C-16: Property Risk and Cats Playing Together

CARe Seminar, June 3-4, 2019
Bermuda

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C-16: Property Risk and Cats Playing Together - Description

This session will introduce property risk rating, starting with dipping your toe into property per risk through an examination of developing and using first loss scales.

The session will then show how experienced practitioners can use advanced per risk tools to price ground-up and excess coverages. An emphasis will be made on illustrating merging attritional, minor, and major cat results to avoid the underlap and overlap issues, as well as adjusting first loss scales based on varying underlying COPE parameters. Pricing of complex layered per risk exposures, including large policy and layer deductibles frequently encountered in the US or International reinsurance marketplaces, will be illustrated.

The broker perspective will be given to highlight market realities when preparing data, identifying potential errors, testing various exposure and experience analyses, and assessing various peril treatments.

C-16 Property Risk and Cats Playing Together - Agenda

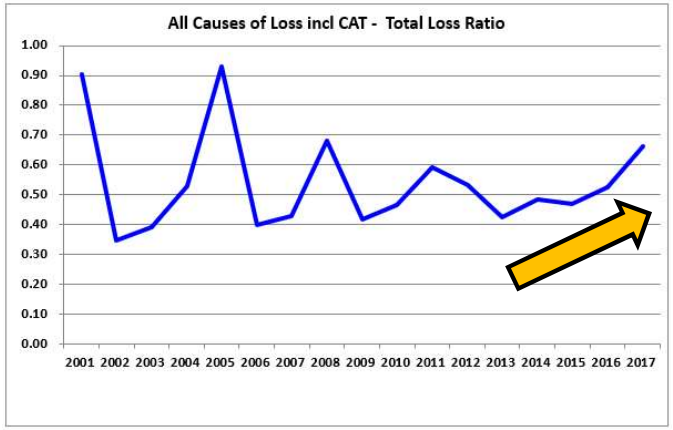
- **Introduction** **[Brian-5]**
- **Property Exposure Rating Overview** **[Brian-20]**
  - 1st loss scales history and definition
  - Developing curves first principles and various market scales
  - Ground-up and layer price Excel example - including frequency
  - Reinsurer perspective
- **A Deeper Dive** **[Don-25]**
  - Overall cat / non-cat loss trends
  - Exposure Rating Overview: A x B x C = D *[AOI x Base loss costs x Curve = Layered Loss Costs]*
  - Ground-up pricing for attritional and cat peril integration (reduce underlap/overlap)
  - Impact of COPE differences on excess scalars
  - Pricing complex layered risks
- **More Real-life Issues and Applications** **[Jonathan-15]**
  - Market / broker anecdotes - messy market, relationship importance, information/winners curse
  - Data issues and investigating errors – risk/cat
  - Blending exposure/experience results, survival ratios, premium allocation
  - Macro large loss trends – emerging issues
  - Blending risk/cat – each peril separate treatment HU/EQ
- **Q&A** **[5 minutes]**

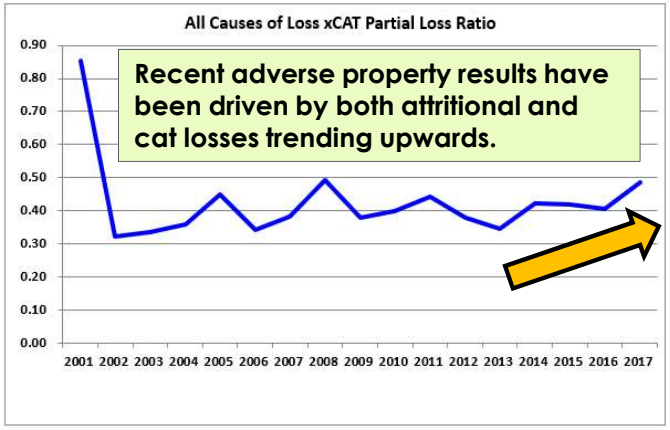
To the extent there is time, will pause for questions after each of the main sections. Otherwise, will have questions at the end.

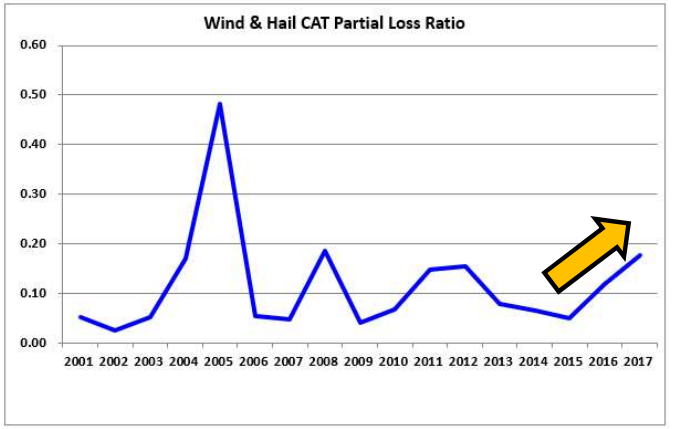
Property Per Risk and Cat
A Deeper Dive

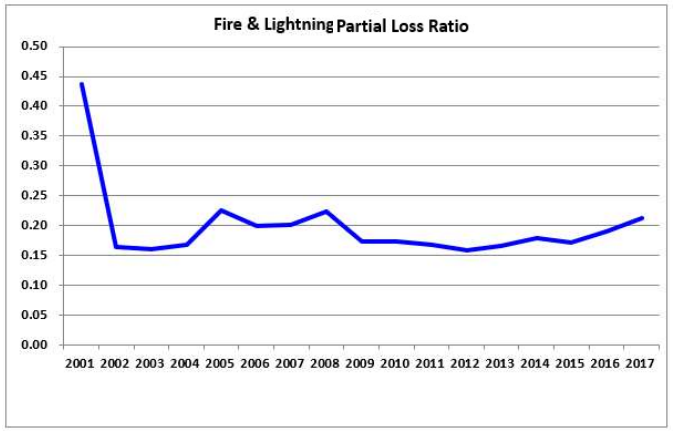
Loss Trends, Ground-up Pricing
For Attritional and Cat Perils

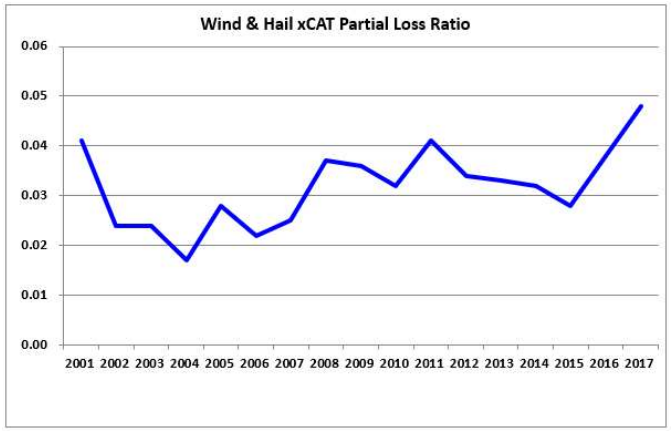
Property Risk and Cat Perils Overview – Ground Up Loss Trends

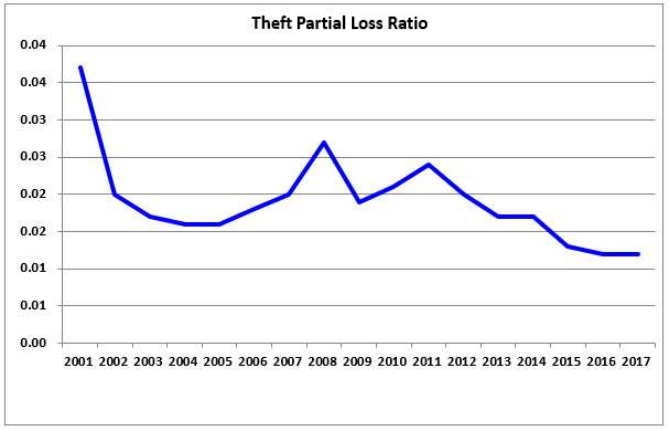












Source: SOLM 2018v2 – using on-level factors from MarketWatch 2018

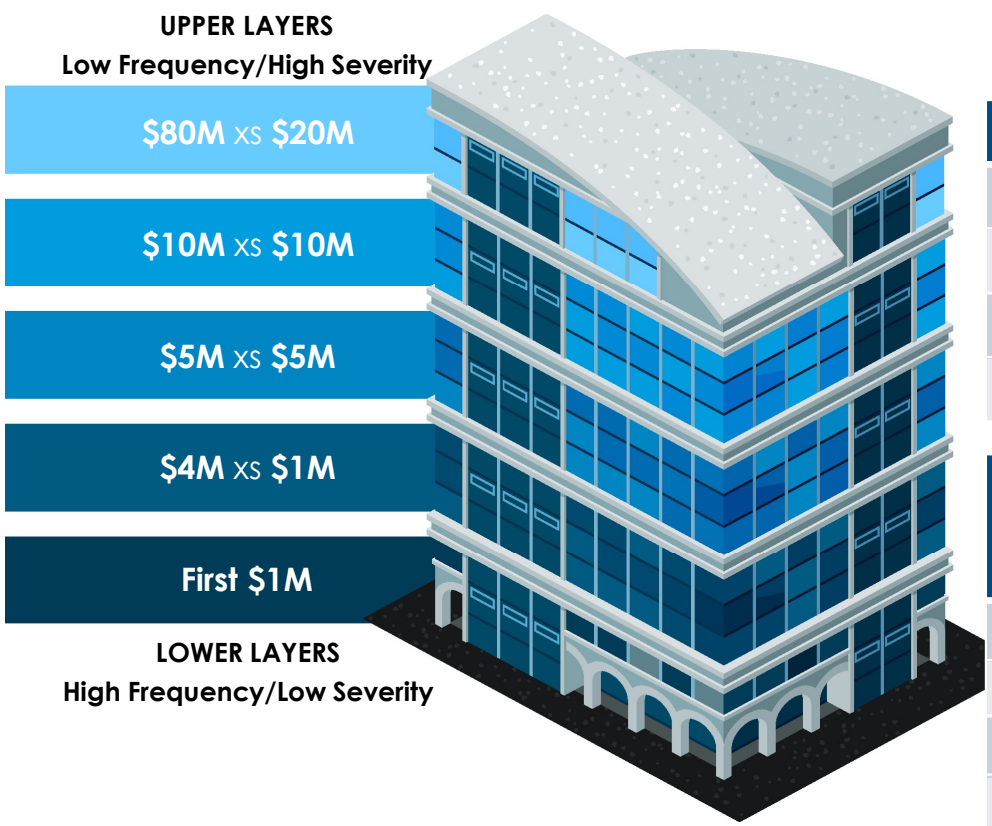
Note: Fire & Lightning Includes Fire, Lightning and Wildfire
Wind and Hail Includes Hurricane, Tornado from Hurricane, Tropical Storm, Tornado, Hail
Theft includes Theft
All Other includes the remaining causes of loss

Ground-Up and Excess Property Per Risk Pricing Basics

To insure any property it is important to first determine the ground-up pricing. Should consider the amount of insurance as well as the construction, occupancy, protection and exposure (COPE) of the building, etc.

All perils, such as fire and wind including those run through cat models, should be carefully considered so as to avoid underlap or overlap of results.

The losses should then be layered using first loss scales that are built on the same definition basis as the ground-up pricing [AOI x Base Loss Costs x Curve = Excess Layer].



Illustrative

Building/Occupancy	%
Corporate Center Building	80%
Bakery/Cafe	5%
Bar/Restaurant	10%
Wireless Provider	5%

Peril Totals	Expected Ground-up Loss Costs
Fire	37,567
Wind	11,230
Special Cause of Loss	6,988
Total Ground-Up Loss	**55,785**
Layer $10M xs $10M	**8,314**

Listing of Property per Risk Occupancies, Coverages, and Perils

Illustrative

ISO's database contains over 50 million individual policies, 5 million individual claims, 235 billion estimated ground-up losses, from 230 CP class codes.

From this information we estimate ground-up loss costs and excess layering for 38 occupancy groups separated into commercial, manufacturing, and residential categories. Including for each of 7 various coverage and peril components.

Commercial:
- agricultural—greenhouses
- air/airplane hangars
- auto repair
- billboards
- churches
- emergency services
- entertainment and recreation
- gasoline stations
- government services
- hospitals and nursing homes
- hotels and motels—other
- hotels and motels—with restaurant
- offices and banks
- other mercantiles—other
- other mercantiles—retail/wholesale
- parking
- personal and repair services
- restaurants and bars
- schools

Manufacturing:
- agricultural—grain elevators
- buildings under construction
- chemical manufacturing
- food processing—other
- food processing—severe
- general industry/metal manufacturing
- heavy manufacturing—other
- heavy manufacturing—wood
- light manufacturing—other
- light manufacturing—printing
- severe manufacturing/petroleum
- storage

Highly Protected Risks:
- highly protected risks—low
- highly protected risks—medium
- highly protected risks—heavy

Residential:
- apartments/condos over 10 units
- apartments/condos under 10 units
- dwelling
- group institutional housing

ISO Rapid Valuator includes the following **coverages and peril** components:

- buildings—BG1 (fire)
- buildings—BG2 (wind)
- buildings—special causes of loss
- contents—BG1 (fire)
- contents—BG2 (wind)
- contents—special causes of loss
- business interruption (time element)

Ground-up and Excess Information by Occupancy for Ground-Up and Excess Pricing

ISO is typically known for producing filed loss costs for various standard occupancies such as apartments, offices, and general mercantile, up to $10M AOI. However, an extensive amount of information exists in non-standard (non-filed) lines such as severe manufacturing and HPR categories. Including much of it from quite large AOIs and large policy sizes.

Importantly for first loss scales, the claims and AOIs are linked to enable quite robust PSOLD curve fits.

Standard

Non-Standard

HPR

Number Filed	PSOLD Rating Group #	PSOLD Rating Group	# of Policies	PSOLD Curve Fits: Gross Attritional Claims	Total Gross AOI	Estimated Total Gross Loss
4/6	1	Apartments/Condos under 10 Units	1,456,563	177,350	2,188,514,991,488	8,667,517,326
8/8	2	Apartments/Condos over 10 Units	1,108,575	182,545	4,475,899,827,489	13,809,526,596
3/4	3	Dwelling	3,678,104	181,386	582,319,606,386	6,172,130,448
3/3	4	Group Institutional Housing	22,194	4,282	27,175,764,331	158,293,793
2/2	5	Hospitals and Nursing Homes	290,925	92,053	1,313,198,374,560	4,978,212,056
4/4	6	Hotels and Motels - With Restaurant	111,833	32,000	549,499,840,918	3,029,847,303
7/7	7	Hotels and Motels - Other	676,147	112,348	704,382,561,595	4,835,980,728
13/14	8	Entertainment and Recreation	2,234,863	311,829	1,180,498,996,192	11,314,666,791
2/3	9	Restaurants and Bars	1,874,013	285,002	1,433,009,466,729	8,379,123,468
2/2	10	Emergency Services	468,334	87,054	1,997,950,832,459	2,823,535,858
1/1	11	Government Services	250,679	48,551	1,199,682,970,709	2,059,435,939
1/1	12	Churches	2,319,314	369,447	1,639,494,902,428	12,425,571,875
1/1	13	Schools	729,620	203,794	4,719,460,408,719	7,991,316,743
1/1	14	Offices and Banks	8,324,637	875,786	5,389,907,703,418	29,140,680,126
0/4	15	Other Mercantiles - Retail/Wholesale	1,288,735	156,276	1,172,406,451,416	8,674,743,903
17/17	16	Other Mercantiles - Other	12,163,707	824,102	3,443,301,869,294	32,019,918,262
1/1	17	Gasoline Stations	1,306,653	98,342	126,777,663,900	2,529,666,821
3/3	18	Auto Repair	2,323,011	202,611	731,690,566,894	7,978,928,652
1/1	19	Parking	780,748	74,687	173,388,031,531	1,665,873,572
0/1	20	Billboards	282,137	6,437	2,695,812,822	114,264,334
6/6	21	Personal and Repair Services	1,788,427	152,873	972,047,531,755	5,702,121,732
1/1	22	Buildings Under Construction	243,698	8,030	121,821,688,249	457,879,316
2/2	23	Airplane Risks	169,363	9,088	30,290,081,206	358,608,181
4/10	24	Storage	3,841,458	143,538	524,815,373,120	4,502,235,237
1/1	25	Agricultural - Greenhouses	90,834	5,888	16,403,456,444	234,628,914
0/6	26	Agricultural - Grain Elevators	46,900	22,556	124,270,144,380	1,644,710,697
3/7	27	Food Processing - Other	235,037	33,474	203,599,561,035	3,281,079,928
0/3	28	Food Processing - Severe	35,051	3,186	31,861,075,939	523,322,604
1/3	29	General Indu/Metal Manufacturing	1,327,155	145,344	1,116,015,426,226	9,878,754,933
0/5	30	Chemical Manufacturing	306,784	33,635	228,028,792,553	4,153,367,453
1/1	31	Light Manufacturing - Printing	205,324	25,778	111,085,097,756	1,114,529,689
2/5	32	Light Manufacturing - Other	201,938	22,194	145,544,632,592	2,267,674,644
0/4	33	Heavy Manufacturing - Wood	636,526	44,594	184,442,987,992	4,939,421,047
3/7	34	Heavy Manufacturing - Other	694,713	70,476	542,306,957,925	4,237,858,963
1/6	35	Severe Manu/Petroleum	18,685	7,947	97,670,982,847	4,091,707,567
0/17	36	Highly Protected Risks - Low	71,978	13,045	57,927,639,063	1,458,952,431
0/15	37	Highly Protected Risks - Medium	556,702	66,246	258,205,967,270	7,128,595,756
0/46	38	Highly Protected Risks - Heavy	250,059	47,417	185,119,645,537	10,768,656,579
99/229		**Grand Total**	**52,411,324**	**5,181,188**	**38,002,713,685,168**	**235,513,340,263**

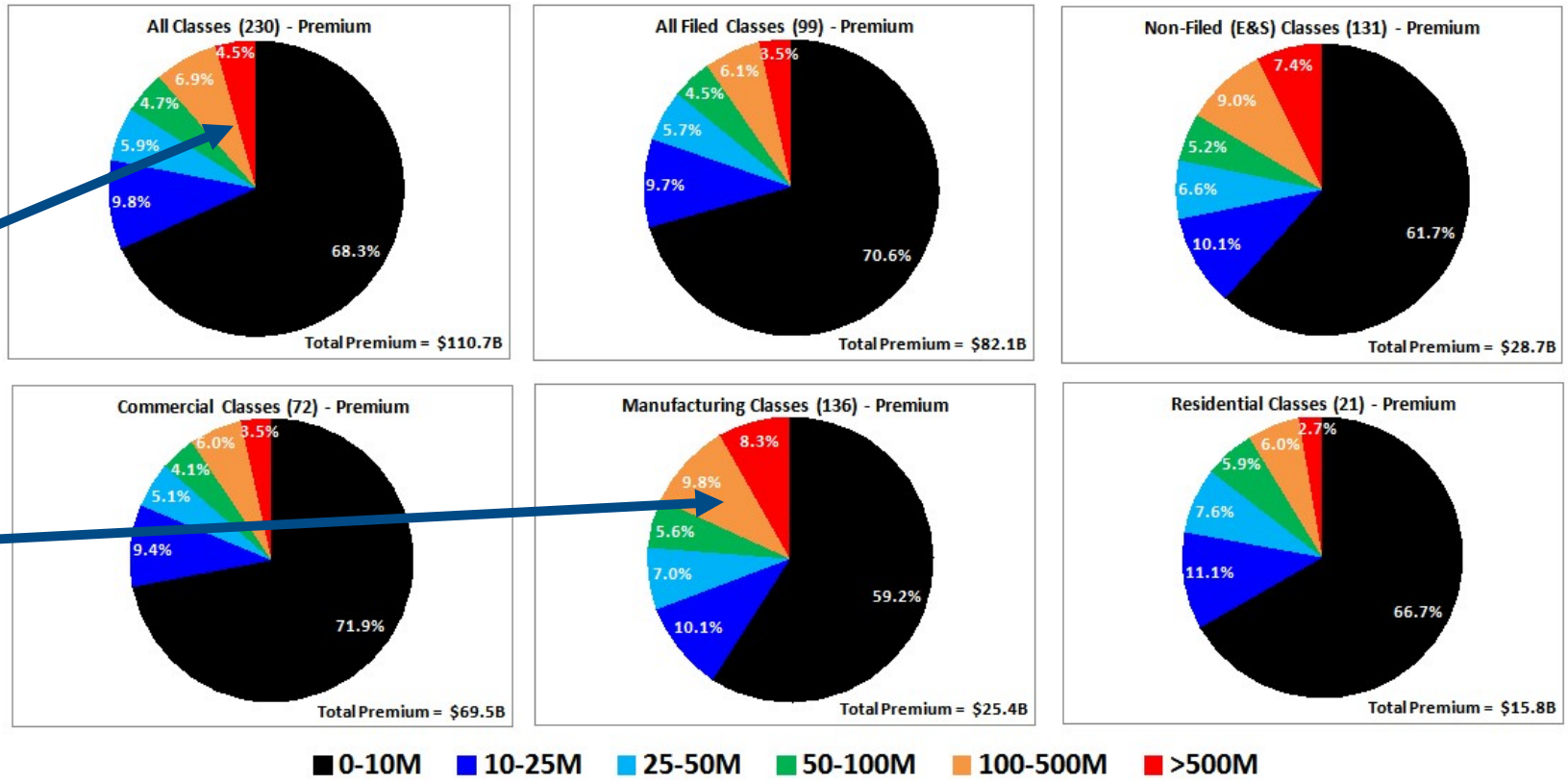
Note: IRV 15 years # of policies and counts net of deductibles for E&S Customization (from 230 ISO CSPs)
PSOLD - 24 years for ground-up curve fits (excluding minor cat); includes countrywide override

Large Policy Analysis by Occupancy Group

Illustrative

Underlying the ground-up pricing and curves is significant amount of information for larger policies. About 11% of total premium is related to policies greater than 100 million AOI, with about 16% of the non-filed categories being from these largest policies. About 26% of the total premium collected and analyze is in the Non-filed (E&S) categories.

About 18% of the premium is for 136 manufacturing occupancies, including 78 HPR, are related to policy sizes larger than 100M is.



Note: Data underlying IRV / PSOLD ground-up and excess loss costs; all 230 ISO CSP Occupancies, 38 IRV/PSOLD Rating Groups - Filed / Non-filed (E&S) Policy Years 2000-2015 - Net of deductibles, Undeveloped, Untrended, Stat data; Manufacturing including 78 HPR categories

Linkage of Claims and Amounts of Insurance for Curve Fitting

ISO is typically known for producing loss costs for up to $10M AOI. However, we have over 400,000 gross claims linked to AOIs larger than 10,000,000. With this information, including the underlying occupancy, coverage, and peril details, we produce over 7 million PSOLD first loss scales. We have different scales for each of the 60 AOI bands up to 1Billion, 38 occupancy groups, 7 coverage component, etc.

Our all-industry validation, indicates that our results are credible up to about 200-250M AOI.

Illustrative

Amount of Insurance (US$)	PSOLD-2016 Cumulative Claim Counts by AOI	
	Net of Deductible	Gross of Deductible
Ground-Up	2,951,769	5,181,188
1,000,000	782,069	1,751,576
5,000,000	223,449	638,413
10,000,000	128,204	405,675
25,000,000	57,089	199,913
50,000,000	33,055	117,412
75,000,000	24,470	85,064
100,000,000	19,892	68,186
150,000,000	13,075	56,093
200,000,000	9,856	31,890

The above claim counts are total number of claims regardless of size, linked to the underlying AOI
All policies and claims from 1991 to 2014; AOI's and claims are trended to 2017 for 2016 PSOLD
All occupancies, states, non-cat perils combined (excluding both minor and major cat)
Gross of deductible counts for ground-up curves use ISO's underlying deductible distributions

Illustrative

Individual Exposures Insured – Statement of Values

Orig Sort	Country - Region	Description/Record Index	Building AOI ($)	Contents AOI ($)	Total B&C AOI ($)	Time Element AOI ($)	Deductible ($)	State/Nominal Region	Zip Code	CSP Class Code	Coverage (Bldgs/Cont)	PPC	Sprinkler System Type	BG1 Construction	BG2 Symbol	Gross Actual Premium
1	United States	Office	40,000,000	5,000,000	45,000,000	10,000,000	1,000	Alabama		0702	Both	10	Part	Joisted Masonry	Ordinary	100,000
2	United States	Distillery	18,000,000	500,000	18,500,000	200,000		Arizona		2459	Both	10	Full	Frame	Semi Wind Re	40,000
3	United States	Hotel - with restaurant	3,381,573	797,940	4,179,513	100,000	25,000	Countrywide		0744	Both	5	Part	Fire Resistive	Superior Win	10,000
4	United States	Office	40,000,000	5,000,000	45,000,000	10,000,000		Nevada		0702	Both	10		Frame	Ordinary	100,000
5	United States	Distillery	18,000,000	500,000	18,500,000	200,000		Nevada		2459	Both	10	Full	Frame	Semi Wind Re	40,000
6	United States	Hotel - with restaurant	3,381,573	797,940	4,179,513	100,000	25,000	South Carolina		0744	Both	1		Fire Resistive	Superior Win	10,000
7	United States	Office	40,000,000	5,000,000	45,000,000	10,000,000	1,000	Alabama	35207	0702	Both	10	Part	Joisted Masonry	Ordinary	100,000
8	United States	Distillery	18,000,000	500,000	18,500,000	200,000		Rhode Island	02801	2459	Both	10	Full	Frame	Semi Wind Re	40,000
9	United States	Hotel - with restaurant	3,381,573	797,940	4,179,513	100,000	25,000	South Carolina		0744	Both	1		Fire Resistive	Superior Win	10,000
10	United States	Office	110,000,000		110,000,000		75,000	Florida		0702	Both	1	Part	Joisted Masonry	Ordinary	100,000

All pricing starts with either a statement of individual insured values, or a banded profile. Sometimes this information will be provided by a cat model submission.

This information will include various amounts of insurance, location and occupancy indicators, as well as often various COPE information and deductibles. Actual premium charged on an exposure level is also quite useful for analysis and establishing e.g. IELRs.

Property Risk and Cat Perils – What can go wrong?

To help determine accurate pricing, should understand what is covered, or what is excluded, in the policy.

Various attritional rating factors and cat results should be included to match the coverage provided.

Illustrative

Ground-Up Pricing

Basic Group I

- Fire
- Lightning
- Explosion
- Vandalism
- Sprinkler Leakage
- Wildfire

Basic Group II

- Windstorm: Hurricane
- Windstorm: Tornado from Hurricane
- Windstorm: Tropical Storm
- Windstorm: Tornado
- Hail
- Smoke
- Aircraft
- Riot
- Sinkhole Collapse: Other than FL
- Catastrophic Ground Cover Collapse: FL
- Volcano

Special Causes of Loss

- Winter Storm: Weight of Ice/Snow
- Winter Storm: Freeze
- Power Outage
- Other Collapse
- Water Damage
- Theft

Time Element / Business Interruption

- TE: Attritional
- TE: Minor CAT
- TE: Major CAT

Excess Layering

PSOLD Curves

- PSOLD Attritional
- PSOLD Minor CAT

None

- Major CAT
- Excluded

Excluded

- Earthquake
- Flood: Coastal and Inland (Riverine)
- Terrorism
- Workers Compensation
- Sinkhole Collapse: FL

Key

- Attritional
- Minor CAT
- Major CAT
- Excluded

Integration of Property Per Risk and Cat Results – Inputs, Perils, Results

A. Inputs

Statement of Value Inputs — **Illustrative** — **IRV Results**

Orig Sort	Country - Region	Description/Record Index	Building AOI ($)	Contents AOI ($)	Total B&C AOI ($)	Time Element AOI ($)	Deductible ($)	State/Nominal Region	Zip Code	CSP Class Code	Coverage (Bldgs/Cont)	PPC	Sprinkler System Type	BG1 Construction	BG2 Symbol	Gross Actual Premium	Account GULC Scalar	IRV Total Gross Loss Costs	Gross ELR (IRV GULC/ Actual Prem)	Net Losses-GU PSOLD: Net Attritional
1	United States	Office	40,000,000	5,000,000	45,000,000	10,000,000	1,000	Alabama		0702	Both	10	Part	Joisted Masonry	Ordinary	100,000		60,714	60.7%	49,299
2	United States	Distillery	18,000,000	500,000	18,500,000	200,000		Arizona		2459	Both	10	Full	Frame	Semi Wind Re	40,000		18,316	45.8%	15,931
3	United States	Hotel - with restaurant	3,381,573	797,940	4,179,513	100,000	25,000	Countrywide		0744	Both	5	Part	Fire Resistive	Superior Win	10,000		7,409	74.1%	7,018
4	United States	Office	40,000,000	5,000,000	45,000,000	10,000,000		Nevada		0702	Both	10		Frame	Ordinary	100,000		30,183	30.2%	30,183
5	United States	Distillery	18,000,000	500,000	18,500,000	200,000		Nevada		2459	Both	10	Full	Frame	Semi Wind Re	40,000		13,354	33.4%	13,354
6	United States	Hotel - with restaurant	3,381,573	797,940	4,179,513	100,000	25,000	South Carolina		0744	Both	1		Fire Resistive	Superior Win	10,000		5,240	52.4%	4,930
7	United States	Office	40,000,000	5,000,000	45,000,000	10,000,000	1,000	Alabama	35207	0702	Both	10	Part	Joisted Masonry	Ordinary	100,000		86,967	87.0%	74,024
8	United States	Distillery	18,000,000	500,000	18,500,000	200,000		Rhode Island	02801	2459	Both	10	Full	Frame	Semi Wind Re	40,000		15,435	38.6%	12,048
9	United States	Hotel - with restaurant	3,381,573	797,940	4,179,513	100,000	25,000	South Carolina		0744	Both	1		Fire Resistive	Superior Win	10,000		5,240	52.4%	4,930
10	United States	Office	110,000,000		110,000,000		75,000	Florida		0702	Both	1	Part	Joisted Masonry	Ordinary	100,000		21,061	21.1%	19,180

B. Peril Mapping

IRV - Peril Mapping for Integrating Cat Model Results

Ground-Up Pricing

Basic Group I
- Fire
- Lightning
- Explosion
- Vandalism
- Sprinkler Leakage
- Wildfire

Basic Group II
- Windstorm: Hurricane
- Windstorm: Tornado from Hurricane
- Windstorm: Tropical Storm
- Windstorm: Tornado
- Hail
- Smoke
- Aircraft
- Riot
- Sinkhole Collapse: Other than FL
- Catastrophic Ground Cover Collapse: FL
- Volcano

Special Causes of Loss
- Winter Storm: Weight of Ice/Snow
- Winter Storm: Freeze
- Power Outage
- Other Collapse
- Water Damage
- Theft

Time Element / Business Interruption
- TE: Attritional
- TE: Minor CAT
- TE: Major CAT

Excess Layering

PSOLD Curves
- PSOLD Attritional
- PSOLD Minor CAT

None
- Major CAT
- Excluded

Excluded
- Earthquake
- Flood: Coastal and Inland (Riverine)
- Terrorism
- Workers Compensation
- Sinkhole Collapse: FL

Key
- Attritional
- Minor CAT
- Major CAT
- Excluded

Integrating property cat model and attritional results requires an understanding of the coverages and perils that are covered in each, so as to avoid underlap or overlap issues. The mapping to the left shows the normal perils covered under a Property Per Risk contract, or excluded as covered by Cat contracts.

Using a typical statement of values, you will want to calculate the attritional loss results as the main goal, but also produce comparative Hurricane and minor cat values (Tornado/Hail, Freeze, etc.). The much more granular cat model results should be relied upon, but a class based approach can provide a handy quick comparison that can also be rolled up for portfolio purposes to compare to the cat models for validation.

C. Results

IRV Summary - Total and Detail Loss Costs

Company / Program
v6.5; LC 2019-1H; new CAT alloc state defaults BG2, SCL, TE

IRV v6.5 (Portal 2019-1H, PSOLD2017)

State/Nominal Region	AOI Band	# of Exposures	Total B+C+TE	Actual Premium	IRV Total Gross Loss Costs (xHU)	IRV Attritional Expected Loss	IRV Minor Cat Expected	Total LC HU iTE	Prem / AOI	GULC / AOI	ELR	Per Risk Avg AOI
Alabama	16: 50.0M-75	2	110,000,000	200,000	147,681	123,323	24,358	11,192	0.182	0.134	73.8%	55,000,000
Arizona	09: 15.0M-20	1	18,700,000	40,000	18,316	15,931	2,385	-	0.214	0.098	45.8%	18,700,000
Countrywide	05: 4.0M-5.0	1	4,279,513	10,000	7,409	7,018	390	1,232	0.234	0.173	74.1%	4,279,513
Florida	18: 100.0M-1	1	110,000,000	100,000	21,061	19,180	1,882	18,463	0.091	0.019	21.1%	110,000,000
Nevada	09: 15.0M-20	1	18,700,000	40,000	13,354	13,354	0	-	0.214	0.071	33.4%	18,700,000
	16: 50.0M-75	1	55,000,000	100,000	30,183	30,183	0	-	0.182	0.055	30.2%	55,000,000
Rhode Island	09: 15.0M-20	1	18,700,000	40,000	15,435	12,048	3,386	6,600	0.214	0.083	38.6%	18,700,000
South Carolina	05: 4.0M-5.0	2	8,559,025	20,000	10,479	9,861	618	726	0.234	0.122	52.4%	4,279,513
Grand Total		10	343,938,538	550,000	263,917	230,898	33,019	38,214	0.160	0.077	48.0%	34,393,854

Hurricane State Research – Coastal/Non-Coastal Zip Codes (Sample)

Illustrative

IRV v6.5 (Portal 2019-1H, PSOLD2017)

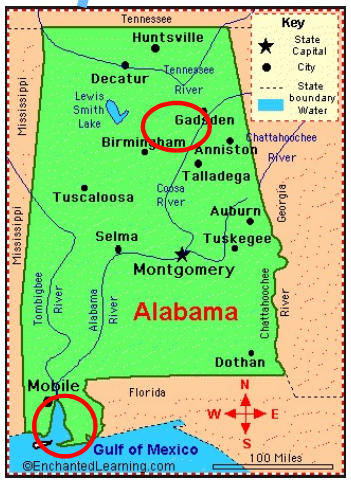
IRV Summary - Total and Detail Loss Costs

New Portal DB HU States tets / Coastal vs. Non-Coastal
Portal DB 2019-1H

State/Nominal Region	Coastal/Non-Co	CAT Territory	# of Exposures	Total B+C+TE	Actual Premium	IRV Total Gross Loss Costs (iHU)	IRV Attritional Expected Loss	IRV Minor Cat Expected Loss	Total LC HU iTE	IRV Total Gross Loss Costs (xHU)	Prem / AOI	GULC (iHU) / AOI	ELR	Per Risk Avg AOI	GULC (xHU) / AOI	HU/Attr %
Alabama	Coastal	Beach	38	1,788,235,294	3,800,000	8,042,723	2,748,779	428,842	**4,865,102**	3,177,621	0.213	0.450	211.7%	47,058,824	0.178	177.0%
	Non-Coastal	Inland	38	1,788,235,294	3,800,000	3,293,190	2,729,513	403,673	**160,005**	3,133,185	0.213	0.184	86.7%	47,058,824	0.175	5.9%
Connecticut	Coastal	Territory II	38	1,788,235,294	3,800,000	2,007,035	1,577,977	171,263	**257,794**	1,749,241	0.213	0.112	52.8%	47,058,824	0.098	16.3%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	1,843,830	1,572,705	167,504	**103,621**	1,740,209	0.213	0.103	48.5%	47,058,824	0.097	6.6%
Delaware	Coastal	Territory II	38	1,788,235,294	3,800,000	1,867,618	1,431,184	47,921	**388,512**	1,479,106	0.213	0.104	49.1%	47,058,824	0.083	27.1%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	1,537,146	1,422,103	46,359	**68,684**	1,468,462	0.213	0.086	40.5%	47,058,824	0.082	4.8%
District of Columbia	Coastal	Entire State	38	1,788,235,294	3,800,000	2,097,137	1,925,616	145,61	**25,905**	2,071,231	0.213	0.117	55.2%	47,058,824	0.116	1.3%
Florida	Coastal	Monroe - Other	38	1,788,235,294	3,800,000	6,481,263	935,456	144,1	**5,401,658**	1,079,604	0.213	0.362	170.6%	47,058,824	0.060	577.4%
	Non-Coastal	Inland Zone 4	38	1,788,235,294	3,800,000	1,533,066	935,044	143,1 6	**454,887**	1,078,179	0.213	0.086	40.3%	47,058,824	0.060	48.6%
Georgia	Coastal	Beach	38	1,788,235,294	3,800,000	3,121,621	1,931,269	198,276	**991,376**	2,130,245	0.213	0.175	82.1%	47,058,824	0.119	51.3%
	Non-Coastal	Inland	38	1,788,235,294	3,800,000	2,300,486	1,963,077	230,449	**106,961**	2,193,526	0.213	0.129	60.5%	47,058,824	0.123	5.4%

From a statement of values, the HU losses are developed on a zip-code level using the a cat model. This exhibit, across an array of 38 occupancies, shows the relative magnitude of the HU losses compared to the other standard perils. And very importantly, how different the results are when comparing coastal and non-coastal zip-codes.

As illustration, for Alabama the results range from 160k to 4,865k for the most exposed zip-codes, while Florida ranges from 454k to 5,401k. It is important to note that while the user should use and rely on the much more granular cat model results including individual building characteristics and actual distance from the coast, these class based values can provide a very handy quick comparison.



Hurricane States – Coastal/Non-Coastal Zip Code Analysis

Illustrative

IRV v6.5 (Portal 2019-1H, PSOLD2017)

Almost all of the hurricane prone states show, not surprisingly, significant coastal vs non-coastal results.

These differences will be amplified by using full detail cat modeling results.

This exhibit also shows relative consistency in attritional and minor cat losses within the state.

IRV Summary - Total and Detail Loss Costs

New Portal DB HU States tets / Coastal vs. Non-Coastal
Portal DB 2019-1H

State/Nominal Region	Coastal/Non-Co	CAT Territory	# of Exposures	Total B+C+TE	Actual Premium	IRV Total Gross Loss Costs (iHU)	IRV Attritional Expected Loss	IRV Minor Cat Expected Loss	Total LC HU iTE	IRV Total Gross Loss Costs (xHU)	Prem / AOI	GULC (iHU) / AOI	ELR	Per Risk Avg AOI	GULC (xHU) / AOI	HU/Attr %
Alabama	Coastal	Beach	38	1,788,235,294	3,800,000	8,042,723	2,748,779	428,842	**4,865,102**	3,177,621	0.213	0.450	211.7%	47,058,824	0.178	177.0%
	Non-Coastal	Inland	38	1,788,235,294	3,800,000	3,293,190	2,729,513	403,673	**160,005**	3,133,185	0.213	0.184	86.7%	47,058,824	0.175	5.9%
Connecticut	Coastal	Territory II	38	1,788,235,294	3,800,000	2,007,035	1,577,977	171,263	**257,794**	1,749,241	0.213	0.112	52.8%	47,058,824	0.098	16.3%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	1,843,830	1,572,705	167,504	**103,621**	1,740,209	0.213	0.103	48.5%	47,058,824	0.097	6.6%
Delaware	Coastal	Territory II	38	1,788,235,294	3,800,000	1,867,618	1,431,184	47,921	**388,512**	1,479,106	0.213	0.104	49.1%	47,058,824	0.083	27.1%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	1,537,146	1,422,103	46,359	**68,684**	1,468,462	0.213	0.086	40.5%	47,058,824	0.082	4.8%
District of Columbia	Coastal	Entire State	38	1,788,235,294	3,800,000	2,097,137	1,925,616	145,616	**25,905**	2,071,231	0.213	0.117	55.2%	47,058,824	0.116	1.3%
Florida	Coastal	Monroe - Other	38	1,788,235,294	3,800,000	6,481,263	935,456	144,148	**5,401,658**	1,079,604	0.213	0.362	170.6%	47,058,824	0.060	577.4%
	Non-Coastal	Inland Zone 4	38	1,788,235,294	3,800,000	1,533,066	935,044	143,136	**454,887**	1,078,179	0.213	0.086	40.3%	47,058,824	0.060	48.6%
Georgia	Coastal	Beach	38	1,788,235,294	3,800,000	3,121,621	1,931,269	198,976	**991,376**	2,130,245	0.213	0.175	82.1%	47,058,824	0.119	51.3%
	Non-Coastal	Inland	38	1,788,235,294	3,800,000	2,300,486	1,963,077	230,449	**106,961**	2,193,526	0.213	0.129	60.5%	47,058,824	0.123	5.4%
Hawaii	Coastal	Entire State	38	1,788,235,294	3,800,000	2,068,942	1,858,027	0	**210,915**	1,858,027	0.213	0.116	54.4%	47,058,824	0.104	11.4%
Louisiana	Coastal	Beach	38	1,788,235,294	3,800,000	8,042,723	2,580,843	596,778	**4,865,102**	3,177,621	0.213	0.450	211.7%	47,058,824	0.178	188.5%
	Non-Coastal	Inland	38	1,788,235,294	3,800,000	3,293,190	2,566,767	566,418	**160,005**	3,133,185	0.213	0.184	86.7%	47,058,824	0.175	6.2%
Maine	Coastal	Territory II	38	1,788,235,294	3,800,000	3,784,814	3,651,031	33,032	**100,751**	3,684,063	0.213	0.212	99.6%	47,058,824	0.206	2.8%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	3,718,229	3,651,741	33,162	**33,326**	3,684,903	0.213	0.208	97.8%	47,058,824	0.206	0.9%
Maryland	Coastal	Territory II	38	1,788,235,294	3,800,000	1,589,382	1,162,967	104,555	**321,860**	1,267,522	0.213	0.089	41.8%	47,058,824	0.071	27.7%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	1,284,815	1,159,238	102,543	**23,035**	1,261,781	0.213	0.072	33.8%	47,058,824	0.071	2.0%
Massachusetts	Coastal	Territory III	38	1,788,235,294	3,800,000	2,898,861	2,229,120	118,795	**550,946**	2,347,915	0.213	0.162	76.3%	47,058,824	0.131	24.7%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	2,454,056	2,229,822	118,933	**105,301**	2,348,755	0.213	0.137	64.6%	47,058,824	0.131	4.7%
Mississippi	Coastal	Beach	38	1,788,235,294	3,800,000	8,042,723	2,572,211	605,410	**4,865,102**	3,177,621	0.213	0.450	211.7%	47,058,824	0.178	189.1%
	Non-Coastal	Inland	38	1,788,235,294	3,800,000	3,293,190	2,560,436	572,750	**160,005**	3,133,185	0.213	0.184	86.7%	47,058,824	0.175	6.2%
New Hampshire	Coastal	Territory II	38	1,788,235,294	3,800,000	1,722,235	1,540,288	44,579	**137,368**	1,584,867	0.213	0.096	45.3%	47,058,824	0.089	8.9%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	1,615,742	1,535,741	43,385	**36,617**	1,579,125	0.213	0.090	42.5%	47,058,824	0.088	2.4%
New Jersey	Coastal	Territory II	38	1,788,235,294	3,800,000	2,795,161	2,241,481	166,779	**386,901**	2,408,260	0.213	0.156	73.6%	47,058,824	0.135	17.3%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	2,476,944	2,240,401	165,408	**71,135**	2,405,809	0.213	0.139	65.2%	47,058,824	0.135	3.2%
New York	Coastal	Territory III	38	1,788,235,294	3,800,000	2,473,802	2,109,938	167,685	**196,179**	2,277,622	0.213	0.138	65.1%	47,058,824	0.127	9.3%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	2,300,657	2,107,852	166,060	**26,745**	2,273,912	0.213	0.129	60.5%	47,058,824	0.127	1.3%
North Carolina	Coastal	Territory III	38	1,788,235,294	3,800,000	4,979,126	1,635,443	183,492	**3,160,191**	1,818,935	0.213	0.278	131.0%	47,058,824	0.102	193.2%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	1,990,921	1,588,366	146,699	**255,856**	1,735,065	0.213	0.111	52.4%	47,058,824	0.097	16.1%
Pennsylvania	Coastal	Entire State	38	1,788,235,294	3,800,000	2,407,504	2,293,232	97,819	**16,453**	2,391,051	0.213	0.135	63.4%	47,058,824	0.134	0.7%
	Non-Coastal	Entire State	38	1,788,235,294	3,800,000	2,113,831	2,001,141	96,237	**16,453**	2,097,378	0.213	0.118	55.6%	47,058,824	0.117	0.8%
Rhode Island	Coastal	Territory II	38	1,788,235,294	3,800,000	2,732,519	2,041,104	190,669	**500,746**	2,231,773	0.213	0.153	71.9%	47,058,824	0.125	24.5%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	2,395,114	2,041,600	191,433	**162,081**	2,233,032	0.213	0.134	63.0%	47,058,824	0.125	7.9%
South Carolina	Coastal	Seacoast	38	1,788,235,294	3,800,000	4,272,571	2,405,441	156,228	**1,710,902**	2,561,669	0.213	0.239	112.4%	47,058,824	0.143	71.1%
	Non-Coastal	Inland	38	1,788,235,294	3,800,000	2,881,795	2,402,225	154,442	**325,128**	2,556,667	0.213	0.161	75.8%	47,058,824	0.143	13.5%
Texas	Coastal	Seacoast 2	38	1,788,235,294	3,800,000	5,274,954	2,440,819	585,696	**2,248,439**	3,026,515	0.213	0.295	138.8%	47,058,824	0.169	92.1%
	Non-Coastal	Central	38	1,788,235,294	3,800,000	2,895,825	2,277,866	481,800	**136,158**	2,759,666	0.213	0.162	76.2%	47,058,824	0.154	6.0%
Vermont	Coastal	Entire State	38	1,788,235,294	3,800,000	3,253,383	3,211,564	25,365	**16,453**	3,236,929	0.213	0.182	85.6%	47,058,824	0.181	0.5%
	Non-Coastal	Entire State	38	1,788,235,294	3,800,000	3,253,383	3,211,564	25,365	**16,453**	3,236,929	0.213	0.182	85.6%	47,058,824	0.181	0.5%
Virginia	Coastal	Territory III	38	1,788,235,294	3,800,000	1,949,904	1,525,150	97,232	**327,522**	1,622,383	0.213	0.109	51.3%	47,058,824	0.091	21.5%
	Non-Coastal	Territory I	38	1,788,235,294	3,800,000	2,165,521	2,018,683	89,637	**57,201**	2,108,321	0.213	0.121	57.0%	47,058,824	0.118	2.8%
Grand Total			**1,596**	**75,105,882,353**	**159,600,000**	**130,546,933**	**88,264,829**	**8,256,271**	**34,025,833**	**96,521,100**	**0.212**	**0.174**	**81.8%**	**47,058,824**	**0.129**	**38.5%**
						Check	130,546,933									

Attritional / Minor / Major Cats-HU Analysis

A. Hurricane State Rollups (22 States) – Coastal / Non-coastal

Illustrative

IRV v6.5 (Portal 2019-1H, PSOLD2017)

IRV Summary - Total and Detail Loss Costs

New Portal DB HU States tets / Coastal vs. Non-Coastal
Portal DB 2019-1H

Coastal/Non-Coastal	# of Exposures	Total B+C+TE	Actual Premium	IRV Total Gross Loss Costs (iHU)	IRV Attritional Expected Loss	IRV Minor Cat Expected Loss	Total LC HU iTE	IRV Total Gross Loss Costs (xHU)	Prem / AOI	GULC (iHU) / AOI	ELR	Per Risk Avg AOI	GULC (xHU) / AOI	HU/Attr %
Coastal	836	39,341,176,471	83,600,000	81,906,001	46,048,944	4,310,880	31,546,177	50,359,824	0.213	0.208	98.0%	47,058,824	0.128	68.5%
Non-Coastal	760	35,764,705,882	76,000,000	48,640,932	42,215,885	3,945,391	2,479,656	46,161,277	0.213	0.136	64.0%	47,058,824	0.129	5.9%
Grand Total	**1,596**	**75,105,882,353**	**159,600,000**	**130,546,933**	**88,264,829**	**8,256,271**	**34,025,833**	**96,521,100**	**0.212**	**0.174**	**81.8%**	**47,058,824**	**0.129**	**38.5%**
				Check	130,546,933									

B. Non-Hurricane State Rollups (29 States) – Low / High BG1

IRV v6.5 (Portal 2019-1H, PSOLD2017)

IRV Summary - Total and Detail Loss Costs

New Portal DB / Non HU states /occupancy test - BG1 Lowest/Highest LC
Portal DB 2019-1H

States	# of Exposures	Total B+C+TE	Actual Premium	IRV Total Gross Loss Costs	IRV Attritional Expected Loss	IRV Minor Cat Expected Loss	Total LC HU	Prem / AOI	GULC / AOI	ELR	Per Risk Avg AOI
Non-Hurricane States - BG1 Lowest LC	1,102	51,858,823,529	110,200,000	58,327,940	52,184,303	6,143,638	-	0.213	0.112	52.9%	47,058,824
Non-Hurricane States - BG1 Highest LC	1,102	51,858,823,529	110,200,000	73,597,378	67,242,815	6,354,563	-	0.213	0.142	66.8%	47,058,824
Grand Total	**3,306**	**155,576,470,588**	**330,600,000**	**190,253,258**	**171,611,420**	**18,641,838**	**-**	**0.002**	**0.001**	**57.5%**	**47,058,824**

Rolling up the results across the HU and non-HU states illustrates the large differences in attritional, minor, and major (HU) cat results.

C. State Ranking Rollups (7 Groupings) – Very Low to Severe States by Peril

IRV v6.5 (Portal 2019-1H, PSOLD2017)

IRV Summary - Total and Detail Loss Costs

New Portal DB / All states/occupancy test
Portal DB 2019-1H

State/Nominal Region	# of Exposures	Total B+C+TE	Actual Premium	IRV Total Gross Loss Costs (iHU)	IRV Attritional Expected Loss	IRV Minor Cat Expected Loss	Total LC HU iTE	IRV Total Gross Loss Costs (xHU)	Prem / AOI	GULC(iHU) / AOI	ELR	Per Risk Avg AOI	GULC (xHU) / AOI	HU/Attr %
Very Low States	38	1,788,235,294	3,800,000	912,837	778,028	79,165	55,644	857,193	0.213	0.051	24.0%	47,058,824	0.048	7.2%
Low States	38	1,788,235,294	3,800,000	1,167,617	960,736	113,056	93,825	1,073,792	0.213	0.065	30.7%	47,058,824	0.060	9.8%
Medium Low States	38	1,788,235,294	3,800,000	1,595,526	1,307,433	162,911	125,182	1,470,344	0.213	0.089	42.0%	47,058,824	0.082	9.6%
Medium States	38	1,788,235,294	3,800,000	2,068,942	1,647,895	210,132	210,915	1,858,027	0.213	0.116	54.4%	47,058,824	0.104	12.8%
Medium High States	38	1,788,235,294	3,800,000	2,832,082	2,187,613	278,271	366,198	2,465,884	0.213	0.158	74.5%	47,058,824	0.138	16.7%
High States	38	1,788,235,294	3,800,000	4,093,272	2,929,093	463,377	700,803	3,392,469	0.213	0.229	107.7%	47,058,824	0.190	23.9%
Severe States	38	1,788,235,294	3,800,000	5,958,738	3,813,374	653,951	1,491,413	4,467,324	0.213	0.333	156.8%	47,058,824	0.250	39.1%
Grand Total	**266**	**12,517,647,059**	**26,600,000**	**18,629,012**	**13,624,171**	**1,960,861**	**3,043,980**	**15,585,033**	**0.213**	**0.149**	**70.0%**	**47,058,824**	**0.125**	**22.3%**

Property Per Risk and Cat
A Deeper Dive

Excess Layering

First Loss Scale Illustration

Linking Amount of Insurance to Loss Size for Layering

Illustrative

% of AOI	% of Loss
0.0%	0.0%
10.0%	40.0%
20.0%	50.0%
25.0%	**60.0%**
30.0%	65.0%
40.0%	70.0%
50.0%	**75.0%**
60.0%	80.0%
70.0%	85.0%
80.0%	90.0%
90.0%	96.0%
100.0%	100.0%

AOI = $20,000,000 (insured value)

What is the charge for $5M excess of $5M?

- **Layer attachment point: $5M / $20M = 25%; per scale, 60% of losses are less than or equal to 25% of AOI. Therefore, 60% of the total ground-up loss costs pays for losses related to the first $5M of building value**
- **Layer limit: $10M / $20M =50%; per scale, 75% of the ground-up losses pays the losses for the first $10M of building value**
- **Layer charge: would want to collect 15% (75.0%-60.0%) of the total ground-up expected loss costs for the $5M excess of $5M layer.**

Therefore, if the total expected losses for this building was $40,000, then the amount for the excess layer would be $6,000 (15% x $40,000)

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A Survey of Property Size of Loss Curves

Many different curves, with varying levels of credibility and transparency, have been used over the decades.

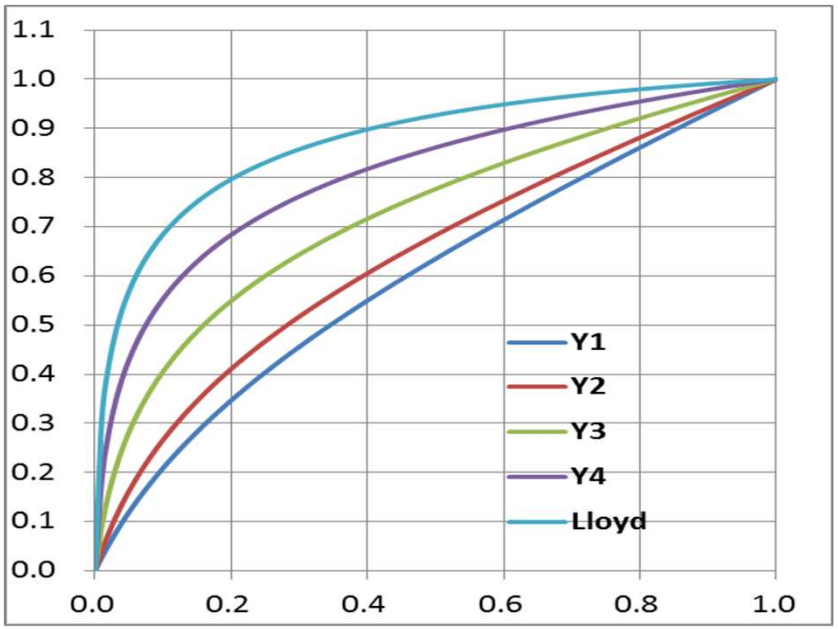
- **The Issues:**
  - Plausible curves need to rely on link between losses and their exposed amounts of insurance
  - Curves vary substantially by Amount of Insurance, occupancy, peril, territory, etc.
  - How are submission profiles produced and how are the curves applied – AOI, TIV, MPL, PML,…
- **Lloyd's Scales** *(World War II-unknown)*
- **Salzman Scales** *(1960 – personal property)*
- **Ludwig Tables** *(mid 1980s – one company HO and small CP)*
- **Various Reinsurer Based Scales**
  - Swiss Re, Munich Re, Skandia, Frankona, Cologne Re, Employers Re, brokers,…
- **MBBEFD Approximations** *(1990s - S. Bernegger)*
  - Modeling loss severity with distributions from Physics (aka Swiss Re Y1 to Y4,…)
- **Extreme Value Theory** *(1990s- G. Ramachandran)*
  - Factors affecting Fire Loss – Multiple regression models
- **ISO – PSOLD**
  - First issued late 1990s
  - Based on 25 years of collected premium and loss information that is linked to original AOI, etc.
  - Uses over 50M individual policies, 235B ground-up losses, 38T AOI, 230 ISO class codes, 60 AOI bands up to 1B and 5M individual claims
  - Now contains over 7M curves, including component curves by coverage / peril

Source: CS2 International Property – June 2013
Perspectives from America: The Missing link: Rating property exposure globally – May 2012 by John Buchanan

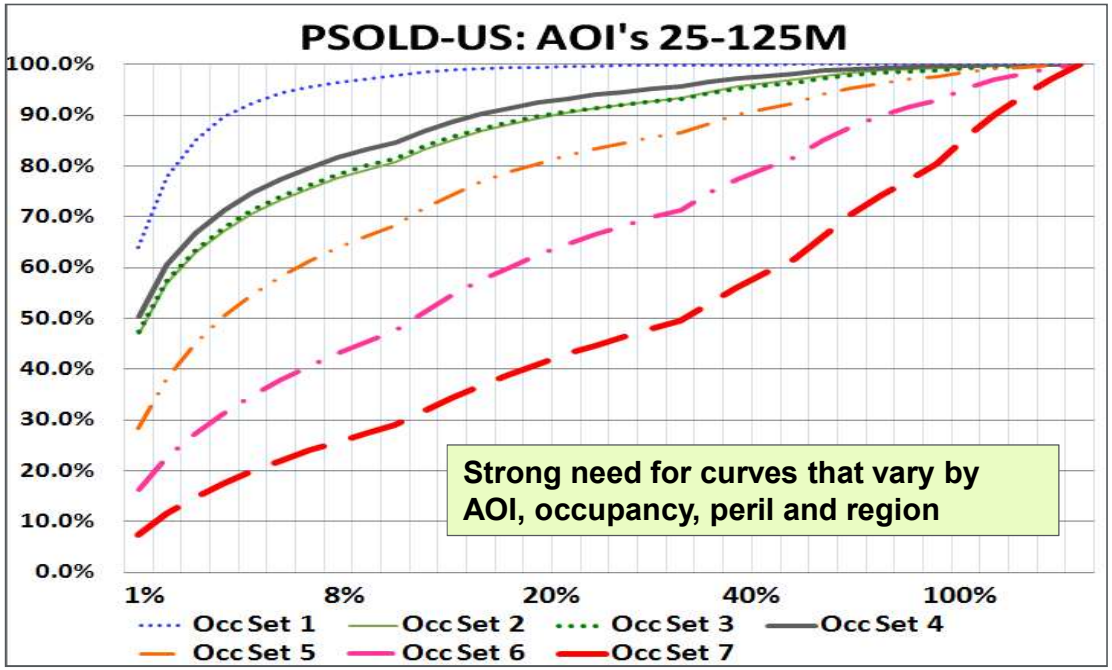
First Loss Scales Comparisons - Illustrative

Scales should vary by AOI, Occupancy, etc.

Illustrative



China Re-CPCR curve comparison MBBEFD (Swiss Re Y1-Y4 parametric approximation)
Lloyd's empirical from unknown data source



PSOLD uses over 5M individual linked losses and exposures to generate curves for 60 AOI bands, 38 occupancies, 4 sets of perils, 50 states, gross/net of deductible, etc.

21

Sample PSOLD Curve Volumes and Average Severities by AOI Band

2014 vs. 2017 – Apts/Condos <10 Units

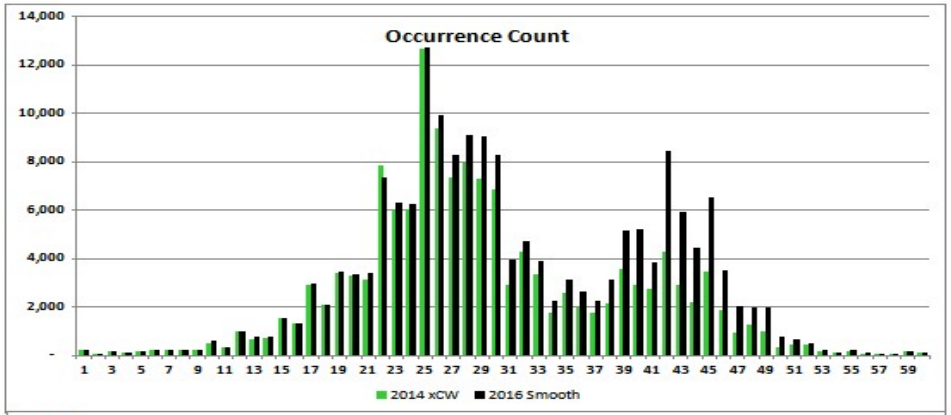
Illustrative

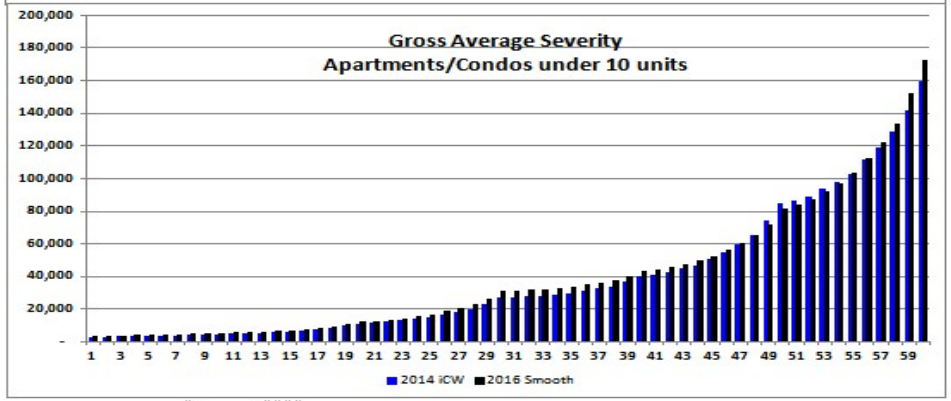
Fitted average severities vary by AOI band. In this low hazard category, they range from 10k to 100k between AOI bands of 100,000 to 250M.

	AOI Group Min	AOI Group Max	2014 xCW Occurrence	2017 Smooth Occurrence	2014 iCW Avg Sev	2017 Smooth Avg Sev
1	0	2,000	214	198	2,498	3,041
2	2,001	3,000	44	54	2,696	3,218
3	3,001	4,000	174	176	2,850	3,464
4	4,001	5,000	108	107	3,044	3,662
5	5,001	6,000	152	166	3,223	3,883
6	6,001	7,000	223	200	3,414	4,103
7	7,001	8,000	180	221	3,597	4,311
8	8,001	9,000	188	221	3,767	4,538
9	9,001	10,000	222	214	3,965	4,759
10	10,001	13,000	488	579	4,258	5,091
11	13,001	15,000	312	289	4,430	5,274
12	15,001	20,000	958	967	4,646	5,508
13	20,001	25,000	646	760	4,996	5,858
14	25,001	30,000	692	766	5,322	6,211
15	30,001	40,000	1,501	1,526	5,809	6,724
16	40,001	50,000	1,313	1,323	6,494	7,424
17	50,001	60,000	2,911	2,952	7,108	8,187
18	60,001	75,000	2,071	2,046	7,975	9,004
19	75,001	100,000	3,386	3,440	9,308	10,404
20	100,001	125,000	3,289	3,321	10,827	11,995
21	125,001	150,000	3,091	3,403	11,207	12,459
22	150,001	200,000	7,839	7,348	11,793	13,176
23	200,001	250,000	5,964	6,309	12,592	14,118
24	250,001	300,000	6,010	6,214	13,370	15,076
25	300,001	400,000	12,627	12,675	14,551	16,484
26	400,001	500,000	9,376	9,920	16,141	18,353
27	500,001	600,000	7,301	8,245	17,655	20,238
28	600,001	750,000	7,910	9,093	19,593	22,576
29	750,001	1,000,000	7,271	9,028	22,622	26,183
30	1,000,001	1,250,000	6,839	8,261	26,375	30,685
31	1,250,001	1,500,000	2,900	3,929	26,710	30,981
32	1,500,001	2,000,000	4,273	4,675	27,199	31,435
33	2,000,001	2,500,000	3,333	3,848	27,819	32,049
34	2,500,001	3,000,000	1,719	2,216	28,509	32,671
35	3,000,001	4,000,000	2,566	3,123	29,435	33,560
36	4,000,001	5,000,000	1,966	2,616	30,757	34,833
37	5,000,001	6,000,000	1,722	2,251	32,103	36,091
38	6,000,001	7,500,000	2,113	3,106	33,671	37,594
39	7,500,001	10,000,000	3,522	5,139	36,335	40,080
40	10,000,001	12,500,000	2,879	5,175	39,418	42,958
41	12,500,001	15,000,000	2,724	3,839	40,543	43,919
42	15,000,001	20,000,000	4,263	8,404	42,117	45,272
43	20,000,001	25,000,000	2,880	5,882	44,487	47,275
44	25,000,001	30,000,000	2,152	4,414	46,663	49,188
45	30,000,001	40,000,000	3,434	6,497	50,058	52,105
46	40,000,001	50,000,000	1,861	3,469	54,526	55,866
47	50,000,001	60,000,000	914	1,997	59,053	59,860
48	60,000,001	75,000,000	1,267	1,979	64,914	64,586
49	75,000,001	100,000,000	950	1,970	73,968	71,802
50	100,000,001	125,000,000	339	734	84,175	81,320
51	125,000,001	150,000,000	408	654	86,306	83,602
52	150,000,001	200,000,000	433	489	88,938	87,018
53	200,000,001	250,000,000	137	181	93,233	92,031
54	250,000,001	300,000,000	84	104	97,588	96,302
55	300,000,001	400,000,000	161	226	102,703	102,896
56	400,000,001	500,000,000	68	74	110,894	112,511
57	500,000,001	600,000,000	57	47	118,319	122,220
58	600,000,001	750,000,000	47	42	128,427	132,933
59	750,000,001	1,000,000,000	137	149	141,715	152,179
60	1,000,000,001	and above	98	101	159,642	172,368
			142,708	177,350	23,968	29,643

Note: PSOLD CP 2017 =PSOLD 2016 with smoothing (released with IRV v5-1/2018)

Rating Group: Apartments/Condos under 10 units





#= ####

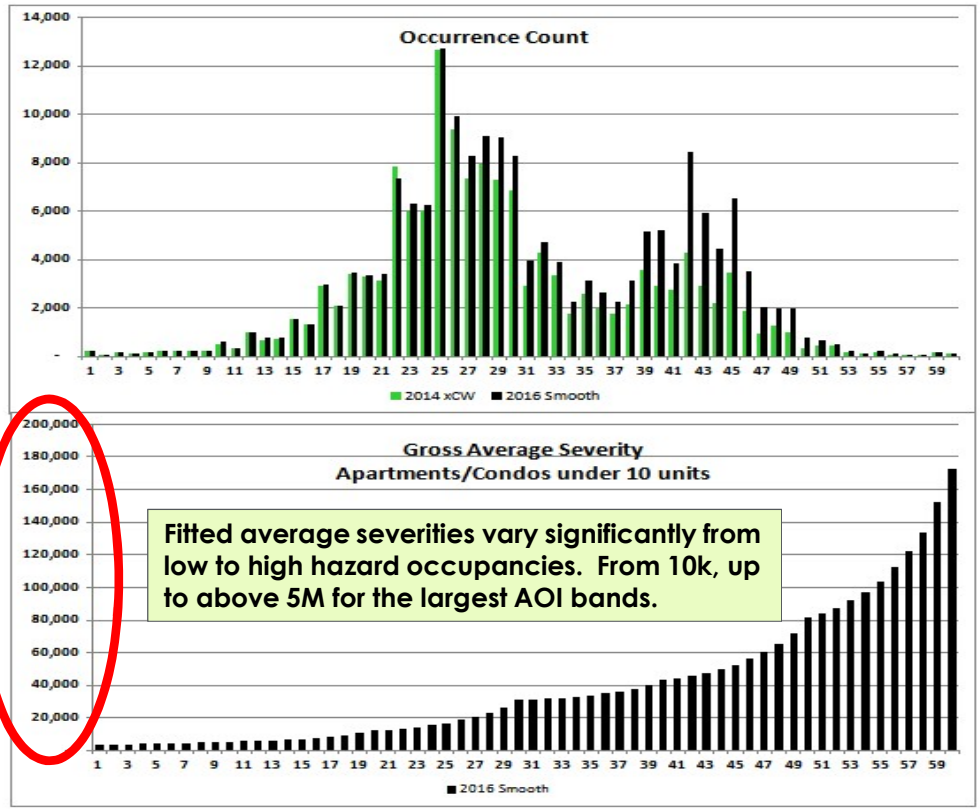
Note: Values shown may not match options selected

PSOLD 2017 – Sample Counts and Curve Comparison

Apts<10 units vs. Severe Manufacturing

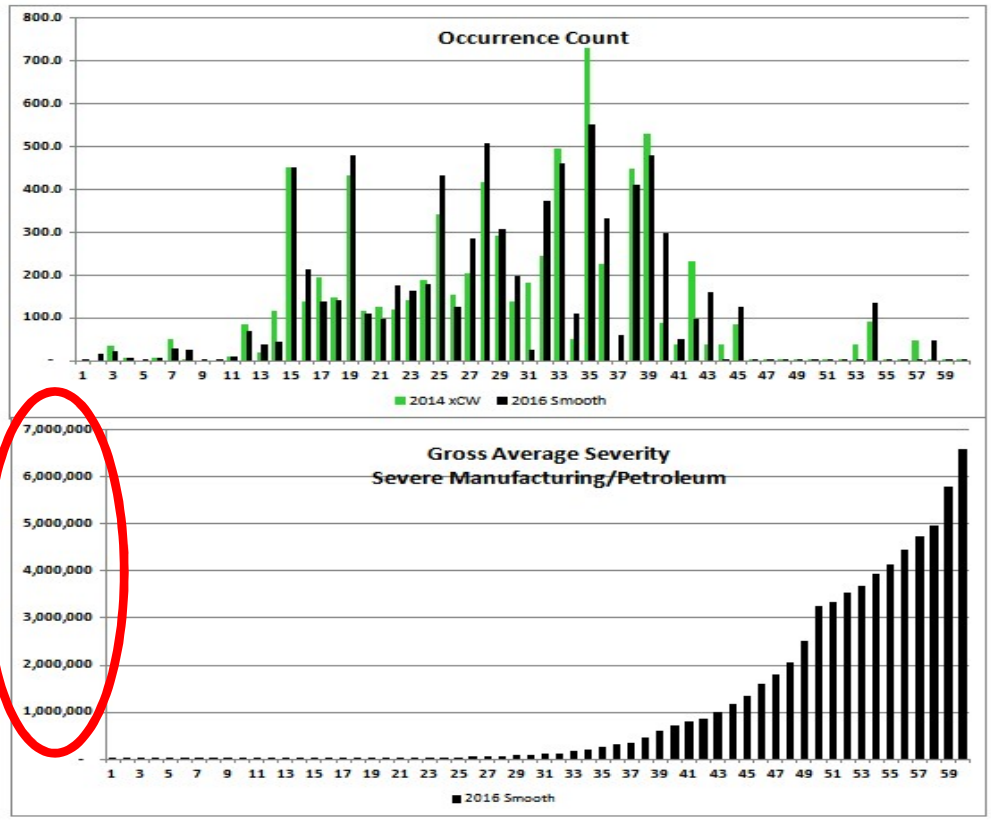
Illustrative

Rating Group: Apartments/Condos under 10 units



Fitted average severities vary significantly from low to high hazard occupancies. From 10k, up to above 5M for the largest AOI bands.

Rating Group: Severe Manufacturing/Petroleum



Note: Values shown may not match options selected

PSOLD Components – Gross
All Occupancies (including smoothed curves)

Illustrative

PSOLD 2017 Excess Claims Frequency per $1B Premium by Peril - All Occupancies - Gross

Curve fits vary significantly by coverage and peril component. For example, there are far fewer large SCL contents claims than there are across all perils.

Layer Width	XS	Retention	Att All Perils B+C+TE Excess Claims	Att All Perils Buildings Excess Claims	Att All Perils Contents Excess Claims	Att All Perils B+C Excess Claims	Att BG1 B+C+TE Excess Claims	Att BG1 Buildings Excess Claims	Att BG1 Contents Excess Claims	Att BG1 B+C Excess Claims
Total Occurrence Count			5,181,247	2,693,416	1,922,312	5,188,674	1,983,599	1,093,199	521,963	1,804,090
5,000	XS	10,000	2.392	1.857	1.881	2.276	3.107	2.379	2.570	2.953
10,000	XS	15,000	1.174	0.872	0.905	1.114	1.470	1.076	1.201	1.388
25,000	**XS**	**25,000**	**0.478**	**0.349**	**0.348**	**0.447**	**0.575**	**0.417**	**0.432**	**0.536**
30,000	XS	50,000	0.133	0.103	0.067	0.117	0.137	0.111	0.069	0.123
20,000	XS	80,000	0.066	0.051	0.022	0.053	0.062	0.049	0.024	0.054
50,000	**XS**	**100,000**	**0.048**	**0.037**	**0.012**	**0.037**	**0.044**	**0.033**	**0.016**	**0.039**
50,000	XS	150,000	0.024	0.018	0.003	0.018	0.022	0.015	0.006	0.019
50,000	XS	200,000	0.014	0.011	0.001	0.010	0.013	0.008	0.003	0.011
150,000	XS	250,000	0.008	0.007	0.001	0.006	0.008	0.005	0.002	0.007
100,000	XS	400,000	0.002	0.002	0.000	0.001	0.002	0.001	0.000	0.002
500,000	XS	500,000	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.001

Layer Width	XS	Retention	Att BG2 B+C+TE Excess Claims	Att BG2 Buildings Excess Claims	Att BG2 Contents Excess Claims	Att BG2 B+C Excess Claims	Att SCL B+C+TE Excess Claims	Att SCL Buildings Excess Claims	Att SCL Contents Excess Claims	Att SCL B+C Excess Claims
Total Occurrence Count			1,125,114	690,842	228,561	1,031,397	2,739,098	947,110	1,209,420	2,510,137
5,000	XS	10,000	1.766	0.944	2.983	1.705	1.000	1.130	0.725	0.950
10,000	XS	15,000	1.004	0.542	1.802	0.983	0.536	0.645	0.403	0.501
25,000	**XS**	**25,000**	**0.572**	**0.327**	**0.939**	**0.584**	**0.263**	**0.336**	**0.167**	**0.244**
30,000	XS	50,000	0.283	0.162	0.285	0.274	0.097	0.105	0.047	0.086
20,000	XS	80,000	0.165	0.092	0.098	0.147	0.042	0.041	0.021	0.033
50,000	**XS**	**100,000**	**0.128**	**0.070**	**0.057**	**0.110**	**0.027**	**0.024**	**0.014**	**0.019**
50,000	XS	150,000	0.070	0.036	0.017	0.056	0.010	0.008	0.006	0.005
50,000	XS	200,000	0.041	0.022	0.007	0.033	0.005	0.003	0.003	0.002
150,000	XS	250,000	0.024	0.013	0.003	0.019	0.002	0.002	0.002	0.001
100,000	XS	400,000	0.005	0.003	0.001	0.004	0.000	0.000	0.000	0.000
500,000	XS	500,000	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.000

Note: Total Gross AOI = $38.0T, Total Gross Loss $235.5B

Relationship of COPE Ground-Up and Excess Factors

For ground-up pricing, selecting different protections (PPC) and constructions (Frame vs. Fire Resistive) has a significant impact on the ground-up loss costs. The ground-up factor range is about 3.0 between the best (PPC=1, Fire Resistive) and worst (PPC=10-unprotected, Frame). That is, ground-up pricing for a 50M building may range from 50k to 150k just due to those components of COPE.

An interesting pricing and engineering question arises as to how do those significant ground-up pricing factors translate into scalars for excess pricing. In other words, if a building is poorly constructed and not well protected, how much additionally are the ground-up losses going to also translate proportionately to higher excess losses. An attempt may then be made to scale up the first loss scales to account for a higher proportion of large (or total) losses due to poor construction and/or no protection.

Illustrative

PSOLD COPE Excess Scalars - Reference Table (Attritional)

	PPC												
BG1 Construction	1	2	3	4	5	6	7	8	8B	9	10	Blank PPC=5	Total Weighted Construction Scalar
Frame	1.09	1.11	1.14	1.15	1.16	1.20	1.26	1.33	1.36	1.47	1.72	1.16	1.290
Joisted Masonry	1.02	1.05	1.07	1.08	1.09	1.12	1.18	1.24	1.27	1.35	1.56	1.09	1.159
Non-Combustible	0.97	1.00	1.01	1.02	1.03	1.06	1.12	1.17	1.19	1.26	1.43	1.03	1.050
Masonry Non-Combustible	0.89	0.91	0.93	0.94	0.95	0.97	1.02	1.07	1.09	1.13	1.28	0.95	0.873
Modified Fire Resistive	0.89	0.91	0.93	0.94	0.94	0.97	1.02	1.06	1.08	1.12	1.26	0.94	0.867
Fire Resistive	0.87	0.89	0.90	0.91	0.92	0.94	0.99	1.03	1.05	1.08	1.21	0.92	0.813
Blank: Non-Combustible	0.97	1.00	1.01	1.02	1.03	1.06	1.12	1.17	1.19	1.26	1.43	1.00	
Total Weighted PPC Scalar	0.902	0.943	0.982	1.000	1.020	1.080	1.196	1.314	1.373	1.433	1.727		

Min PPC, Construction	0.73
Max PPC, Construction	2.23
Range Max/Min	3.04

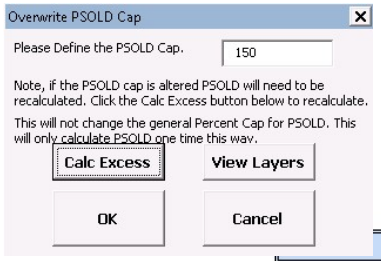
Layering Example 5 Risks / 4 Layers Each with Ground-up Loss Estimates

Illustrative

			Total AOI:	890,000,000	3,560,000,000	Deductible:	0	Total Gross LS:	720,523	2,882,090
Orig Sort	Country - Region	Description/Record Index	Building AOI ($)	Contents AOI ($)	Total B&C AOI ($)	Time Element AOI ($)	PSOLD: Syndication Entry Point	PSOLD: Syndication Exit Point	PSOLD: Syndication % Share	IRV Total Gross Loss Costs
1	United States	Office - Layer 1	20,000,000	5,000,000	25,000,000	5,000,000	-	50,000,000	20.0%	18,513
2	United States	Office - Layer 2	20,000,000	5,000,000	25,000,000	5,000,000	50,000,000	100,000,000	20.0%	18,513
3	United States	Office - Layer 2	20,000,000	5,000,000	25,000,000	5,000,000	100,000,000	250,000,000	20.0%	18,513
4	United States	Office - Layer 4	20,000,000	5,000,000	25,000,000	5,000,000	250,000,000	500,000,000	20.0%	18,513
5	United States	Storage - Layer 1	30,000,000	20,000,000	50,000,000	10,000,000	-	50,000,000	20.0%	47,521
6	United States	Storage - Layer 2	30,000,000	20,000,000	50,000,000	10,000,000	50,000,000	100,000,000	20.0%	47,521
7	United States	Storage - Layer 3	30,000,000	20,000,000	50,000,000	10,000,000	100,000,000	250,000,000	20.0%	47,521
8	United States	Storage - Layer 4	30,000,000	20,000,000	50,000,000	10,000,000	250,000,000	500,000,000	20.0%	47,521
9	United States	Medium Manufacturing - Layer 1	150,000,000	50,000,000	200,000,000	50,000,000	-	50,000,000	20.0%	170,303
10	United States	Medium Manufacturing - Layer 2	150,000,000	50,000,000	200,000,000	50,000,000	50,000,000	100,000,000	20.0%	170,303
11	United States	Medium Manufacturing - Layer 3	150,000,000	50,000,000	200,000,000	50,000,000	100,000,000	250,000,000	20.0%	170,303
12	United States	Medium Manufacturing - Layer 4	150,000,000	50,000,000	200,000,000	50,000,000	250,000,000	500,000,000	20.0%	170,303
13	United States	High Hazard HPR - Layer 1	150,000,000	50,000,000	200,000,000	50,000,000	-	50,000,000	20.0%	142,550
14	United States	High Hazard HPR - Layer 2	150,000,000	50,000,000	200,000,000	50,000,000	50,000,000	100,000,000	20.0%	142,550
15	United States	High Hazard HPR - Layer 3	150,000,000	50,000,000	200,000,000	50,000,000	100,000,000	250,000,000	20.0%	142,550
16	United States	High Hazard HPR - Layer 4	150,000,000	50,000,000	200,000,000	50,000,000	250,000,000	500,000,000	20.0%	142,550
17	United States	Energy - Layer 1	200,000,000	50,000,000	250,000,000	50,000,000	-	50,000,000	20.0%	341,635
18	United States	Energy - Layer 2	200,000,000	50,000,000	250,000,000	50,000,000	50,000,000	100,000,000	20.0%	341,635
19	United States	Energy - Layer 3	200,000,000	50,000,000	250,000,000	50,000,000	100,000,000	250,000,000	20.0%	341,635
20	United States	Energy - Layer 4	200,000,000	50,000,000	250,000,000	50,000,000	250,000,000	500,000,000	20.0%	341,635

PSOLD Layering – Before Shares / Deductibles

Illustrative



Experience Period (adj):		5.0						
Expected Claim Counts - Exper Period		0.33	0.20	0.08	0.04	0.04	0.02	0.01
100.0%	37.5%	9.2%	13.9%	10.4%	2.8%	8.3%	14.4%	3.5%
Return Period:		15.1	25.1	59.7	120.8	140.3	214.6	748.7
Layer Frequency:		0.066	0.040	0.017	0.008	0.007	0.005	0.001

		$ 2,882,090	Layer Deductible						
		$ 2,882,090	$0	Participation Percentage (Using PSOLD detail results - All Years)					
TOTALS		$ -	$ 55,112,980	100%	100%	100%	100%	100%	100%	100%	100%
20	$ 3,560,000,000	$ 2,755,649	$ 2,755,649	$ 1,032,647	$ 253,775	$ 382,704	$ 285,332	$ 76,632	$ 229,590	$ 397,630	$ 97,339

ISO Rapid Valuator - Outputs		PSOLD Input	PSOLD Output	PSOLD Outputs - Attritional (Layers in 000s)							
Description/Record Index	Buildings + Content AOI	PSOLD-Gross Attritional Losses	PSOLD-Net Attritional Losses	Base - 5,000 XS 0	Sub1 - 5,000 XS 5,000	Sub2 - 15,000 XS 10,000	Sub3 - 25,000 XS 25,000	Layer1 - 10,000 XS 50,000	Layer2 - 40,000 XS 60,000	Layer3 - 150,000 XS 100,000	Layer4 - 750,000 XS 250,000
1: Office - Layer 1	$ 25,000,000	$ 16,879	$ 16,879	$ 14,281	$ 1,316	$ 972	$ 309	$ -	$ -	$ -	$ -
2: Office - Layer 2	$ 25,000,000	$ 16,879	$ 16,879	$ 14,281	$ 1,316	$ 972	$ 309	$ -	$ -	$ -	$ -
3: Office - Layer 2	$ 25,000,000	$ 16,879	$ 16,879	$ 14,281	$ 1,316	$ 972	$ 309	$ -	$ -	$ -	$ -
4: Office - Layer 4	$ 25,000,000	$ 16,879	$ 16,879	$ 14,281	$ 1,316	$ 972	$ 309	$ -	$ -	$ -	$ -
5: Storage - Layer 1	$ 50,000,000	$ 44,279	$ 44,279	$ 32,796	$ 3,694	$ 3,906	$ 2,392	$ 562	$ 929	$ -	$ -
6: Storage - Layer 2	$ 50,000,000	$ 44,279	$ 44,279	$ 32,796	$ 3,694	$ 3,906	$ 2,392	$ 562	$ 929	$ -	$ -
7: Storage - Layer 3	$ 50,000,000	$ 44,279	$ 44,279	$ 32,796	$ 3,694	$ 3,906	$ 2,392	$ 562	$ 929	$ -	$ -
8: Storage - Layer 4	$ 50,000,000	$ 44,279	$ 44,279	$ 32,796	$ 3,694	$ 3,906	$ 2,392	$ 562	$ 929	$ -	$ -
9: Medium Manufacturing - Layer 1	$ 200,000,000	$ 161,123	$ 161,123	$ 123,824	$ 14,851	$ 14,750	$ 5,514	$ 695	$ 1,044	$ 436	$ 8
10: Medium Manufacturing - Layer 2	$ 200,000,000	$ 161,123	$ 161,123	$ 123,824	$ 14,851	$ 14,750	$ 5,514	$ 695	$ 1,044	$ 436	$ 8
11: Medium Manufacturing - Layer 3	$ 200,000,000	$ 161,123	$ 161,123	$ 123,824	$ 14,851	$ 14,750	$ 5,514	$ 695	$ 1,044	$ 436	$ 8
12: Medium Manufacturing - Layer 4	$ 200,000,000	$ 161,123	$ 161,123	$ 123,824	$ 14,851	$ 14,750	$ 5,514	$ 695	$ 1,044	$ 436	$ 8
13: High Hazard HPR - Layer 1	$ 200,000,000	$ 133,370	$ 133,370	$ 26,064	$ 12,951	$ 22,356	$ 18,161	$ 5,092	$ 15,708	$ 28,017	$ 5,022
14: High Hazard HPR - Layer 2	$ 200,000,000	$ 133,370	$ 133,370	$ 26,064	$ 12,951	$ 22,356	$ 18,161	$ 5,092	$ 15,708	$ 28,017	$ 5,022
15: High Hazard HPR - Layer 3	$ 200,000,000	$ 133,370	$ 133,370	$ 26,064	$ 12,951	$ 22,356	$ 18,161	$ 5,092	$ 15,708	$ 28,017	$ 5,022
16: High Hazard HPR - Layer 4	$ 200,000,000	$ 133,370	$ 133,370	$ 26,064	$ 12,951	$ 22,356	$ 18,161	$ 5,092	$ 15,708	$ 28,017	$ 5,022
17: Energy - Layer 1	$ 250,000,000	$ 333,261	$ 333,261	$ 61,196	$ 30,632	$ 53,691	$ 44,957	$ 12,810	$ 39,717	$ 70,954	$ 19,304
18: Energy - Layer 2	$ 250,000,000	$ 333,261	$ 333,261	$ 61,196	$ 30,632	$ 53,691	$ 44,957	$ 12,810	$ 39,717	$ 70,954	$ 19,304
19: Energy - Layer 3	$ 250,000,000	$ 333,261	$ 333,261	$ 61,196	$ 30,632	$ 53,691	$ 44,957	$ 12,810	$ 39,717	$ 70,954	$ 19,304
20: Energy - Layer 4	$ 250,000,000	$ 333,261	$ 333,261	$ 61,196	$ 30,632	$ 53,691	$ 44,957	$ 12,810	$ 39,717	$ 70,954	$ 19,304

PSOLD Layering – After Shares / Before Deductibles

Illustrative

		$ 2,882,090	Tot IRV value												
		$ 2,882,090	Att + Minor			Layer Deductible:		$0	Participation Percentage (Using PSOLD detail results - All Years)						
TOTALS		$ -	Major Cat				Check:	$ 2,755,649	100%	100%	100%	100%	100%	100%	100%
20	$ 3,560,000,000	$ 2,755,649	$ 126,441			Net after shares, partic, deductibles:		$ 137,782	$ 51,580	$ 12,663	$19,090	$14,229	$ 3,821	$11,446	$ 19,821	$ 5,133
ISO Rapid Valuator - Outputs		PSOLD Input	PSOLD Input					PSOLD Output	PSOLD Outputs - Attritional (Layers in 000s)							
Description/Record Index	Buildings + Content AOI	PSOLD-Gross Attritional Losses	PSOLD-Gross Minor Cat Losses	Entry Point	Exit Point	Percent Share		PSOLD-Net Attritional Losses	Base - 5,000 XS 0	Sub1 - 5,000 XS 5,000	Sub2 - 15,000 XS 10,000	Sub3 - 25,000 XS 25,000	Layer1 - 10,000 XS 50,000	Layer2 - 40,000 XS 60,000	Layer3 - 150,000 XS 100,000	Layer4 - 750,000 XS 250,000
1: Office - Layer 1	$ 25,000,000	$ 16,879	$ 1,634		$ 50,000,000	20.0%		$ 3,376	$ 2,856	$ 263	$ 194	$ 62	$ -	$ -	$ -	$ -
2: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 50,000,000	$100,000,000	20.0%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 100,000,000	$250,000,000	20.0%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4: Office - Layer 4	$ 25,000,000	$ 16,879	$ 1,634	$ 250,000,000	$500,000,000	20.0%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5: Storage - Layer 1	$ 50,000,000	$ 44,279	$ 3,243		$ 50,000,000	20.0%		$ 8,558	$ 6,559	$ 739	$ 781	$ 478	$ -	$ -	$ -	$ -
6: Storage - Layer 2	$ 50,000,000	$ 44,279	$ 3,243	$ 50,000,000	$100,000,000	20.0%		$ 298	$ -	$ -	$ -	$ -	$ 112	$ 186	$ -	$ -
7: Storage - Layer 3	$ 50,000,000	$ 44,279	$ 3,243	$ 100,000,000	$250,000,000	20.0%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8: Storage - Layer 4	$ 50,000,000	$ 44,279	$ 3,243	$ 250,000,000	$500,000,000	20.0%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9: Medium Manufacturing - Layer 1	$ 200,000,000	$ 161,123	$ 9,180		[illegible]	20.0%		$ 31,788	$ 24,765	$ 2,970	$ 2,950	$ 1,103	$ -	$ -	$ -	$ -
10: Medium Manufacturing - Layer 2	$ 200,000,000	$ 161,123	$ 9,180	[illegible]	$100,000,000	20.0%		$ 348	$ -	$ -	$ -	$ -	$ 139	$ 209	$ -	$ -
11: Medium Manufacturing - Layer 3	$ 200,000,000	$ 161,123	$ 9,180	$ 100,000,000	$250,000,000	20.0%		$ 87	$ -	$ -	$ -	$ -	$ -	$ -	$ 87	$ -
12: Medium Manufacturing - Layer 4	$ 200,000,000	$ 161,123	$ 9,180	[illegible]	$500,000,000	20.0%		$ 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2
13: High Hazard HPR - Layer 1	$ 200,000,000	$ 133,370	$ 9,180		$ 50,000,000	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$ -	$ -	$ -	$ -
14: High Hazard HPR - Layer 2	$ 200,000,000	$ 133,370	$ 9,180	$ 50,000,000	$100,000,000	20.0%		$ 4,160	$ -	$ -	$ -	$ -	$ 1,018	$ 3,142	$ -	$ -
15: High Hazard HPR - Layer 3	$ 200,000,000	$ 133,370	$ 9,180	$ 100,000,000	$250,000,000	20.0%		$ 5,603	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,603	$ -
16: High Hazard HPR - Layer 4	$ 200,000,000	$ 133,370	$ 9,180	$ 250,000,000	$500,000,000	20.0%		$ 1,004	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,004
17: Energy - Layer 1	$ 250,000,000	$ 333,261	$ 8,374		$ 50,000,000	20.0%		$ 37,934	$ 12,187	$ 6,100	$ 10,693	$ 8,953	$ -	$ -	$ -	$ -
18: Energy - Layer 2	$ 250,000,000	$ 333,261	$ 8,374	$ 50,000,000	$100,000,000	20.0%		$ 10,461	$ -	$ -	$ -	$ -	$ 2,551	$ 7,910	$ -	$ -
19: Energy - Layer 3	$ 250,000,000	$ 333,261	$ 8,374	$ 100,000,000	$250,000,000	20.0%		$ 14,131	$ -	$ -	$ -	$ -	$ -	$ -	$ 14,131	$ -
20: Energy - Layer 4	$ 250,000,000	$ 333,261	$ 8,374	$ 250,000,000	$500,000,000	20.0%		$ 4,127	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,127

PSOLD Layering – After Shares / After $10M Policy Deductible

Illustrative

		$ 2,882,090	Tot IRV value												
		$ 2,882,090	Att + Minor			Layer Deductible:					Participation Percentage (Using PSOLD detail results - All Years)				
TOTALS		$ -	Major Cat					Check:	$ 1,470,783		0%	0%	100%	100%	100%
20	$ 3,560,000,000	$ 2,755,649	$ 126,441					Net after shares, partic, deductibles:	$ 73,539		$ 51,580	$ 12,663	$19,090	$14,229	$ 3,821
ISO Rapid Valuator - Outputs		PSOLD Input	PSOLD Input						PSOLD Output		PSOLD Outputs - Attritional (Layers in 000s)				
Description/Record Index	Buildings + Content AOI	PSOLD-Gross Attritional Losses	PSOLD-Gross Minor Cat Losses	Entry Point	Exit Point	Percent Share			PSOLD-Net Attritional Losses		Base - 5,000 XS 0	Sub1 - 5,000 XS 5,000	Sub2 - 15,000 XS 10,000	Sub3 - 25,000 XS 25,000	Layer1 - 10,000 XS 50,000
1: Office - Layer 1	$ 25,000,000	$ 16,879	$ 1,634		$ 50,000,000	20.0%			$ 256		$ 2,856	$ 263	$ 194	$ 62	$ -
2: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 50,000,000	$100,000,000	20.0%			$ -		$ -	$ -	$ -	$ -	$ -
3: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 100,000,000	$250,000,000	20.0%			$ -		$ -	$ -	$ -	$ -	$ -
4: Office - Layer 4	$ 25,000,000	$ 16,879	$ 1,634	$ 250,000,000	$500,000,000	20.0%			$ -		$ -	$ -	$ -	$ -	$ -
5: Storage - Layer 1	$ 50,000,000	$ 44,279	$ 3,243		$ 50,000,000	20.0%			$ 1,260		$ 6,559	$ 739	$ 781	$ 478	$ -
6: Storage - Layer 2	$ 50,000,000	$ 44,279	$ 3,243	$ 50,000,000	$100,000,000	20.0%			$ 298		$ -	$ -	$ -	$ -	$ -
7: Storage - Layer 3	$ 50,000,000	$ 44,279	$ 3,243	$ 100,000,000	$250,000,000	20.0%			$ -		$ -	$ -	$ -	$ -	$ -
8: Storage - Layer 4	$ 50,000,000	$ 44,279	$ 3,243	$ 250,000,000	$500,000,000	20.0%			$ -		$ -	$ -	$ -	$ -	$ -
9: Medium Manufacturing - Layer 1	$ 200,000,000	$ 161,123	$ 9,180		$ 50,000,000	20.0%			$ 4,053		$ 24,765	$ 2,970	$ 2,950	$ 1,103	$ -
10: Medium Manufacturing - Layer 2	$ 200,000,000	$ 161,123	$ 9,180	$ 50,000,000	$100,000,000	20.0%			$ 348		$ -	$ -	$ -	$ -	$ 139
11: Medium Manufacturing - Layer 3	$ 200,000,000	$ 161,123	$ 9,180	$ 100,000,000	$250,000,000	20.0%			$ 87		$ -	$ -	$ -	$ -	$ -
12: Medium Manufacturing - Layer 4	$ 200,000,000	$ 161,123	$ 9,180	$ 250,000,000	$500,000,000	20.0%			$ 2		$ -	$ -	$ -	$ -	$ -
13: High Hazard HPR - Layer 1	$ 200,000,000	$ 133,370	$ 9,180		$ 50,000,000	20.0%			$ 8,103		$ 5,213	$ 2,590	$ 4,471	$ 3,632	$ -
14: High Hazard HPR - Layer 2	$ 200,000,000	$ 133,370	$ 9,180	$ 50,000,000	$100,000,000	20.0%			$ 4,160		$ -	$ -	$ -	$ -	$ 1,018
15: High Hazard HPR - Layer 3	$ 200,000,000	$ 133,370	$ 9,180	$ 100,000,000	$250,000,000	20.0%			$ 5,603		$ -	$ -	$ -	$ -	$ -
16: High Hazard HPR - Layer 4	$ 200,000,000	$ 133,370	$ 9,180	$ 250,000,000	$500,000,000	20.0%			$ 1,004		$ -	$ -	$ -	$ -	$ -
17: Energy - Layer 1	$ 250,000,000	$ 333,261	$ 8,374		$ 50,000,000	20.0%			$ 19,646		$ 12,187	$ 6,100	$ 10,693	$ 8,953	$ -
18: Energy - Layer 2	$ 250,000,000	$ 333,261	$ 8,374	$ 50,000,000	$100,000,000	20.0%			$ 10,461		$ -	$ -	$ -	$ -	$ 2,551
19: Energy - Layer 3	$ 250,000,000	$ 333,261	$ 8,374	$ 100,000,000	$250,000,000	20.0%			$ 14,131		$ -	$ -	$ -	$ -	$ -
20: Energy - Layer 4	$ 250,000,000	$ 333,261	$ 8,374	$ 250,000,000	$500,000,000	20.0%			$ 4,127		$ -	$ -	$ -	$ -	$ -

Layer1 - 10,000 XS 50,000	Layer2 - 40,000 XS 60,000	Layer3 - 150,000 XS 100,000	Layer4 - 750,000 XS 250,000
$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -
$ 112	$ 186	$ -	$ -
$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -
$ 139	$ 209	$ -	$ -
$ -	$ -	$ 87	$ -
$ -	$ -	$ -	$ 2
$ -	$ -	$ -	$ -
$ 1,018	$ 3,142	$ -	$ -
$ -	$ -	$ 5,603	$ -
$ -	$ -	$ -	$ 1,004
$ -	$ -	$ -	$ -
$ 2,551	$ 7,910	$ -	$ -
$ -	$ -	$ 14,131	$ -
$ -	$ -	$ -	$ 4,127

Layering Example 5 Risks / 4 Layers – Including $10M per Layer Deductible

Illustrative

			Total AOI:	890,000,000	3,560,000,000	Deductible:	10,000,000	Total Gross LS:	720,523	2,882,090	66,854
Orig Sort	Country - Region	Description/Record Index	Building AOI ($)	Contents AOI ($)	Total B&C AOI ($)	Time Element AOI ($)	PSOLD: Syndication Entry Point	PSOLD: Syndication Exit Point	PSOLD: Syndication % Share	IRV Total Gross Loss Costs	PSOLD: Net Attritional
1	United States	Office - Layer 1	20,000,000	5,000,000	25,000,000	5,000,000	10,000,000	50,000,000	20.0%	18,513	256
2	United States	Office - Layer 2	20,000,000	5,000,000	25,000,000	5,000,000	60,000,000	100,000,000	20.0%	18,513	-
3	United States	Office - Layer 2	20,000,000	5,000,000	25,000,000	5,000,000	110,000,000	250,000,000	20.0%	18,513	-
4	United States	Office - Layer 4	20,000,000	5,000,000	25,000,000	5,000,000	260,000,000	500,000,000	20.0%	18,513	-
5	United States	Storage - Layer 1	30,000,000	20,000,000	50,000,000	10,000,000	10,000,000	50,000,000	20.0%	47,521	1,260
6	United States	Storage - Layer 2	30,000,000	20,000,000	50,000,000	10,000,000	60,000,000	100,000,000	20.0%	47,521	186
7	United States	Storage - Layer 3	30,000,000	20,000,000	50,000,000	10,000,000	110,000,000	250,000,000	20.0%	47,521	-
8	United States	Storage - Layer 4	30,000,000	20,000,000	50,000,000	10,000,000	260,000,000	500,000,000	20.0%	47,521	-
9	United States	Medium Manufacturing - Layer 1	150,000,000	50,000,000	200,000,000	50,000,000	10,000,000	50,000,000	20.0%	170,303	4,053
10	United States	Medium Manufacturing - Layer 2	150,000,000	50,000,000	200,000,000	50,000,000	60,000,000	100,000,000	20.0%	170,303	209
11	United States	Medium Manufacturing - Layer 3	150,000,000	50,000,000	200,000,000	50,000,000	110,000,000	250,000,000	20.0%	170,303	66
12	United States	Medium Manufacturing - Layer 4	150,000,000	50,000,000	200,000,000	50,000,000	260,000,000	500,000,000	20.0%	170,303	1
13	United States	High Hazard HPR - Layer 1	150,000,000	50,000,000	200,000,000	50,000,000	10,000,000	50,000,000	20.0%	142,550	8,103
14	United States	High Hazard HPR - Layer 2	150,000,000	50,000,000	200,000,000	50,000,000	60,000,000	100,000,000	20.0%	142,550	3,142
15	United States	High Hazard HPR - Layer 3	150,000,000	50,000,000	200,000,000	50,000,000	110,000,000	250,000,000	20.0%	142,550	4,977
16	United States	High Hazard HPR - Layer 4	150,000,000	50,000,000	200,000,000	50,000,000	260,000,000	500,000,000	20.0%	142,550	823
17	United States	Energy - Layer 1	200,000,000	50,000,000	250,000,000	50,000,000	10,000,000	50,000,000	20.0%	341,635	19,646
18	United States	Energy - Layer 2	200,000,000	50,000,000	250,000,000	50,000,000	60,000,000	100,000,000	20.0%	341,635	7,910
19	United States	Energy - Layer 3	200,000,000	50,000,000	250,000,000	50,000,000	110,000,000	250,000,000	20.0%	341,635	12,552
20	United States	Energy - Layer 4	200,000,000	50,000,000	250,000,000	50,000,000	260,000,000	500,000,000	20.0%	341,635	3,670

PSOLD Layering – After Shares / After $10M Per Layer Deductible

Illustrative

		$ 2,882,090	Tot IRV value											
		$ 2,882,090	Att + Minor			Layer Deductible:	$10,000,000							
TOTALS		$ -	Major Cat			Check:	$ 1,337,075							
20	$ 3,560,000,000	$ 2,755,649	$ 126,441			Net after shares, partic, deductibles:	$ 66,854							
ISO Rapid Valuator - Outputs		PSOLD Input	PSOLD Input				PSOLD Output	Participation Percentage (Using PSOLD detail results - All Years)						
								100%	100%	100%	100%	100%	100%	100%
								$ -	$ -	$19,090	$14,229	$ -	$11,446	$ 17,596	$ 4,494
								PSOLD Outputs - Attritional (Layers in 000s)						
Description/Record Index	Buildings + Content AOI	PSOLD-Gross Attritional Losses	PSOLD-Gross Minor Cat Losses	Entry Point	Exit Point	Percent Share	PSOLD-Net Attritional Losses	Base - 5,000 XS 0	Sub1 - 5,000 XS 5,000	Sub2 - 5,000 XS 10,000	Sub3 - 25,000 XS 25,000	Layer1 - 10,000 XS 50,000	Layer2 - 50,000 XS 60,000	Layer3 - 150,000 XS 100,000	Layer4 - 750,000 XS 250,000
1: Office - Layer 1	$ 25,000,000	$ 16,879	$ 1,634	$ 10,000,000	$ 50,000,000	20.0%	$ 256	$ -	$ -	$ 194	$ 62	$ -	$ -	$ -	$ -
2: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 60,000,000	$100,000,000	20.0%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 110,000,000	$250,000,000	20.0%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4: Office - Layer 4	$ 25,000,000	$ 16,879	$ 1,634	$ 260,000,000	$500,000,000	20.0%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5: Storage - Layer 1	$ 50,000,000	$ 44,279	$ 3,243	$ 10,000,000	$ 50,000,000	20.0%	$ 1,260	$ -	$ -	$ 781	$ 478	$ -	$ -	$ -	$ -
6: Storage - Layer 2	$ 50,000,000	$ 44,279	$ 3,243	$ 60,000,000	$100,000,000	20.0%	$ 186	$ -	$ -	$ -	$ -	$ -	$ 186	$ -	$ -
7: Storage - Layer 3	$ 50,000,000	$ 44,279	$ 3,243	$ 110,000,000	$250,000,000	20.0%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8: Storage - Layer 4	$ 50,000,000	$ 44,279	$ 3,243	$ 260,000,000	$500,000,000	20.0%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9: Medium Manufacturing - Layer 1	$ 200,000,000	$ 161,123	$ 9,180	$ 10,000,000	$ 50,000,000	20.0%	$ 4,053	$ -	$ -	$ 950	$ 1,103	$ -	$ -	$ -	$ -
10: Medium Manufacturing - Layer 2	$ 200,000,000	$ 161,123	$ 9,180	$ 60,000,000	$100,000,000	20.0%	$ 209	$ -	$ -	$ -	$ -	$ -	$ 209	$ -	$ -
11: Medium Manufacturing - Layer 3	$ 200,000,000	$ 161,123	$ 9,180	$ 110,000,000	$250,000,000	20.0%	$ 66	$ -	$ -	$ -	$ -	$ -	$ -	$ 66	$ -
12: Medium Manufacturing - Layer 4	$ 200,000,000	$ 161,123	$ 9,180	$ 260,000,000	$500,000,000	20.0%	$ 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1
13: High Hazard HPR - Layer 1	$ 200,000,000	$ 133,370	$ 9,180	$ 10,000,000	$ 50,000,000	20.0%	$ 8,103	$ -	$ -	$ 4,471	$ 3,632	$ -	$ -	$ -	$ -
14: High Hazard HPR - Layer 2	$ 200,000,000	$ 133,370	$ 9,180	$ 60,000,000	$100,000,000	20.0%	$ 3,142	$ -	$ -	$ -	$ -	$ -	$ 3,142	$ -	$ -
15: High Hazard HPR - Layer 3	$ 200,000,000	$ 133,370	$ 9,180	$ 110,000,000	$250,000,000	20.0%	$ 4,977	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,977	$ -
16: High Hazard HPR - Layer 4	$ 200,000,000	$ 133,370	$ 9,180	$ 260,000,000	$500,000,000	20.0%	$ 823	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 823
17: Energy - Layer 1	$ 250,000,000	$ 333,261	$ 8,374	$ 10,000,000	$ 50,000,000	20.0%	$ 19,646	$ -	$ -	$ 10,693	$ 8,953	$ -	$ -	$ -	$ -
18: Energy - Layer 2	$ 250,000,000	$ 333,261	$ 8,374	$ 60,000,000	$100,000,000	20.0%	$ 7,910	$ -	$ -	$ -	$ -	$ -	$ 7,910	$ -	$ -
19: Energy - Layer 3	$ 250,000,000	$ 333,261	$ 8,374	$ 110,000,000	$250,000,000	20.0%	$ 12,552	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,552	$ -
20: Energy - Layer 4	$ 250,000,000	$ 333,261	$ 8,374	$ 260,000,000	$500,000,000	20.0%	$ 3,670	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,670

PSOLD Layering – After Shares / After $25M Per Layer Deductible

Illustrative

		$ 2,882,090	Tot IRV value	Layer Deductible:	$25,000,000
TOTALS		$ 2,882,090	Att + Minor		
		$ -	Major Cat	Check:	$ 780,275
20	$ 3,560,000,000	$ 2,755,649	$ 126,441	Net after shares, partic, deductibles:	$ 39,014

ISO Rapid Valuator - Outputs		PSOLD Input	PSOLD Input				PSOLD Output
Description/Record Index	Buildings + Content AOI	PSOLD-Gross Attritional Losses	PSOLD-Gross Minor Cat Losses	Entry Point	Exit Point	Percent Share	PSOLD-Net Attritional Losses
1: Office - Layer 1	$ 25,000,000	$ 16,879	$ 1,634	$ 25,000,000	$ 50,000,000	20.0%	$ 62
2: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 75,000,000	$100,000,000	20.0%	$ -
3: Office - Layer 2	$ 25,000,000	$ 16,879	$ 1,634	$ 125,000,000	$250,000,000	20.0%	$ -
4: Office - Layer 4	$ 25,000,000	$ 16,879	$ 1,634	$ 275,000,000	$500,000,000	20.0%	$ -
5: Storage - Layer 1	$ 50,000,000	$ 44,279	$ 3,243	$ 25,000,000	$ 50,000,000	20.0%	$ 478
6: Storage - Layer 2	$ 50,000,000	$ 44,279	$ 3,243	$ 75,000,000	$100,000,000	20.0%	$ 56
7: Storage - Layer 3	$ 50,000,000	$ 44,279	$ 3,243	$ 125,000,000	$250,000,000	20.0%	$ -
8: Storage - Layer 4	$ 50,000,000	$ 44,279	$ 3,243	$ 275,000,000	$500,000,000	20.0%	$ -
9: Medium Manufacturing - Layer 1	$ 200,000,000	$ 161,123	$ 9,180	$ 25,000,000	$ 50,000,000	20.0%	$ 1,103
10: Medium Manufacturing - Layer 2	$ 200,000,000	$ 161,123	$ 9,180	$ 75,000,000	$100,000,000	20.0%	$ 93
11: Medium Manufacturing - Layer 3	$ 200,000,000	$ 161,123	$ 9,180	$ 125,000,000	$250,000,000	20.0%	$ 44
12: Medium Manufacturing - Layer 4	$ 200,000,000	$ 161,123	$ 9,180	$ 275,000,000	$500,000,000	20.0%	$ 1
13: High Hazard HPR - Layer 1	$ 200,000,000	$ 133,370	$ 9,180	$ 25,000,000	$ 50,000,000	20.0%	$ 3,632
14: High Hazard HPR - Layer 2	$ 200,000,000	$ 133,370	$ 9,180	$ 75,000,000	$100,000,000	20.0%	$ 1,822
15: High Hazard HPR - Layer 3	$ 200,000,000	$ 133,370	$ 9,180	$ 125,000,000	$250,000,000	20.0%	$ 4,131
16: High Hazard HPR - Layer 4	$ 200,000,000	$ 133,370	$ 9,180	$ 275,000,000	$500,000,000	20.0%	$ 578
17: Energy - Layer 1	$ 250,000,000	$ 333,261	$ 8,374	$ 25,000,000	$ 50,000,000	20.0%	$ 8,953
18: Energy - Layer 2	$ 250,000,000	$ 333,261	$ 8,374	$ 75,000,000	$100,000,000	20.0%	$ 4,593
19: Energy - Layer 3	$ 250,000,000	$ 333,261	$ 8,374	$ 125,000,000	$250,000,000	20.0%	$ 10,418
20: Energy - Layer 4	$ 250,000,000	$ 333,261	$ 8,374	$ 275,000,000	$500,000,000	20.0%	$ 3,051

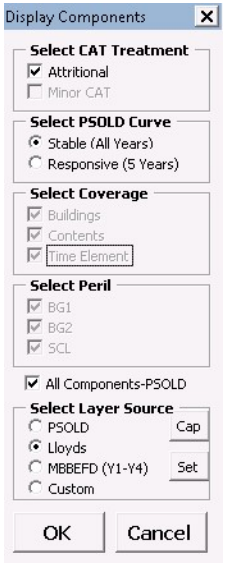
Participation Percentage (Using PSOLD detail results - All Years)

100%	100%	100%	100%	100%	100%	100%	100%
$ -	$ -	$ -	$14,229	$ -	$ 6,563	$ 14,593	$ 3,629

PSOLD Outputs - Attritional (Layers in 000s)							
Base - ,000 XS 0	Sub1 - 5,000 XS 5,000	Sub2 - 15,000 XS 10,000	Sub3 - 25,000 XS 25,000	Layer1 - 10,000 XS 50,000	Layer2 - 40,000 XS 60,000	Layer3 - 150,000 XS 100,000	Layer4 - 750,000 XS 250,000
$ -	$ -	$ -	$ 62	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ 478	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ 56	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ 1,103	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ 93	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ 44	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1
$ -	$ -	$ -	$ 3,632	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ 1,822	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ 4,131	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 578
$ -	$ -	$ -	$ 8,953	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ 4,593	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ 10,418	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,051

Layering Example – Lloyds – Before Shares / Deductibles

Illustrative

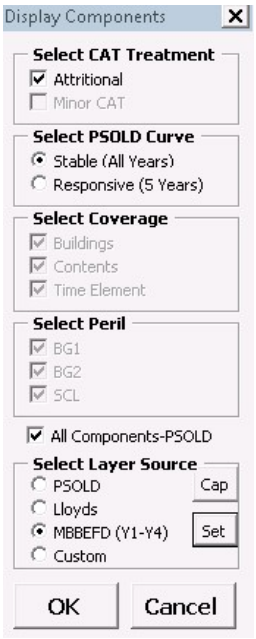


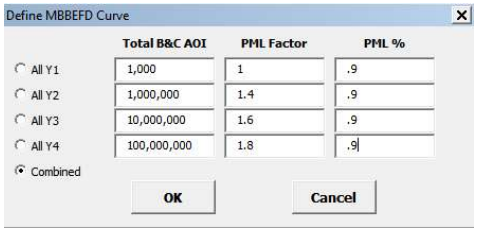
		$ 2,882,090	Layer Deductible
		$ 2,882,090	$0
TOTALS		$ -	$ 55,112,980
20	$ 3,560,000,000	$ 2,755,649	$ 2,755,649
ISO Rapid Valuator - Outputs		PSOLD Input	PSOLD Output
Description/Record Index	Buildings + Content AOI	PSOLD-Gross Attritional Losses	PSOLD-Net Attritional Losses
1: Office - Layer 1	$ 25,000,000	$ 16,879	$ 16,879
2: Office - Layer 2	$ 25,000,000	$ 16,879	$ 16,879
3: Office - Layer 2	$ 25,000,000	$ 16,879	$ 16,879
4: Office - Layer 4	$ 25,000,000	$ 16,879	$ 16,879
5: Storage - Layer 1	$ 50,000,000	$ 44,279	$ 44,279
6: Storage - Layer 2	$ 50,000,000	$ 44,279	$ 44,279
7: Storage - Layer 3	$ 50,000,000	$ 44,279	$ 44,279
8: Storage - Layer 4	$ 50,000,000	$ 44,279	$ 44,279
9: Medium Manufacturing - Layer 1	$ 200,000,000	$ 161,123	$ 161,123
10: Medium Manufacturing - Layer 2	$ 200,000,000	$ 161,123	$ 161,123
11: Medium Manufacturing - Layer 3	$ 200,000,000	$ 161,123	$ 161,123
12: Medium Manufacturing - Layer 4	$ 200,000,000	$ 161,123	$ 161,123
13: High Hazard HPR - Layer 1	$ 200,000,000	$ 133,370	$ 133,370
14: High Hazard HPR - Layer 2	$ 200,000,000	$ 133,370	$ 133,370
15: High Hazard HPR - Layer 3	$ 200,000,000	$ 133,370	$ 133,370
16: High Hazard HPR - Layer 4	$ 200,000,000	$ 133,370	$ 133,370
17: Energy - Layer 1	$ 250,000,000	$ 333,261	$ 333,261
18: Energy - Layer 2	$ 250,000,000	$ 333,261	$ 333,261
19: Energy - Layer 3	$ 250,000,000	$ 333,261	$ 333,261
20: Energy - Layer 4	$ 250,000,000	$ 333,261	$ 333,261

Participation Percentage (Using PSOLD detail results - All Years)							
100%	100%	100%	100%	100%	100%	100%	100%
$ 862,541	$ 297,010	$ 443,960	$ 352,980	$ 103,727	$ 218,366	$ 477,064	$ -
Lloyds Scale - Layer Results							
Base - 5,000 XS 0	Sub1 - 5,000 XS 5,000	Sub2 - 15,000 XS 10,000	Sub3 - 25,000 XS 25,000	Layer1 - 10,000 XS 50,000	Layer2 - 40,000 XS 60,000	Layer3 - 150,000 XS 100,000	Layer4 - 750,000 XS 250,000
$ 11,056	$ 2,363	$ 3,460	$ -	$ -	$ -	$ -	$ -
$ 11,056	$ 2,363	$ 3,460	$ -	$ -	$ -	$ -	$ -
$ 11,056	$ 2,363	$ 3,460	$ -	$ -	$ -	$ -	$ -
$ 11,056	$ 2,363	$ 3,460	$ -	$ -	$ -	$ -	$ -
$ 23,911	$ 5,092	$ 7,616	$ 7,660	$ -	$ -	$ -	$ -
$ 23,911	$ 5,092	$ 7,616	$ 7,660	$ -	$ -	$ -	$ -
$ 23,911	$ 5,092	$ 7,616	$ 7,660	$ -	$ -	$ -	$ -
$ 23,911	$ 5,092	$ 7,616	$ 7,660	$ -	$ -	$ -	$ -
$ 47,612	$ 20,865	$ 23,121	$ 23,121	$ 5,800	$ 12,729	$ 27,874	$ -
$ 47,612	$ 20,865	$ 23,121	$ 23,121	$ 5,800	$ 12,729	$ 27,874	$ -
$ 47,612	$ 20,865	$ 23,121	$ 23,121	$ 5,800	$ 12,729	$ 27,874	$ -
$ 47,612	$ 20,865	$ 23,121	$ 23,121	$ 5,800	$ 12,729	$ 27,874	$ -
$ 39,411	$ 17,271	$ 19,139	$ 19,139	$ 4,801	$ 10,536	$ 23,073	$ -
$ 39,411	$ 17,271	$ 19,139	$ 19,139	$ 4,801	$ 10,536	$ 23,073	$ -
$ 39,411	$ 17,271	$ 19,139	$ 19,139	$ 4,801	$ 10,536	$ 23,073	$ -
$ 39,411	$ 17,271	$ 19,139	$ 19,139	$ 4,801	$ 10,536	$ 23,073	$ -
$ 93,646	$ 28,660	$ 57,654	$ 38,325	$ 15,330	$ 31,327	$ 68,319	$ -
$ 93,646	$ 28,660	$ 57,654	$ 38,325	$ 15,330	$ 31,327	$ 68,319	$ -
$ 93,646	$ 28,660	$ 57,654	$ 38,325	$ 15,330	$ 31,327	$ 68,319	$ -
$ 93,646	$ 28,660	$ 57,654	$ 38,325	$ 15,330	$ 31,327	$ 68,319	$ -

Layering Example – MBBEFD Combined (including PML Usage Concepts)

Illustrative





Expected Claim Counts - Exper Period		0.56	0.34	0.15	0.04	0.04	0.02	
100.0%	18.1%	11.8%	20.4%	23.0%	2.9%	9.2%	14.7%	0.0%
Return Period:		9.0	14.7	33.5	127.3	137.6	222.8	
Layer Frequency:		0.111	0.068	0.030	0.008	0.007	0.004	

		$ 2,882,090	Layer Deductible
		$ 2,882,090	$0
TOTALS		$ -	$ 55,112,982
20	$ 3,560,000,000	$ 2,755,649	$ 2,755,649

Participation Percentage (Using PSOLD detail results - All Years)

100%	100%	100%	100%	100%	100%	100%	100%
$ 498,361	$ 324,087	$ 561,688	$ 634,326	$ 78,554	$ 253,768	$ 404,864	$ -

ISO Rapid Valuator - Outputs

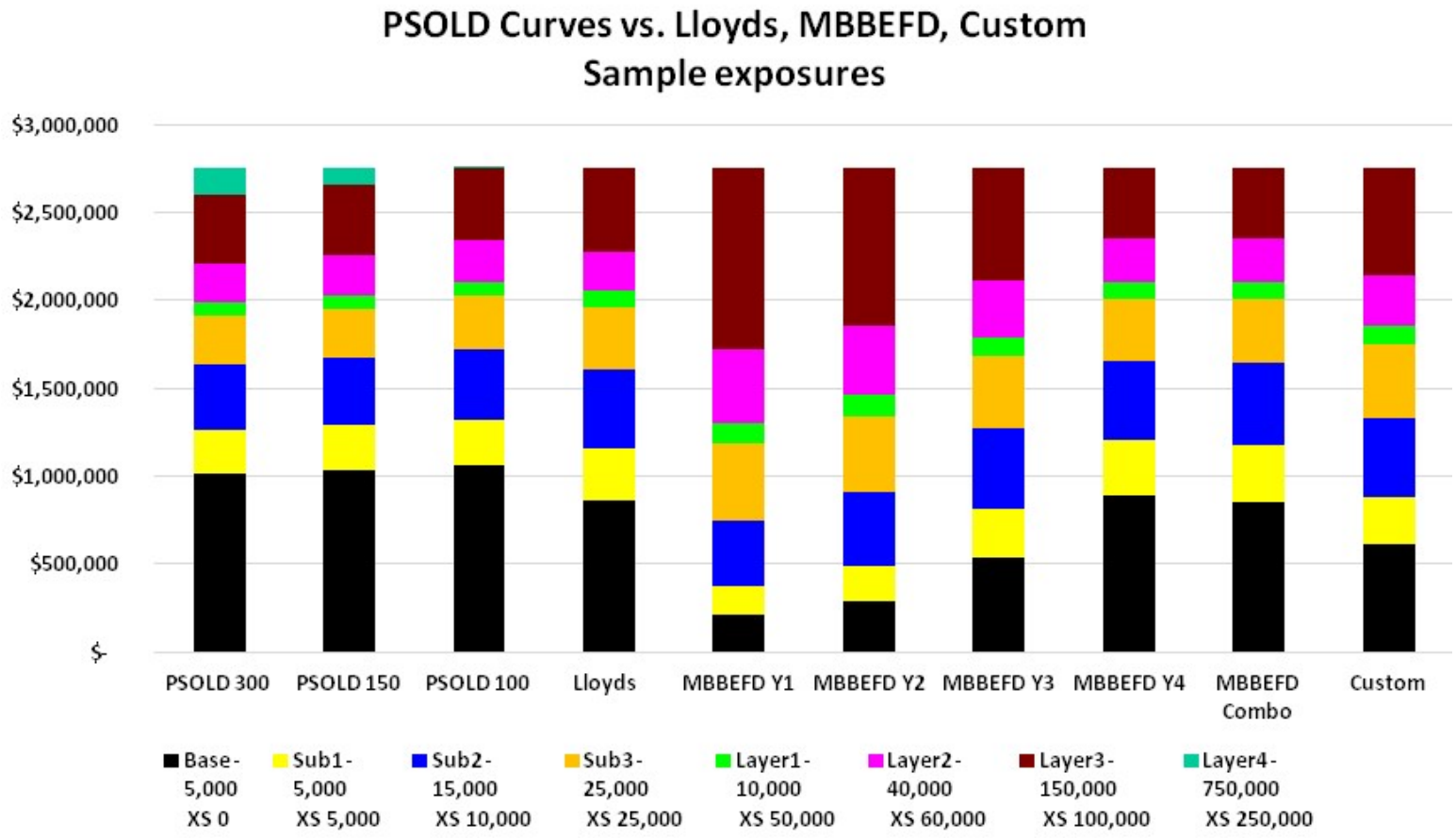
MBBEFD: Combined Scale - Layer Results

Description/Record Index	Buildings + Content AOI	PSOLD Input: PSOLD-Gross Attritional Losses	PSOLD Output: PSOLD-Net Attritional Losses	Base - 5,000 XS 0	Sub1 - 5,000 XS 5,000	Sub2 - 15,000 XS 10,000	Sub3 - 25,000 XS 25,000	Layer1 - 10,000 XS 50,000	Layer2 - 40,000 XS 60,000	Layer3 - 150,000 XS 100,000	Layer4 - 750,000 XS 250,000
1: Office - Layer 1	$ 25,000,000	$ 16,879	$ 16,879	$ 9,283	$ 2,869	$ 4,726	$ -	$ -	$ -	$ -	$ -
2: Office - Layer 2	$ 25,000,000	$ 16,879	$ 16,879	$ 9,283	$ 2,869	$ 4,726	$ -	$ -	$ -	$ -	$ -
3: Office - Layer 2	$ 25,000,000	$ 16,879	$ 16,879	$ 9,283	$ 2,869	$ 4,726	$ -	$ -	$ -	$ -	$ -
4: Office - Layer 4	$ 25,000,000	$ 16,879	$ 16,879	$ 9,283	$ 2,869	$ 4,726	$ -	$ -	$ -	$ -	$ -
5: Storage - Layer 1	$ 50,000,000	$ 44,279	$ 44,279	$ 14,169	$ 10,184	$ 10,184	$ 9,741	$ -	$ -	$ -	$ -
6: Storage - Layer 2	$ 50,000,000	$ 44,279	$ 44,279	$ 14,169	$ 10,184	$ 10,184	$ 9,741	$ -	$ -	$ -	$ -
7: Storage - Layer 3	$ 50,000,000	$ 44,279	$ 44,279	$ 14,169	$ 10,184	$ 10,184	$ 9,741	$ -	$ -	$ -	$ -
8: Storage - Layer 4	$ 50,000,000	$ 44,279	$ 44,279	$ 14,169	$ 10,184	$ 10,184	$ 9,741	$ -	$ -	$ -	$ -
9: Medium Manufacturing - Layer 1	$ 200,000,000	$ 161,123	$ 161,123	$ 29,808	$ 15,307	$ 35,850	$ 35,850	$ 5,639	$ 16,112	$ 22,557	$ -
10: Medium Manufacturing - Layer 2	$ 200,000,000	$ 161,123	$ 161,123	$ 29,808	$ 15,307	$ 35,850	$ 35,850	$ 5,639	$ 16,112	$ 22,557	$ -
11: Medium Manufacturing - Layer 3	$ 200,000,000	$ 161,123	$ 161,123	$ 29,808	$ 15,307	$ 35,850	$ 35,850	$ 5,639	$ 16,112	$ 22,557	$ -
12: Medium Manufacturing - Layer 4	$ 200,000,000	$ 161,123	$ 161,123	$ 29,808	$ 15,307	$ 35,850	$ 35,850	$ 5,639	$ 16,112	$ 22,557	$ -
13: High Hazard HPR - Layer 1	$ 200,000,000	$ 133,370	$ 133,370	$ 24,673	$ 12,670	$ 29,675	$ 29,675	$ 4,668	$ 13,337	$ 18,672	$ -
14: High Hazard HPR - Layer 2	$ 200,000,000	$ 133,370	$ 133,370	$ 24,673	$ 12,670	$ 29,675	$ 29,675	$ 4,668	$ 13,337	$ 18,672	$ -
15: High Hazard HPR - Layer 3	$ 200,000,000	$ 133,370	$ 133,370	$ 24,673	$ 12,670	$ 29,675	$ 29,675	$ 4,668	$ 13,337	$ 18,672	$ -
16: High Hazard HPR - Layer 4	$ 200,000,000	$ 133,370	$ 133,370	$ 24,673	$ 12,670	$ 29,675	$ 29,675	$ 4,668	$ 13,337	$ 18,672	$ -
17: Energy - Layer 1	$ 250,000,000	$ 333,261	$ 333,261	$ 46,657	$ 39,991	$ 59,987	$ 83,315	$ 9,331	$ 33,993	$ 59,987	$ -
18: Energy - Layer 2	$ 250,000,000	$ 333,261	$ 333,261	$ 46,657	$ 39,991	$ 59,987	$ 83,315	$ 9,331	$ 33,993	$ 59,987	$ -
19: Energy - Layer 3	$ 250,000,000	$ 333,261	$ 333,261	$ 46,657	$ 39,991	$ 59,987	$ 83,315	$ 9,331	$ 33,993	$ 59,987	$ -
20: Energy - Layer 4	$ 250,000,000	$ 333,261	$ 333,261	$ 46,657	$ 39,991	$ 59,987	$ 83,315	$ 9,331	$ 33,993	$ 59,987	$ -

Note: Values shown may not match options selected

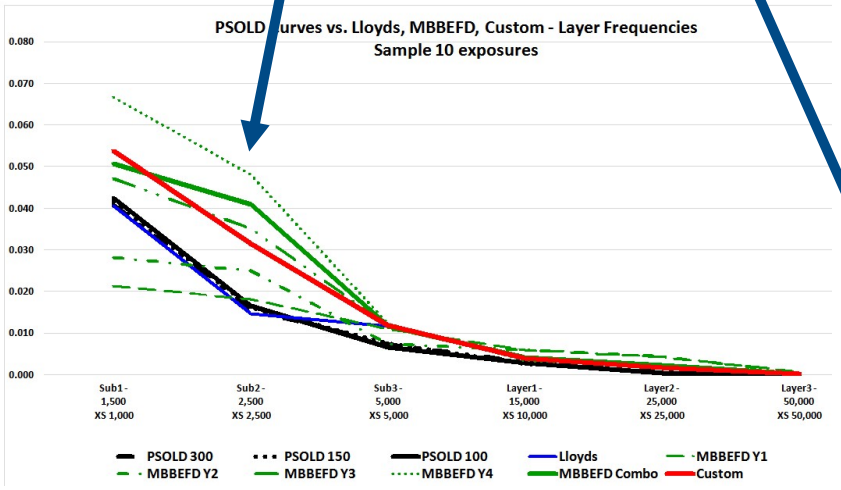
PSOLD vs. Alt Scales Lloyd's, MBBEFD

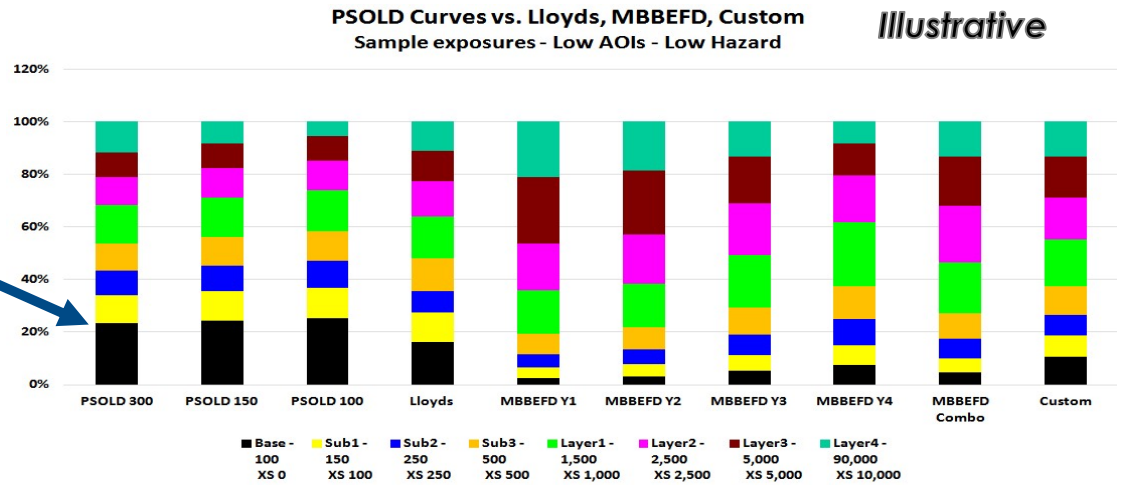
Illustrative

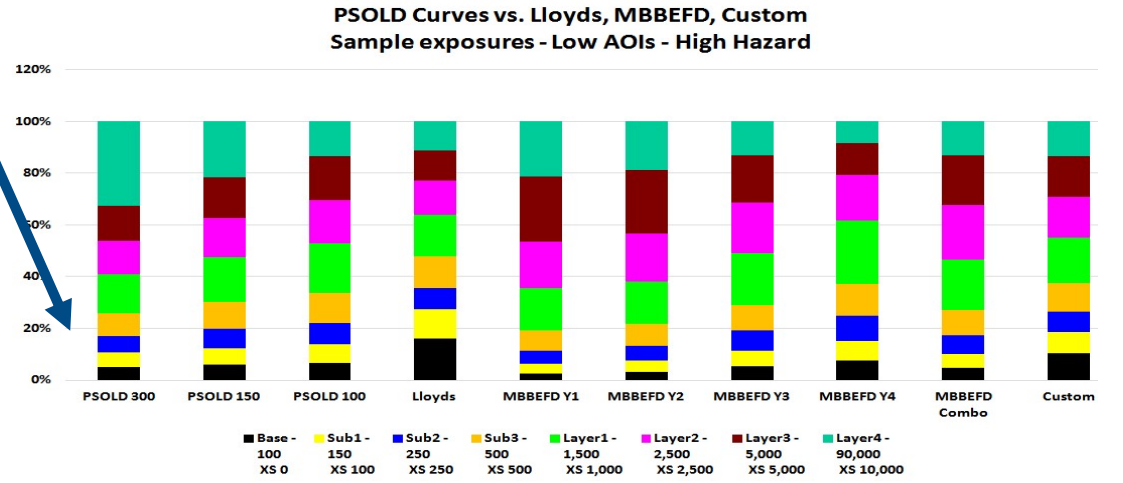


PSOLD layer results and frequencies can be compared to standard Lloyds and MBBEFD scales

PSOLD results respond significantly to differences in occupancy, AOI band, etc. Low hazard and high hazard exposures will have very different layer loss costs, unlike the standard curves. Also for validation of whatever curve is used, it is instructive to compare layer frequencies as well, and to the actual experience.







IRV / PSOLD 2017 Component Pricing – 5 Risks / 4 Layers- gross
Coverages / Perils including Business Interruption (TE) (7)

Illustrative

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	$ 630,435	$ 136,168	$ 199,643	$ 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.

Note: Values shown may not match options selected

A Survey of Property Amount of Insurance Definitions *Illustrative*

It is very important to understand what amount of insurance is being supplied either in a statement of values or in a banded profile. Many different definitions have been used in the industry. A true $100M AOI or TSI, may show up in a schedule as $25M or lower depending upon the definition used.

If the value supplied is not what you expect in your ground-up pricing or layering or in application of your first loss scale, then the formulation of your results via AxBxC may be significantly misstated.

6.1 What Is Meant by Amount of Insurance

The exposure value is meant to represent the upper bound of the risk transferred, or the largest payment that the insurer or reinsurer would be required to make in response to a covered loss. However, the concept of AOI can represent many different amounts. The manner in which the exposure value is represented also often depends on how it is being used and on what questions are being investigated.

The order of the reference list, starting with AOI and TIV and ending with NLE is the rough reverse size order that may be encountered with these terms. For example, Figure 5 shows how illustrative PML and MFL values may be estimated from a building's overall value or limit. In this illustrative example, if a building's value is $100M, through various COPE estimates and loss mitigation factors, the estimated MFL is 25% of the building value, while the PML is 13%. In this example, the MFL also incorporates the potential failure of a key loss reduction system such as automatic fire sprinkler system.

6.2 Varying Terminology: AOI, TIV, MPL, MFL, PML, SOV

A short-hand summary of the various definitions used for AOIs is shown in Figure 4.

Figure 4 - Reference List for AOI Definitions

Acronym	Short For:	Meaning
AOI TSI	Amount of Insurance Total Sum Insured	The amount of insurance (AOI) purchased, the policy limit, the total sum insured (TSI), or total insured value (TIV) (but TIV could have two meanings as below). Includes **direct loss** such as buildings and business personal property (contents), as well as **indirect loss** such as business interruption (also called time element). Different policy limits are typically purchased for buildings, contents, and business interruption.
TIV	Total Insured Values Or Total Insurable Values	**Total Insured Values** can be defined as the total AOI or policy limit. Or **Total Insurable Values** can be a reduction to the full AOI values and relates to the MPL and other estimated values. Statistically, buildings and contents are unlikely to suffer a total loss. The MFL, PML, EML, and NLE are all percentages less than the MPL. Estimating these values will depend on many variables specific to the risk including combustibility of the building, various COPE attributes and may include complex engineering scenarios with extensive exposure and loss simulations.
MPL	Maximum Possible Loss	The **MPL** is the **maximum amount of loss possible**. From a **direct loss** perspective, the MPL of a building and the business personal property (contents) within the building is 100% of the total values at risk which are measurable. From an **indirect loss** perspective, the MPL of business income can only be estimated because there is no definitive measure of the period of restoration (POR) following a worst-case, business closing loss. The **MPL may be larger than the AOI** or policy limits issued.
MFL	Maximum Foreseeable Loss	The **MFL** is the worst loss that is likely to occur if **a key loss reduction system fails** such as automatic fire alarms and sprinklers, watchman services, public fire suppression, etc.
PML	Probable Maximum Loss	The **PML** is an estimate of the largest loss the risk is likely to suffer when **critical protection systems are functioning as expected** and takes into account any relevant COPE attributes.
EML	Estimated Maximum Loss	The **EML** can and usually will **ignore any particularly unlikely events** or "remote coincidences" even if they are possible.
NLE	Normal Loss Expectancy	The **NLE** may assume that all active and passive protection systems and features are **fully operating as expected** under normal conditions.

IFoA / CAS International Research Working Party - August 2017 (reprint) 22

Source: GIRO IFoA / CAS International Research Working Party - August 2017 (reprint)

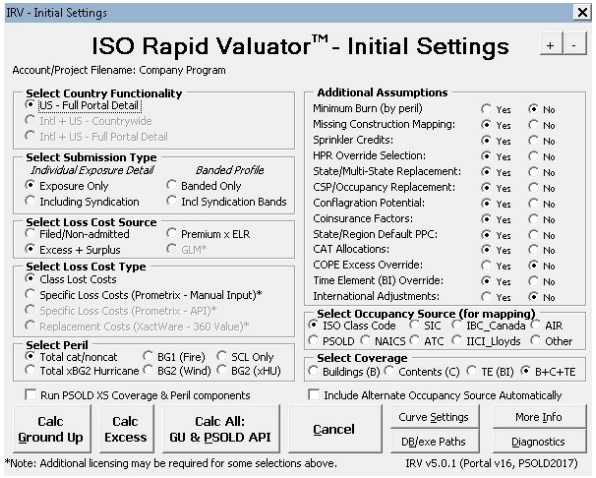
Appendix

Deeper Analysis into Ground-up Pricing Basics - COPE

Ground-up pricing involves using AOIs from statement of values, and incorporating many other factors and COPE adjustments. Estimates in total, or by coverage/peril component can be estimated.

If using component curves, the individual coverage and peril loss costs including time element can be run together as one unit, or separately and then combined via relevant statistics and simulation.

Illustrative



More Info - Individual Exposure and Loss Cost (LC) Information

A - Exposure Info

Exposure Number	1	Sprinkler Status	Part	Description	1: Office
Building AOI	40,000,000	Construction Type	Joisted Masonry	Occupancy	0702: Non-Governmental Offices and Banks
Contents AOI	5,000,000	BG2 Symbol	Ordinary	City, State/Region	Alabama
Time Element AOI	10,000,000	PPC	10	Zip Code	35004
Deductible	1,000	Prometrix Risk ID		Address	
BG1 Circular Number	LI-CF-2016-057			Latitude/Longitude	
BG1 Circular Date	2/1/2017			Conflagration Potential	TBD

B - LC Details

	BG1 (Fire et al)		iHU BG2 (Wind et al)		SCL (Ice/snow, theft, et al)	
	Building	Contents	Building	Contents	Building	Contents
LC Factor	0.122	0.165	0.091	0.077	0.047	0.141
LOL Factor	0.469	0.427	0.455	0.434	0.350	0.153
Scalar Adjustment	1.000	1.000	1.000	1.000	1.000	1.000
Sprinkler Credit	0.150	0.150				
PPC Factor	1.580	1.580				
Loss Cost	**27,664**	**4,258**	**14,906**	**1,504**	**5,922**	**971**

C - LC Summaries

Peril Totals		E&S Peril Scalars		Coverage Totals	
Total BG1 LC	31,922	BG1	1.00	Total Building LC	48,492
Total BG2 LC	16,410	BG2	1.00	Total Contents LC	6,733
Total SCL LC	6,893	SCL	1.00	Time Element LC	8,095
Total TE LC	8,095	TE: %	15.0		
Total LC xTE	**55,224**			**Total LC**	**63,319**

Total Gross Loss Cost - Cl	63,319
Attritional Gross Loss Cost	49,371
Attritional Net Loss Cost*	20,743

Note: Above Loss Costs may include other default or customized class or specific location adjustments for e.g. coinsurance (Value = 0.90), experience credits, etc. TE LC is based on BG1 + BG2 pre-sprinkler Loss Costs.

OK

*Losses > $1M

Note: Values shown may not match options selected

Sample ground-up results including / excluding HU and COPE Excess Scalar

Illustrative

ISO RAPID VALUATOR

IRV v6.5 (Portal 2019-1H, PSOLD2017)

Company	Company	Total Amount of Insurance	343,938,538	Settings Menu	CALC
Program	Program	# of Exposures	10		
Inception Date	1/1/2019	Average Exposure	34,393,854		
Comment	v6.5; LC 2019-1H; new CAT alloc state defaults F	Largest Exposure	110,000,000		

Total Premium & Loss Cost Info (xHU)		Gross	Gross ELR	Net
550,000	Total	263,917	48.0%	230,898
0.160	Total / AOI	0.077		0.067

Statement of Value Inputs

IRV Results

Orig Sort	Country - Region	Description/Record Index	Building AOI ($)	Contents AOI ($)	Total B&C AOI ($)	Time Element AOI ($)	Deductible ($)	State/Nominal Region	Zip Code	CSP Class Code	Coverage (Bldgs/Cont)	PPC	Sprinkler System Type	BG1 Construction	BG2 Symbol	Gross Actual Premium	Account GULC Scalar	IRV Total Gross Loss Costs	Gross ELR (IRV GULC/ Actual Prem)	Net Losses-GU PSOLD: Net Attritional
1	United States	Office	40,000,000	5,000,000	45,000,000	10,000,000	1,000	Alabama		0702	Both	10	Part	Joisted Masonry	Ordinary	100,000		60,714	60.7%	49,299
2	United States	Distillery	18,000,000	500,000	18,500,000	200,00										40,000		18,316	45.8%	15,931
3	United States	Ho																7,409	74.1%	7,018
4	United States	Of																30,183	30.2%	30,183
5	United States	Di																13,354	33.4%	13,354
6	United States	Ho																5,240	52.4%	4,930
7	United States	Of																86,967	87.0%	74,024
8	United States	Di																15,435	38.6%	12,048
9	United States	Ho																5,240	52.4%	4,930
10	United States	Of																21,061	21.1%	19,180
11																				
12																				
13																				
14																				
15																				
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More Info - Individual Exposure and Loss Cost (LC) Information

A - Exposure Info

Exposure Number	1	Sprinkler Status	Part	Description	1: Office
Building AOI	40,000,000	Construction Type	Joisted Masonry	Original Occupancy	0702: Non-Governmental Offices and Banks
Contents AOI	5,000,000	BG2 Symbol	Ordinary	Mapped ISO Occupancy	0702: Non-Governmental Offices and Banks
Time Element AOI	10,000,000	PPC	10	City, State/Region	Alabama
Deductible	1,000	Prometrix Risk ID		Zip Code	35004
BG1 Circular Number	LI-CF-2016-057	Conflagration	TBD	Address	
BG1 Circular Date	02/01/2017			Latitude/Longitude	

B - LC Details

	BG1 (Fire et al)		BG2 (Wind et al)				SCL (Ice/snow, theft, et al)	
	Building	Contents	Building iHU	xHU	Contents iHU	xHU	Building	Contents
LC Factor	0.122	0.165	0.091	0.064	0.077	0.052	0.047	0.129
LOL Factor	0.469	0.483	0.455		0.490		0.350	0.201
Scalar Adjustment	1.000	1.000	1.000		1.000		1.000	1.000
Sprinkler Credit	0.150	0.150						
PPC Factor	1.720	1.720						
Loss Cost	**30,086**	**5,243**	**14,904**	**10,482**	**1,698**	**1,147**	**5,930**	**1,167**

C - LC Summaries

Peril Totals		E&S Peril Scalars		Coverage Totals	
Total BG1 LC	35,329	BG1	1.00	Total BLD xHU LC	46,498
Total BG2 LC	11,629	BG2	1.00	Total CNT xHU LC	7,557
Total SCL LC	7,096	SCL	1.00	TE/BI xHU LC	6,660
Total TE LC	7,282	TE: %	12.5	Hurricane LC	1,973
Total LC xTE	**54,055**			TE/BI HU LC	623
				Total xHU LC	**60,714**
				Total iHU LC	66,310

Total Gross Loss Cost - Class **60,714**

Attritional Gross Loss Cost **49,299**
Attritional Net Loss Cost* **49,299**

CAT Allocations ?

BG2 - Att	42.3%
BG2 - Minor	57.7%
SCL - Att	76.2%
COPE XS: 1.560	

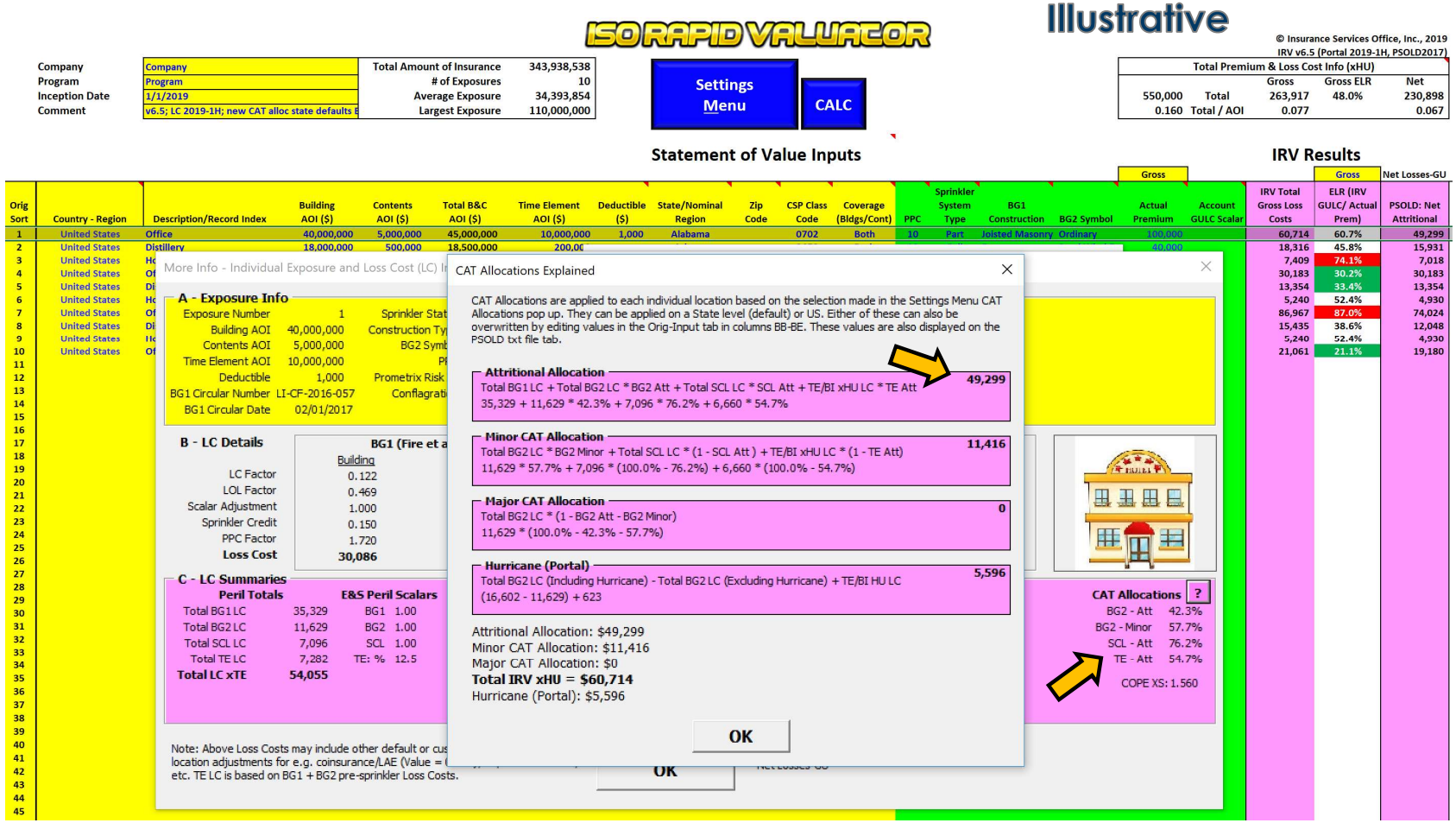
Note: Above Loss Costs may include other default or customized class or specific location adjustments for e.g. coinsurance/LAE (Value = 0.900), experience credits, etc. TE LC is based on BG1 + BG2 pre-sprinkler Loss Costs.

OK

*Net Losses-GU

Note: Values shown may not match options selected

Sample results including / excluding HU – underlying cat allocation factors



Note: Values shown may not match options selected

PSOLD 2017 Curve Fit Compare – Original vs. Smooth Curves

Illinois Billboards – All years – All Perils – Ground Up

Illustrative

PSOLD-All Yrs - Stability		Billboards - Illinois											
AOI Group Min	AOI Group Max	W(1)	W(2)	W(3)	W(4)	W(5)	W(6)	W(7)	W(8)	W(9)	W(10)	W(11)	Occs.
0	2,000	0.525219	0.390553	0.080733	0.003363	0.000132	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	3.3
2,001	3,000	0.498510	0.398020	0.096088	0.007103	0.000278	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	3.5
3,001	4,000	0.452433	0.410902	0.122579	0.013554	0.000531	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	19.3
4,001	5,000	0.417644	0.420628	0.142581	0.018425	0.000722	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	12.2
5,001	6,000	0.375239	0.432484	0.166960	0.024362	0.000955	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	17.6
7,500,001	10,000,000	0.000000	0.319104	0.428863	0.145610	0.061953	0.031103	0.008461	0.003976	0.000929	0.000000	0.000000	0.3
10,000,001	12,500,000	0.000000	0.319104	0.419978	0.145777	0.066422	0.034140	0.008978	0.004489	0.001113	0.000000	0.000000	0.1
12,500,001	15,000,000	0.000000	0.319104	0.419978	0.145777	0.066422	0.033980	0.009084	0.004542	0.001113	0.000000	0.000000	0.1
15,000,001	20,000,000	0.000000	0.319104	0.419978	0.145777	0.066422	0.033574	0.009355	0.004677	0.001113	0.000000	0.000000	0.3
100,000,001	125,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
125,000,001	150,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
150,000,001	200,000,000	0.000000	0.319104	0.419978	0.145776	0.063220	0.026168	0.016782	0.007859	0.001113	0.000000	0.000000	0.0
200,000,001	250,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
250,000,001	300,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
300,000,001	400,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
400,000,001	500,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
500,000,001	600,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
600,000,001	750,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
750,000,001	1,000,000,000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-
1,000,000,001	and above	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-

PSOLD-All Yrs - Stability		Billboards - Illinois											
AOI Group Min	AOI Group Max	W(1)	W(2)	W(3)	W(4)	W(5)	W(6)	W(7)	W(8)	W(9)	W(10)	W(11)	Occs.
0	2,000	0.525219	0.390553	0.080733	0.003363	0.000132	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	3.3
2,001	3,000	0.498510	0.398020	0.096088	0.007103	0.000278	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	3.5
3,001	4,000	0.452433	0.410902	0.122579	0.013554	0.000531	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	19.3
4,001	5,000	0.417644	0.420628	0.142581	0.018425	0.000722	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	12.2
5,001	6,000	0.375239	0.432484	0.166960	0.024362	0.000955	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	17.6
7,500,001	10,000,000	0.000000	0.319104	0.428863	0.145610	0.061953	0.031103	0.008461	0.003976	0.000929	0.000000	0.000000	0.3
10,000,001	12,500,000	0.000000	0.319104	0.419978	0.145777	0.066422	0.034140	0.008978	0.004489	0.001113	0.000000	0.000000	0.1
12,500,001	15,000,000	0.000000	0.319104	0.419978	0.145777	0.066422	0.033980	0.009084	0.004542	0.001113	0.000000	0.000000	0.1
15,000,001	20,000,000	0.000000	0.319104	0.419978	0.145777	0.066422	0.033574	0.009355	0.004677	0.001113	0.000000	0.000000	0.3
100,000,001	125,000,000	0.000000	0.319104	0.419978	0.145776	0.065355	0.025809	0.015360	0.007504	0.001113	0.000000	0.000000	0.0
125,000,001	150,000,000	0.000000	[illegible]	0.419978	0.145776	0.064288	0.025988	0.016071	0.007682	0.001113	0.000000	0.000000	0.0
150,000,001	200,000,000	0.000000	0.319104	0.419978	0.145776	0.063220	0.026168	0.016782	0.007859	0.001113	0.000000	0.000000	0.0
200,000,001	250,000,000	0.000000	[illegible]	0.414044	0.161906	0.068077	0.028347	0.017334	0.008384	0.001510	0.000066	0.000000	0.0
250,000,001	300,000,000	0.000000	0.281562	0.408110	0.178035	0.072933	0.030527	0.017886	0.008909	0.001907	0.000131	0.000000	0.0
300,000,001	400,000,000	0.000000	0.262791	0.402176	0.194165	0.077789	0.032706	0.018438	0.009434	0.002304	0.000197	0.000000	0.0
400,000,001	500,000,000	0.000000	0.225250	0.390309	0.226424	0.087502	0.037066	0.019542	0.010484	0.003097	0.000328	0.000000	0.0
500,000,001	600,000,000	0.000000	0.187708	0.378441	0.258683	0.097214	0.041425	0.020646	0.011533	0.003891	0.000459	0.000000	0.0
600,000,001	750,000,000	0.000000	0.150166	0.366574	0.290942	0.106926	0.045784	0.021751	0.012583	0.004685	0.000590	0.000000	0.0
750,000,001	1,000,000,000	0.000000	0.093854	[illegible]	0.339330	0.121495	0.052323	0.023407	0.014157	0.005875	0.000786	0.000000	0.0
1,000,000,001	and above	0.000000	0.000000	0.319104	0.419978	0.145776	0.063220	0.026168	0.016782	0.007859	0.001113	0.000001	0.0

Note: Upper AOI extrapolation uses 1-column jog
Values shown may not match options selected

IRV 6.5 - Default CAT allocations by Peril for discussion

Default State CAT Allocation (Attritional vs Minor vs Major Catastrophe)

Using Portal ALCCL - incl/excl HU, PCS (19 AIR States), and PSOLD attritional Minor CAT curve fits

			Override?	FALSE	100%	100%			100%	100%
22										
19		IRV v6.5	Including Hurricane - GULC				Excluding Hurricane - GULC			
Hurricane States (AIR)	BG2 Major - HU		BG2 Att	BG2 Minor	SCL Att	TE Att	BG2 Att	BG2 Minor	SCL Att	TE Att
Alabama	30.7%	COUNTRYWIDE	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%
Connecticut	0.0%	ALASKA	100.0%	0.0%	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%
Delaware	79.2%	ALABAMA	8.8%	12.0%	76.2%	54.7%	42.3%	57.7%	76.2%	54.7%
Dist. Of Columbia	0.0%	ARKANSAS	43.5%	56.5%	79.9%	72.1%	43.5%	56.5%	79.9%	72.1%
Florida	0.0%	ARIZONA	37.9%	62.1%	86.6%	97.4%	37.9%	62.1%	86.6%	97.4%
Georgia	0.0%	CALIFORNIA	82.8%	17.2%	93.6%	96.7%	82.8%	17.2%	93.6%	96.7%
Maine	0.0%	COLORADO	45.7%	54.3%	72.1%	85.5%	45.7%	54.3%	72.1%	85.5%
Maryland	51.6%	CONNECTICUT	26.7%	21.7%	61.8%	92.4%	55.2%	44.8%	61.8%	92.4%
Massachusetts	23.9%	District Of Columbia	39.7%	36.4%	87.6%	62.6%	52.2%	47.8%	87.6%	62.6%
New Hampshire	34.7%	DELAWARE	54.8%	10.5%	86.6%	99.5%	84.0%	16.0%	86.6%	99.5%
New Jersey	96.8%	FLORIDA	0.9%	2.3%	86.2%	32.6%	28.6%	71.4%	86.2%	32.6%
New York	33.6%	GEORGIA	31.1%	35.3%	76.5%	87.4%	46.8%	53.2%	76.5%	87.4%
North Carolina	80.0%	HAWAII	20.0%	0.0%	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%
Pennsylvania	0.0%	IOWA	45.2%	54.8%	58.3%	95.9%	45.2%	54.8%	58.3%	95.9%
Rhode Island	0.0%	IDAHO	100.0%	0.0%	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%
South Carolina	0.0%	ILLINOIS	58.5%	41.5%	73.1%	87.2%	58.5%	41.5%	73.1%	87.2%
Texas	0.0%	INDIANA	54.4%	45.6%	73.3%	85.1%	54.4%	45.6%	73.3%	85.1%
Vermont	0.0%	KANSAS	43.2%	56.8%	76.0%	53.0%	43.2%	56.8%	76.0%	53.0%
Virginia	0.0%	KENTUCKY	68.7%	31.3%	71.5%	74.4%	68.7%	31.3%	71.5%	74.4%
	65.0%	LOUISIANA	11.4%	23.6%	70.9%	21.8%	32.6%	67.4%	70.9%	21.8%
Louisiana	52.4%	MASSACHUSETTS	39.6%	8.0%	69.5%	87.7%	83.3%	16.7%	69.5%	87.7%
Mississippi	34.6%	MARYLAND	40.6%	24.8%	72.4%	95.5%	62.1%	37.9%	72.4%	95.5%
Hawaii	54.7%	MAINE	37.7%	7.6%	90.0%	98.7%	83.2%	16.8%	90.0%	98.7%
	0.0%	MICHIGAN	64.5%	35.5%	85.6%	85.6%	64.5%	35.5%	85.6%	85.6%
	0.0%	MINNESOTA	48.2%	51.8%	82.9%	94.9%	48.2%	51.8%	82.9%	94.9%
	0.0%	MISSOURI	51.5%	48.5%	70.1%	75.9%	51.5%	48.5%	70.1%	75.9%
	40.0%	MISSISSIPPI	15.9%	44.1%	69.3%	26.5%	26.5%	73.5%	69.3%	26.5%
	0.0%	MONTANA	49.4%	50.6%	93.7%	99.2%	49.4%	50.6%	93.7%	99.2%
	89.5%	NORTH CAROLINA	5.5%	5.0%	79.5%	92.9%	52.7%	47.3%	79.5%	92.9%
	0.0%	NORTH DAKOTA	92.2%	7.8%	94.7%	100.0%	92.2%	7.8%	94.7%	100.0%
	0.0%	NEBRASKA	44.0%	56.0%	82.5%	93.2%	44.0%	56.0%	82.5%	93.2%
	42.3%	NEW HAMPSHIRE	44.6%	13.1%	87.0%	99.6%	77.3%	22.7%	87.0%	99.6%
	47.1%	NEW JERSEY	21.7%	31.2%	80.8%	76.8%	41.0%	59.0%	80.8%	76.8%
	0.0%	NEW MEXICO	80.0%	20.0%	85.3%	99.9%	80.0%	20.0%	85.3%	99.9%
	0.0%	NEVADA	100.0%	0.0%	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%
	37.7%	NEW YORK	34.1%	28.2%	74.5%	71.5%	54.8%	45.2%	74.5%	71.5%
	0.0%	OHIO	56.8%	43.2%	72.7%	96.2%	56.8%	43.2%	72.7%	96.2%
	0.0%	OKLAHOMA	40.8%	59.2%	63.8%	45.4%	40.8%	59.2%	63.8%	45.4%
	0.0%	OREGON	77.5%	22.5%	96.8%	99.4%	77.5%	22.5%	96.8%	99.4%
	12.2%	PENNSYLVANIA	55.1%	32.7%	80.1%	95.5%	62.7%	37.3%	80.1%	95.5%
	57.5%	RHODE ISLAND	14.7%	27.8%	64.2%	90.2%	34.6%	65.4%	64.2%	90.2%
	62.0%	SOUTH CAROLINA	23.2%	14.8%	83.3%	99.7%	61.0%	39.0%	83.3%	99.7%
	0.0%	SOUTH DAKOTA	64.8%	35.2%	91.8%	99.9%	64.8%	35.2%	91.8%	99.9%
	0.0%	TENNESSEE	43.5%	56.5%	71.7%	80.4%	43.5%	56.5%	71.7%	80.4%
	31.8%	TEXAS	41.2%	27.0%	77.0%	68.2%	60.4%	39.6%	77.0%	68.2%
	0.0%	UTAH	89.9%	10.1%	98.9%	100.0%	89.9%	10.1%	98.9%	100.0%
	61.1%	VIRGINIA	25.3%	13.6%	73.7%	93.4%	65.1%	34.9%	73.7%	93.4%
	12.7%	VERMONT	77.0%	10.3%	92.7%	99.8%	88.2%	11.8%	92.7%	99.8%
	0.0%	WASHINGTON	75.5%	24.5%	96.5%	98.2%	75.5%	24.5%	96.5%	98.2%
	0.0%	WISCONSIN	64.8%	35.2%	81.2%	98.8%	64.8%	35.2%	81.2%	98.8%
	0.0%	WEST VIRGINIA	74.9%	25.1%	92.2%	99.1%	74.9%	25.1%	92.2%	99.1%
	0.0%	WYOMING	74.0%	26.0%	90.1%	100.0%	74.0%	26.0%	90.1%	100.0%
	30.7%	Very Low States	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%
	30.7%	Low States	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%
	30.7%	Medium Low States	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%
	30.7%	Medium States	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%
	30.7%	Medium High States	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%
	30.7%	High States	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%
	30.7%	Severe States	32.8%	36.5%	75.6%	65.1%	47.3%	52.7%	75.6%	65.1%

IRV/PSOLD Minor CAT: PCS Defined = Wind and Thunderstorm Events, Winter Storm, Riot, Water Damage, etc. (see IRV FAQ for more complete peril description)

Illustrative

IRV v6.5 (Portal 2019-1H, PSOLD2017)

US to International Property Risk Excess Loss Factors
COPE Assessment Matrix – Steps

1. **Start with a list of potential differences between the US and target countries**
   - Standard in Property Underwriting is COPE – Construction, Occupancy, Protection, and Exposure
   - To this list, we add ARM: Amounts of Insurance, Rebuilding costs, Miscellaneous (social, etc.)
2. **Assess whether each item would favorably or unfavorably impact expected loss results compared to the US**
   - expected to **reduce (positive)** or **increase (negative)** the excess losses, no impact or unknown
3. **Attempt to evaluate magnitude of the impact of each item**
   - **L**ow, **M**edium, **H**igh, or unknown
4. **Tally the expected cumulative effect of each of the COPE (ARM) items**
   - Include direction and magnitude of all items
   - Could vary for example by groups of occupancies (e.g. Facilities)
5. **Reconcile total impact assessment to historical excess loss layers vs. US**
   - Review actual number of large claims to US, using exposure base such as $B of subject premium
   - Review cross country comparisons
6. **Can do the same for Ground-up Loss Costs as proxy outside the US**

US to International Property Risk Excess Loss Factors
PSOLD International: COPE Assessment Matrix (for illustration only)

Commercial / Industrial

		US	Country A	Country B	Country C	Country D	Country E	Country F	Country G
Construction	C		H	M	L		M	M	M
Occupancy	O		L	H		M		H	L
Protection	P			M	M	M	H	M	H
Exposure (e.g. industrial facilities)	E			M	L	H			L
Amount of Insurance	A		M			M	L	H	M
Replacement Costs	R		M	L	H	L	L	H	M
Miscellaneous	M			M		L		H	
Total Indicated (before validation)				H		M	L	L	H

Impact Key *(compared to US)*	
Direction	Worse
	Better
	No difference
Magnitude	H = High
	M = Moderate
	L = Low

1. With US as base, compare each COPE+ attribute
2. Tally up expected impacts and qualitatively weigh them by COPE+ attribute
3. See how compares to actual large loss experience
4. Use same procedure for Ground-up Loss Costs, but include Frequency component – COPE+FARM

http://www.verisk.com/iso/excess-reinsurance