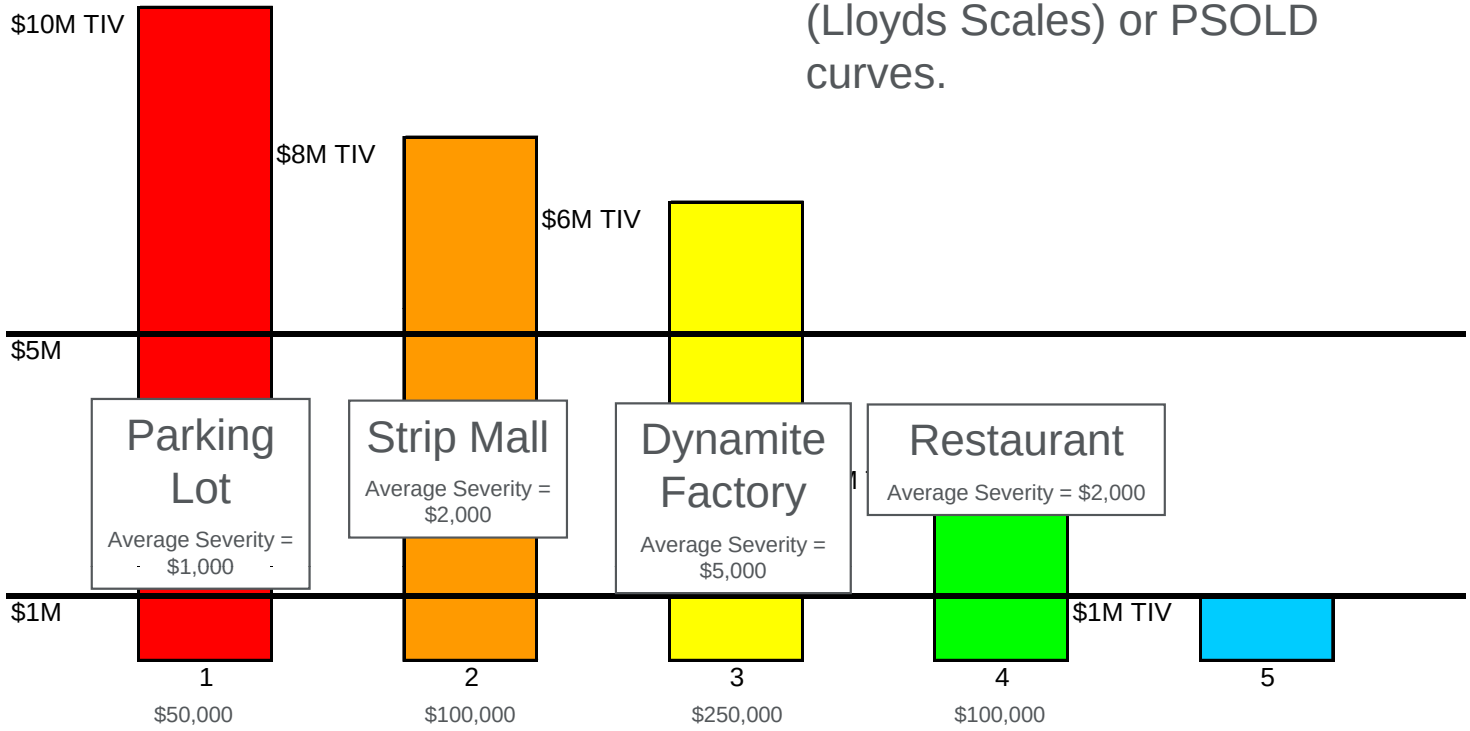
Do they subject the policy to equal risk?



Allocate Based on Potential for Loss

SOLUTION

Policy = $4M, attaches @ $1M
Total Premium = $500,000



Average Severity of loss can be based on First Loss Scales (Lloyds Scales) or PSOLD curves.

Property Per Risk

HPR and Component Modeling

Verisk
SERVE | ADD VALUE | INNOVATE

PROP EXPO PSOLD HPR BLENDING FUNCTIONALITY

- Main idea is to increase the weight given to HPR occupancy, since ISO has pulled large claims out from individual class code groups and *reassigned them* to HPR groups, leaving the rest of the group with a lower severity curve than it had in the previous version.
- Has had an impact on the *shape* of the curve, as the lower remaining severity could cause the class code to be assigned to an entirely different severity group prior to fitting.
- Break points and HPR group assignment was worked out with ISO, who has included similar logic in their ***ISO Rapid Valuator*** tool, with advice that it be applied in the case of *sprinklered* locations. One might infer that once a building reaches a certain size, or value, it is most likely to have sprinklers, thus qualifying it as HPR by ISO logic.
- No such logic has been built into the PSOLD program. Only the IRV uses it at this point.

The analysis started off with a full limit profile, such as this one.

Lower Limit(B+C)	Upper Limit(B+C)	Sir/Ded	Prem.	Ratio	Lower AOI	Upper AOI	Avg AOI	Participate	Rating Grp
-	1,000,000		32,323,884	44.93%			230,293		
1,000,000	2,000,000		22,633,487	44.93%			1,398,012		
2,000,000	3,000,000		17,333,837	44.93%			2,421,370		
3,000,000	4,000,000		14,967,753	44.93%			3,434,508		
4,000,000	5,000,000		12,791,562	44.93%			4,428,927		
5,000,000	7,500,000		24,241,449	44.93%			6,070,239		
7,500,000	10,000,000		16,461,631	44.93%			8,636,239		
10,000,000	12,500,000		13,394,068	44.93%			11,079,641		
12,500,000	15,000,000		9,691,028	44.93%			13,614,457		
15,000,000	17,500,000		7,828,622	44.93%			16,153,150		
17,500,000	20,000,000		6,156,642	44.93%			18,612,035		
20,000,000	22,500,000		4,928,558	44.93%			21,211,319		
22,500,000	25,000,000		3,797,507	44.93%			23,731,843		
25,000,000	27,500,000		3,836,649	44.93%			26,211,023		
27,500,000	30,000,000		3,349,953	44.93%			28,739,547		
45,000,000	47,500,000		1,773,029	44.93%			46,069,800		
47,500,000	50,000,000		889,998	44.93%			48,517,240		
50,000,000	52,500,000		1,231,749	44.93%			51,101,351		
52,500,000	55,000,000		836,157	44.93%			53,692,526		
55,000,000	57,500,000		1,172,066	44.93%			55,934,348		
57,500,000	60,000,000		507,438	44.93%			58,771,071		
60,000,000	62,500,000		801,373	44.93%			61,146,400		
62,500,000	65,000,000		597,683	44.93%			63,334,750		
65,000,000	67,500,000		280,347	44.93%			65,870,429		
67,500,000	70,000,000		172,311	44.93%			68,411,250		
70,000,000	75,000,000		1,533,779	44.93%			72,050,259		
75,000,000	80,000,000		629,259	44.93%			77,403,467		
80,000,000	85,000,000		927,622	44.93%			82,274,200		
85,000,000	90,000,000		575,021	44.93%			87,872,800		
90,000,000	95,000,000		250,246	44.93%			91,562,833		
95,000,000	100,000,000		380,872	44.93%			97,502,000		
100,000,000	199,463,547		6,155,520	44.93%			149,731,773		

The red boxes sectioning off parts of the profile indicate the points where weight given to HPR classes will change.

Subj. Prem.	328,782,428
Prem. In Lmt Profile	223,435,174

	HPR Transition Factors			
	Limit	25,000,000	75,000,000	100,000,000
	% Weight to HPR	50.00%	75.00%	100.00%

Lower Limit(B+C)	Upper Limit(B+C)	Sir/Ded	Prem.	Ratio	Lower AOI	Upper AOI	Avg AOI	Participate	Rating Grp
-	1,000,000		32,323,884	44.93%			**230,293**		
1,000,000	2,000,000		22,633,487	44.93%			**1,398,012**		
2,000,000	3,000,000		17,333,837	44.93%			**2,421,370**		
3,000,000	4,000,000		14,967,753	44.93%					
4,000,000	5,000,000		12,791,562	44.93%					
5,000,000	7,500,000		24,241,449	44.93%					
7,500,000	10,000,000		16,461,631	44.93%			**8,636,239**		
10,000,000	12,500,000		13,394,068	44.93%			**11,079,641**		
12,500,000	15,000,000		9,691,028	44.93%			**13,614,457**		
15,000,000	17,500,000		7,828,622	44.93%			**16,153,150**		
17,500,000	20,000,000		6,156,642	44.93%			**18,612,035**		
20,000,000	22,500,000		4,928,558	44.93%			**21,211,319**		
22,500,000	25,000,000		3,797,507	44.93%			**23,731,843**		
25,000,000	27,500,000		3,836,649	44.93%			**26,211,023**		
27,500,000	30,000,000		3,349,953	44.93%			**28,739,547**		
30,000,000	32,500,000		2,725,353	44.93%			**31,146,086**		
32,500,000	35,000,000		2,081,365	44.93%			**33,750,926**		
35,000,000	37,500,000		1,853,513	44.93%			**36,178,824**		
37,500,000	40,000,000		1,903,802	44.93%			**38,675,492**		
40,000,000	42,500,000		1,574,744	44.93%			**41,178,587**		
42,500,000	45,000,000		845,291	44.93%			**43,658,333**		
45,000,000	47,500,000		1,773,029	44.93%					
47,500,000	50,000,000		889,998	44.93%					
50,000,000	52,500,000		1,231,749	44.93%					
52,500,000	55,000,000		836,157	44.93%			**53,692,526**		
55,000,000	57,500,000		1,172,066	44.93%			**55,934,348**		
57,500,000	60,000,000		507,438	44.93%			**58,771,071**		
60,000,000	62,500,000		801,373	44.93%			**61,146,400**		
62,500,000	65,000,000		597,683	44.93%			**63,334,750**		
65,000,000	67,500,000		280,347	44.93%			**65,870,429**		
67,500,000	70,000,000		172,311	44.93%			**68,411,250**		
70,000,000	75,000,000		1,533,779	44.93%			**72,050,259**		
75,000,000	80,000,000		629,259	44.93%			**77,403,467**		
80,000,000	85,000,000		927,622	44.93%					
85,000,000	90,000,000		575,021	44.93%					
90,000,000	95,000,000		250,246	44.93%					
95,000,000	100,000,000		380,872	44.93%			**97,502,000**		
100,000,000	199,463,547						**149,731,773**		

HPR Weight = 0%

HPR Weight = 50%

HPR Weight = 75%

HPR Weight = 100%

Subj. Prem proportional to portion of Limit Profile Premium in this profile segment.

Subj. Prem.	274,506,341
Prem. In Lmt Profile	186,550,030

	HPR Transition Factors			
	Limit	25,000,000	75,000,000	100,000,000
	% Weight to HPR	50.00%	75.00%	100.00%

Lower Limit(B+C)	Upper Limit(B+C)	Sir/Ded	Prem.	Ratio	Lower AOI	Upper AOI	Avg AO
-	1,000,000		32,323,884	44.93%			
1,000,000	2,000,000		22,633,487	44.93%			
2,000,000	3,000,000		17,333,837	44.93%			
3,000,000	4,000,000		14,967,753	44.93%			
4,000,000	5,000,000		12,791,562	44.93%			
5,000,000	7,500,000		24,241,449	44.93%			
7,500,000	10,000,000		16,461,631	44.93%			
10,000,000	12,500,000		13,394,068	44.93%			
12,500,000	15,000,000		9,691,028	44.93%			
15,000,000	17,500,000		7,828,622	44.93%			
17,500,000	20,000,000		6,156,642	44.93%			
20,000,000	22,500,000		4,928,558	44.93%			
22,500,000	25,000,000		3,797,507	44.93%			

HPR Weight = 0%

#	Occupancy Types	Prem Wgts
1	Apartment/Condo under 10 units	867,037
2	Apartment/Condo over 10 units	4,994,644
3	Dwelling	1,257,155
4	Group Institutional Housing	2,179,257
5	Hospitals and Nursing Homes	12,536,152
6	Hotels and Motels - With Restaurant	943,215
7	Hotels and Motels - Other	97,089
8	Entertainment and Recreation	3,395,870
9	Restaurants and Bars	889,990
10	Emergency Services	-
11	Government Services	5,275,024
12	Churches	610,519
13	Schools	15,519,071
14	Offices and Banks	60,950,780
15	Other Mercantiles - Retail/Wholesale	42,363,163
16	Other Mercantiles - Other	-
17	Gasoline Stations	179,536
18	Auto Repair	466,812
19	Parking	1,256,237
20	Billboards	-
21	Personal and Repair Services	8,294,391
22	Buildings Under Construction	33,785
23	Air/Airplane Hangars	34,772
24	Storage	14,883,518
25	Agricultural - Greenhouses	105,378
26	Agricultural - Grain Elevators	-
27	Food Processing - Other	1,854,005
28	Food Processing - Severe	-
29	General Indu/Metal Manufacturing	18,889,533
30	Chemical Manufacturing	3,423,333
31	Light Manufacturing - Printing	4,591,718
32	Light Manufacturing - Other	2,292,011
33	Heavy Manufacturing - Wood	838,053
34	Heavy Manufacturing - Other	14,413,126
35	Severe Manufacturing - Petroleum	-
36	Highly Protected Risks - Low	-
37	Highly Protected Risks - Medium	-
38	Highly Protected Risks - Heavy	-
39	All (Excl. HPR)	1,152,094
	Total	224,587,268

Subj. Prem proportional to portion of Limit Profile Premium in this profile segment.

Subj. Prem.	41,152,551
Prem. In Lmt Profile	27,966,602

	HPR Transition Factors			
	Limit	25,000,000	75,000,000	100,000,000
	% Weight to HPR	50.00%	75.00%	100.00%

HPR Weight = 50%

Lower Limit(B+C)	Upper Limit(B+C)	Sir/Ded	Prem.	Ratio	Lower AOI	Upper AOI	Avg AOI
25,000,000	27,500,000		3,836,649	44.93%			2
27,500,000	30,000,000		3,349,953	44.93%			2
30,000,000	32,500,000		2,725,353	44.93%			3
32,500,000	35,000,000		2,081,365	44.93%			3
35,000,000	37,500,000		1,853,513	44.93%			3
37,500,000	40,000,000		1,903,802	44.93%			3
40,000,000	42,500,000		1,574,744	44.93%			4
42,500,000	45,000,000		845,291	44.93%			4
45,000,000	47,500,000		1,773,029	44.93%			4
47,500,000	50,000,000		889,998	44.93%			4
50,000,000	52,500,000		1,231,749	44.93%			5
52,500,000	55,000,000		836,157	44.93%			5
55,000,000	57,500,000		1,172,066	44.93%			5
57,500,000	60,000,000		507,438	44.93%			5
60,000,000	62,500,000		801,373	44.93%			6
62,500,000	65,000,000		597,683	44.93%			6
65,000,000	67,500,000		280,347	44.93%			6
67,500,000	70,000,000		172,311	44.93%			6
70,000,000	75,000,000		1,533,779	44.93%			7

#	Occupancy Types	Prem Wgts
1	Apartment/Condo under 10 units	433,519
2	Apartment/Condo over 10 units	2,497,322
3	Dwelling	628,578
4	Group Institutional Housing	1,089,629
5	Hospitals and Nursing Homes	6,268,076
6	Hotels and Motels - With Restaurant	471,608
7	Hotels and Motels - Other	48,545
8	Entertainment and Recreation	1,697,935
9	Restaurants and Bars	444,995
10	Emergency Services	-
11	Government Services	2,637,512
12	Churches	305,260
13	Schools	7,759,536
14	Offices and Banks	30,475,390
15	Other Mercantile	21,181,582
16	Other Mercanti	-
17	Gasoline Stat	89,768
18	Auto repair	233,406
19	Parking	628,119
20	Billboards	-
21	Personal a	4,147,196
22	Buildings U	16,893
23	Air/Airplan	17,386
24	Storage	7,441,759
25	Agricultura	52,689
26	Agricultura	-
27	Food Proce	927,003
28	Food Proce	-
29	General Indu	9,444,767
30	Chemical Ma	1,711,667
31	Light Manufac	2,295,859
32	Light Manufactu	1,146,006
33	Heavy Manufactu	419,027
34	Heavy Manufacturi	7,206,563
35	Severe Manufacturin	-
36	Highly Protected Risks	10,243,437
37	Highly Protected Risks - M	78,986,213
38	Highly Protected Risks - Heavy	23,063,984
39	All (Excl. HPR)	576,047
	Total	224,587,268

Subj. Prem proportional to portion of Limit Profile Premium in this profile segment.

Subj. Prem.	13,123,537
Prem. In Lmt Profile	8,918,541

	HPR Transition Factors			
	Limit	25,000,000	75,000,000	100,000,000
	% Weight to HPR	50.00%	75.00%	100.00%

Lower Limit(B+C)	Upper Limit(B+C)	Sir/Ded	Prem.	Ratio	Lower AOI	Upper AOI	Avg AOI
75,000,000	80,000,000		629,259	44.93%			7
80,000,000	85,000,000		927,622	44.93%			8
85,000,000	90,000,000		575,021	44.93%			8
90,000,000	95,000,000		250,246	44.93%			9
95,000,000	100,000,000		380,872	44.93%			9

HPR Weight = 75%

#	Occupancy Types	Prem Wgts
1	Apartment/Condo under 10 units	216,759
2	Apartment/Condo over 10 units	1,248,661
3	Dwelling	314,289
4	Group Institutional Housing	544,814
5	Hospitals and Nursing Homes	3,134,038
6	Hotels and Motels - With Restaurant	235,804
7	Hotels and Motels - Other	24,272
8	Entertainment and Recreation	848,968
9	Restaurants and Bars	222,498
10	Emergency Services	-
11	Government Services	1,318,756
12	Churches	152,630
13	Schools	3,879,768
14	Offices and Banks	15,237,695
15	Other Mercantile /Wholesale	10,590,791
16	Other Mercanti er	-
17	Gasoline Stat	44,884
18	Auto repair	116,703
19	Parking	314,059
20	Billboards	-
21	Personal a r Services	2,073,598
22	Buildings U nstruction	8,446
23	Air/Airplan rs	8,693
24	Storage	3,720,880
25	Agricultura houses	26,345
26	Agricultura Elevators	-
27	Food Proce Other	463,501
28	Food Proce Severe	-
29	General Indu Manufacturing	4,722,383
30	Chemical Ma ng	855,833
31	Light Manufac rinting	1,147,930
32	Light Manufactu her	573,003
33	Heavy Manufactu d	209,513
34	Heavy Manufacturi	3,603,282
35	Severe Manufacturin	-
36	Highly Protected Risks	15,365,156
37	Highly Protected Risks - M	118,479,320
38	Highly Protected Risks - Heavy	34,595,975
39	All (Excl. HPR)	288,024
	Total	224,587,268

Subj. Prem proportional to portion of Limit Profile Premium in this profile segment.

Subj. Prem.	9,057,781
Prem. In Lmt Profile	186,550,030

	HPR Transition Factors			
	Limit	25,000,000	75,000,000	100,000,000
	% Weight to HPR	50.00%	75.00%	100.00%

Lower Limit(B+C)	Upper Limit(B+C)	Sir/Ded	Prem.	Ratio	Lower AOI	Upper AOI	Avg AOI
100,000,000	199,463,547		6,155,520	44.93%			14

HPR Weight = 100%

#	Occupancy Types	Prem Wgts
1	Apartment/Condo under 10 units	-
2	Apartment/Condo over 10 units	-
3	Dwelling	-
4	Group Institutional Housing	-
5	Hospitals and Nursing Homes	-
6	Hotels and Motels - With Restaurant	-
7	Hotels and Motels - Other	-
8	Entertainment and Recreation	-
9	Restaurants and Bars	-
10	Emergency Services	-
11	Government Services	-
12	Churches	-
13	Schools	-
14	Offices and Banks	-
15	Other Mercantile /Wholesale	-
16	Other Mercanti er	-
17	Gasoline Stat	-
18	Auto repair	-
19	Parking	-
20	Billboards	-
21	Personal a r Services	-
22	Buildings U nstruction	-
23	Air/Airplan rs	-
24	Storage	-
25	Agricultura nhouses	-
26	Agricultura Elevators	-
27	Food Proce Other	-
28	Food Proce Severe	-
29	General Indu Manufacturing	-
30	Chemical Ma ng	-
31	Light Manufac rinting	-
32	Light Manufactu her	-
33	Heavy Manufactu d	-
34	Heavy Manufacturi	-
35	Severe Manufacturin	-
36	Highly Protected Risks	20,486,874
37	Highly Protected Risks - M	157,972,427
38	Highly Protected Risks - Heavy	46,127,967
39	All (Excl. HPR)	-
	Total	224,587,268

COMPONENT PRICING

- Main idea is that if you are producing results across any individual coverages or perils, you will need to include potential for loss combinations
- For example, you would want to include adjustments for a Building and a Contents Loss combining for losses into higher layers.
- You will want to review various sets of statistics to see how often you have one type of claim or another independently, and then combined
- The modeling approach might be similar to HPR, whereby you take the components, estimate their combined likelihood, and then perhaps add simulation or more advanced combination methodologies.

Coverage & Peril Component Summary (Attritional Only) - Stable (All Years)

IRV Component Loss Costs	Total All Layers	5,000 XS 0	5,000 XS 5,000	15,000 XS 10,000	25,000 XS 25,000	10,000 XS 50,000	40,000 XS 60,000	150,000 XS 100,000	750,000 XS 250,000	No Layer	No Layer
BG1 - Buildings	$1,035,430	$ 480,296	$ 114,897	$ 160,386	$ 110,593	$ 25,658	$ 63,158	$ 72,743	$ 7,699	$ -	$ -
BG1 - Contents	$ 488,090	$ 217,449	$ 67,182	$ 88,088	$ 68,675	$ 19,319	$ 27,377	$ -	$ -	$ -	$ -
BG2 - Buildings	$ 102,205	$ 42,546	$ 5,152	$ 8,922	$ 10,329	$ 3,374	$ 10,686	$ 18,925	$ 2,272	$ -	$ -
BG2 - Contents	$ 52,335	$ 30,588	$ 5,849	$ 8,551	$ 5,189	$ 1,003	$ 1,154	$ -	$ -	$ -	$ -
SCL - Buildings	$ 227,029	$ 107,593	$ 16,119	$ 30,336	$ 28,631	$ 7,337	$ 17,783	$ 17,883	$ 1,347	$ -	$ -
SCL - Contents	$ 205,224	$ 104,027	$ 13,954	$ 27,647	$ 32,840	$ 10,801	$ 15,955	$ -	$ -	$ -	$ -
Time Element	$ 645,337	$ 274,192	$ 89,728	$ 135,504	$ 92,499	$ 22,694	$ 30,721	$ -	$ -	$ -	$ -
Buildings - BG1+BG2+SCL	$1,364,663	$ 650,435	$ 136,168	$ 199,843	$ 149,553	$ 36,368	$ 91,626	$ 109,551	$ 11,318	$ -	$ -
Contents - BG1+BG2+SCL	$ 745,649	$ 352,065	$ 86,985	$ 124,286	$ 106,703	$ 31,124	$ 44,486	$ -	$ -	$ -	$ -
BG1 - Buildings+Contents	$1,523,520	$ 697,745	$ 182,080	$ 248,474	$ 179,268	$ 44,977	$ 90,535	$ 72,743	$ 7,699	$ -	$ -
BG2 - Buildings+Contents	$ 154,539	$ 73,134	$ 11,001	$ 17,473	$ 15,518	$ 4,377	$ 11,839	$ 18,925	$ 2,272	$ -	$ -
SCL - Buildings+Contents	$ 432,252	$ 211,621	$ 30,073	$ 57,982	$ 61,471	$ 18,138	$ 33,738	$ 17,883	$ 1,347	$ -	$ -
B+C+TE+All Perils-Components	$2,755,649	$1,256,691	$ 312,881	$ 459,433	$ 348,755	$ 90,186	$ 166,833	$ 109,551	$ 11,318	$ -	$ -
B+C+TE+All Perils-PSOLD	$2,755,649	$1,032,647	$ 253,775	$ 382,704	$ 285,332	$ 76,632	$ 229,590	$ 397,630	$ 97,339	$ -	$ -
Difference	$ 0	$ 224,045	$ 59,106	$ 76,730	$ 63,423	$ 13,554	$ (62,757)	$ (288,079)	$ (86,022)	$ -	$ -

Note: Parallel display option: keeps layered values in original syndicated columns.

SERVE | ADD VALUE | INNOVATE