Concurrent Session 2: International Property

CAS/CARe Seminar, Bermuda, June 6-7, 2013

John Buchanan, ISO – Excess and Reinsurance

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Concurrent Session 2
International Property

This session will provide a survey of the International Property market and benchmarking methodologies, with an emphasis on Per Risk covers. Similarities and differences between US and various European, Asia-Pacific and other developed and developing country data sources will be discussed. Various curve applications and adjustments for differences such as construction, occupancy, and protection differences (COPE-ARM adjustments) and resulting macro country-wide validations will be explored. This session will include a case study approach to highlighting sensitivities and pitfalls of having incomplete data.

Moderator / Panelist:
John Buchanan, Principal, Excess and Reinsurance Division, ISO

Panelists:
Dave Sandeman, Director of Operations, Axco Insurance Information Services
Christie Lee, Vice President, Guy Carpenter

Agenda – International Property CS2

- **Overview – John 5 mins**
- **Survey of International Property Markets – Dave 20 mins**
  - o Comparison of mature, emerging, and nascent markets
  - o North America, Europe, BRICS, CIVETS
  - o Statistical and non-statistical factors
- **The Challenges of Having Incomplete Data – Christie 20 mins**
  - o Asia-Pacific large property policies
  - o Engineering exposures
- **International Property Per Risk Benchmarking – John 20 mins**
  - o Adjusting US data for use in other countries – the big issues
  - o COPE (ARM) adjustments and cross-country validations
  - o Tripod: Mixing ground-up loss costs, non-cat and cat results

- **QA 10 mins**

Today's Presentations

Concurrent Session 2 (International Property)

	1	2	3	4	5	6	7
	Trends						
	Ground Up			Excess		Loss Dev't Factors	
	Severity	Freq	Exposure	Severity	Freq	Ground Up	Excess
Property							
Casualty							
Specialty							

	8	9	10	11	12	13	14	15
	Rate Changes		Ground-Up	Excess Loss		Region/ Hazard/	Layer Experience/	Emergence
	Primary	Reinsurance	Loss Costs	Factors	ALAE	Subline	Exposure	Testing
Property	CS2-DS		CS2-JB	CS2-DS,CL,JB		CS2-JB	CS2-JB	
Casualty								
Specialty								

	16	17	18	19	20	21	22	23
						Industry	LOB	Where
	External	Loss Ratios			Aggregate	Macro	Redund/Def/	in the
	Forces	Primary	Reinsurers	Volatility	Distribution	Application	Correlations	Cycle?
Property	CS2-DS,CL	CS2-DS				CS2-JB		
Casualty								
Specialty								

International Property Per Risk Benchmarking

Property Per Risk Benchmarking Agenda

- **Need for Benchmarking – The Big Issues**
  - Exception to *"Never make analogies to US business"?* *
- **Adjusting US Data for Use in Other Countries**
  - Property Per Risk Example
  - Establish strong US benchmark
  - Explicitly adjust for differences between US and target countries
    - Using COPE (ARM) adjustments
  - Validation to external sources
- **International Data Collection**
  - Global Benchmarking
  - Collecting carrier specific data
- **"Tripod" Approach – Integrating Multiple Applications**
  - Ground-Up Loss Costs
  - Excess Layers for Non-Cat Business
  - Cat modeling

** Jeffrey Dollinger – International Reinsurance: The Education of an American Actuary – CAGNY May 2013*

The Property Per Risk Benchmarking Issues
A Survey of International Property Size of Loss Curves

- **The Issues:**
  - Plausible curves need to rely on link between losses and their exposed amounts of insurance
  - Establishing connection between US & International experience – large loss occupancy test
- **Lloyd's Scales**
- **Salzman Scales**
- **Ludwig Tables**
- **Various Reinsurer Based Scales**
  - Swiss Re, Munich Re, Skandia
- **MBBEFD Approximations** *(S. Bernegger)*
  - Modeling loss severity with distributions from Physics
- **Extreme Value Theory** *(G. Ramachandran)*
  - Factors affecting Fire Loss – Multiple regression models
- **ISO – PSOLD International**
  - Based on US Proxy Approach, COPE (ARM), with validation
  - Four countries released so far (UK, Germany, France, Australia)
  - Others in process

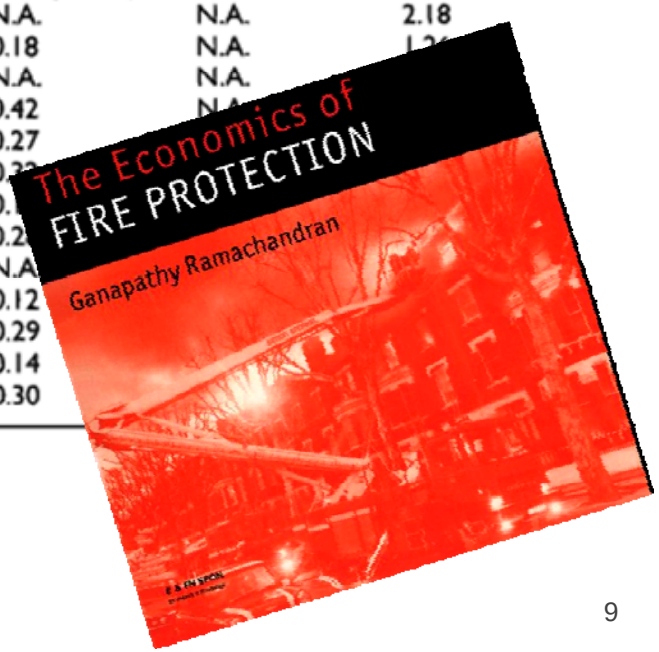
The Property Per Risk Benchmarking Issues

Illustrative comparison of Fire losses between countries

Table 1.1 International fire costs comparisons

Country	Direct fire losses (%)[a]	Indirect fire losses (%)[a]	Costs of fire fighting organisations (%)[a]	Costs of fire insurance administration (%)[a]	Costs of fire protection to buildings (%)[a]	Total cost of fire (%)[a]	Fire deaths per 100,000 persons (%)[b]
Austria	0.21 (79–80)	0.029 (79–80)	N.A.	0.14 (79–80)	N.A.	N.A.	0.74
Belgium	0.40 (88–89)	N.A.	0.18 (87–89)	0.28	0.21 (87–88)	N.A.	1.47
Canada	0.24	N.A.	0.16 (85)	0.21 (80–81)	0.34	N.A.	1.58
Denmark	0.26	0.034	0.09 (87–88)	0.08 (87–88)	0.40 (86–88)	0.864	1.64
Finland	0.17 (88–89)	0.021	0.18 (85–86)	0.05	N.A.	N.A.	2.18
France	0.23	0.037	N.A.	0.16 (79–80)	0.18	N.A.	
Germany, West	0.20	0.037	N.A.	0.09	N.A.	N.A.	
Hungary	0.12 (86–88)	0.028	N.A.	0.01 (87–88)	0.42		
Japan	0.08	0.016 (85–86)	0.27	0.11	0.27		
Netherlands	0.19	0.03	0.16 (87–88)	0.04 (87–88)			
New Zealand	0.20	N.A.	0.18	0.22			
Norway	0.24	0.005	0.12	0.11			
Spain	0.12 (1984)	N.A.	N.A.	0.05 (86)	N.A		
Sweden	0.25	0.009	0.21	0.06	0.12		
Switzerland	0.23 (1989)	0.095	N.A.	N.A.	0.29		
UK	0.19	0.019	0.27	0.11	0.14		
USA	0.15	0.013	0.29	0.06	0.30		

Notes
[a] Average percentage of gross domestic product (1991–3)
[b] 1991–3
N.A. = estimate not available
The years are indicated in brackets wherever they are not 1991–3.

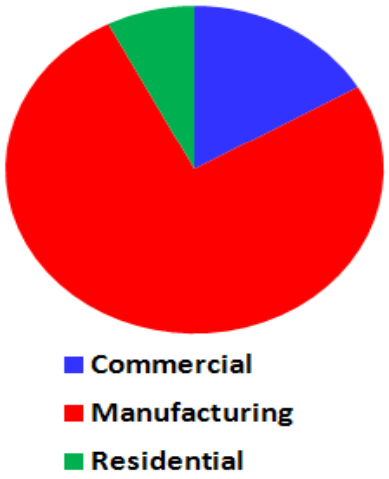


The Property Per Risk Benchmarking Issues

US Large Fire Loss Occupancy Distribution – 20 years >25M

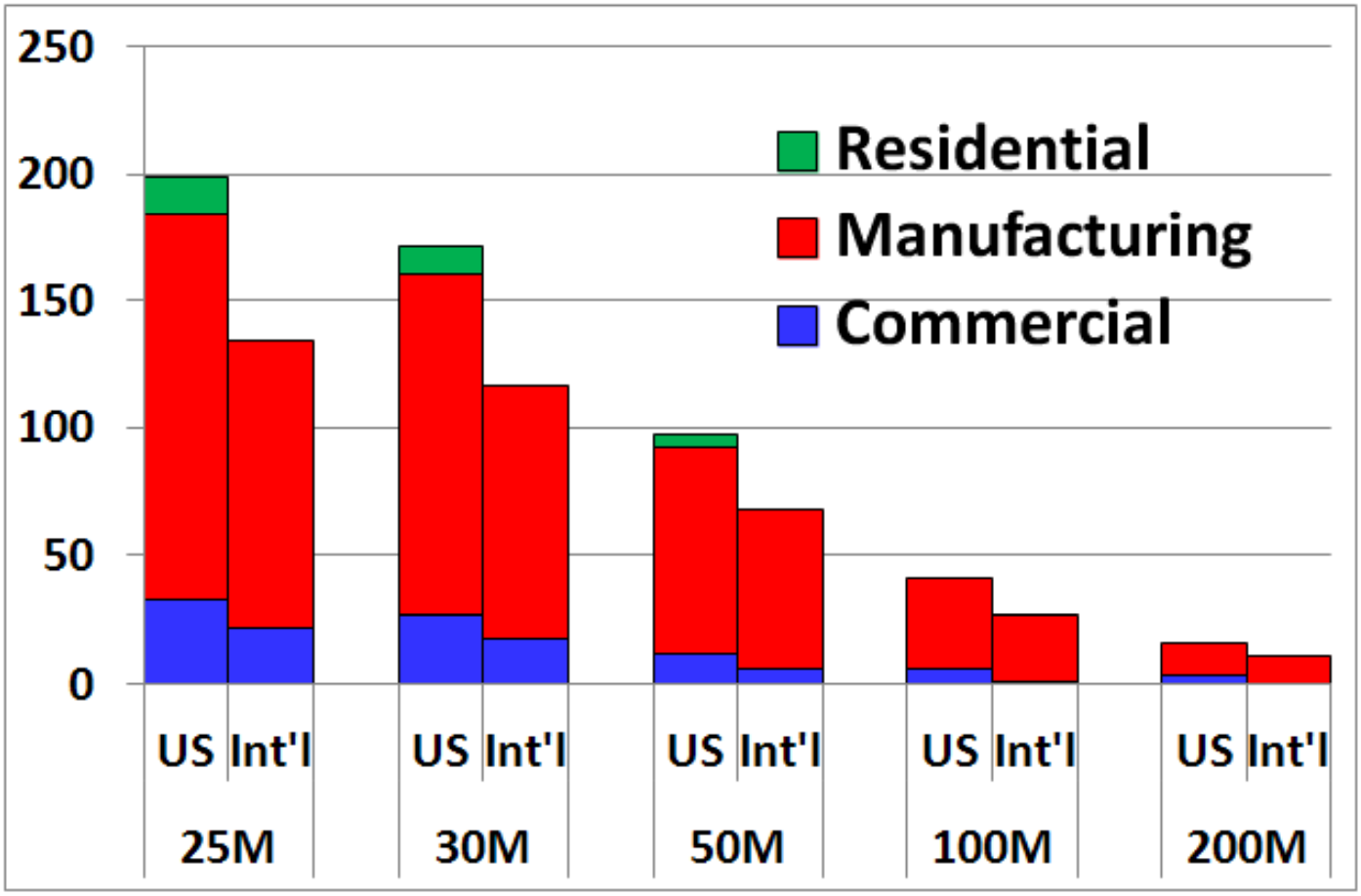
US Large Fire Loss Experience by Occupancy (NFPA 20 years: 1991-2010)

Row Labels	Sum of Estimated Loss (in $mm)	Count of Estimated Loss (in $mm)2	% Total Counts	US $XS Threshold 25mm	% XS Threshold
Commercial	**2,727.6**	**33**	**16.6%**	**1,903**	**15.2%**
Aircraft	409.9	9	4.5%	185	1.5%
Cafeteria	27.7	1	0.5%	3	0.0%
Casino	382.7	1	0.5%	358	2.9%
Casino/Hotel	46.7	1	0.5%	22	0.2%
College/University	69.1	2	1.0%	19	0.2%
Film/Movie Studio	44.1	1	0.5%	19	0.2%
Hangar	50.4	1	0.5%	25	0.2%
Hospital	71.6	1	0.5%	47	0.4%
Hotel	76.3	2	1.0%	26	0.2%
Hotel/Casino	115.9	1	0.5%	91	0.7%
Office	921.8	6	3.0%	772	6.2%
Office/Stores	231.4	1	0.5%	206	1.7%
Residential/Commercial	124.6	1	0.5%	100	0.8%
School	99.6	3	1.5%	25	0.2%
Store	55.8	2	1.0%	6	0.0%
Manufacturing	**14,053.3**	**151**	**75.9%**	**10,278**	**82.3%**
Chemical Waste	33.4	1	0.5%	8	0.1%
Electric Sub-station	26.9	1	0.5%	2	0.0%
Lumber Yard	38.7	1	0.5%	14	0.1%
Mall	263.7	3	1.5%	189	1.5%
Manufacturing	8,700.8	80	40.2%	6,701	53.6%
Meat Prep Plant	56.3	1	0.5%	31	0.3%
Mill	31.0	1	0.5%	6	0.0%
Packing Plant	119.4	1	0.5%	94	0.8%
Pipeline	146.7	2	1.0%	97	0.8%
Plant	534.1	11	5.5%	259	2.1%
Power Plant	102.4	2	1.0%	52	0.4%
Ship	90.3	1	0.5%	65	0.5%
Special Property	385.1	8	4.0%	185	1.5%
Tractor Trailor	49.5	1	0.5%	25	0.2%
Truck	119.4	1	0.5%	94	0.8%
Warehouse	3,355.6	36	18.1%	2,456	19.7%
Residential	**689.0**	**15**	**7.5%**	**314**	**2.5%**
Apartment	456.6	9	4.5%	232	1.9%
Condo	33.1	1	0.5%	8	0.1%
Residential	199.3	5	2.5%	74	0.6%
Grand Total	**17,469.9**	**199**	**100.0%**	**12,495**	**100.0%**



The Property Per Risk Benchmarking Issues

Comparison of Large Fire Losses by Occupancy – US vs. International



International counts used in establishing First Level validation of PSOLD Int'l results

Basic Steps in Adjusting US Excess Loss Curves for International

- **Step 1: Validate US Curves – Want Strong Proxy Anchor**
  - US Commercial Property market is 1.5 x size of 7 initial target countries combined
  - Evaluate credibility of US original and fitted data – in total and by component
  - Validate using actual vs. expected large losses (from 25mm to 250mm; NFPA 20 years)
- **Step 2: Adjust US Curves to International – COPE (ARM)**
  - Assess differences in Amounts of Insurance, Occupancy, Protection, Construction, etc.
  - Using various industry exposure databases – US vs. International
  - Consolidate individual selections to total COPE adjustments
- **Step 3: Validate Proxy Curves with Industry Data** *(First Level)*
  - Industry large loss information (FPA-UK, other sources)
  - Compare actual vs. expected claim counts at various attachment points
  - Cross country comparisons – counts and occupancy differences
- **Step 4: Further Validate with Participant Data Collection** *(Second Level)*
  - Submissions: individual large claims
  - Aggregated exposure information

Establish Credibility of Collected Claim Information

Growth In Claims – 2002 to 2012

PSOLD 2002 Distribution of losses

Range (millions)		Loss count	
low	high	between	above
1	2.5	1363	4250
2.5	5	2094	2887
5	8	502	793
8	10	139	291
10	25	62	152
25	50	69	90
50	80	15	21
80	100	2	6
100	+	4	4

PSOLD 2004 Distribution of losses

Range (millions)		Loss count	
low	high	between	above
1	2.5	2142	5614
2.5	5	2518	3472
5	8	533	954
8	10	178	421
10	25	121	243
25	50	88	122
50	80	21	34
80	100	2	13
100	+	11	11

32.1%

PSOLD 2006 Distribution of losses

Range (millions)		Loss count	
low	high	between	above
1	2.5	2797	6554
2.5	5	2683	3757
5	8	586	1074
8	10	205	488
10	25	140	283
25	50	103	143
50	80	23	40
80	100	2	17
100	+	15	15

16.7%

PSOLD 2008 Distribution of losses

Range (millions)		Loss count	
low	high	between	above
1	2.5	3593	8402
2.5	5	3469	4809
5	8	717	1340
8	10	272	624
10	25	182	352
25	50	114	170
50	80	38	55
80	100	2	17
100	+	15	15

28.2%

PSOLD 2010 Distribution of losses

Range (millions)		Loss count	
low	high	between	above
1	2.5	4139	**9687**
2.5	5	4028	**5548**
5	8	801	**1519**
8	10	320	**718**
10	25	206	**399**
25	50	137	**193**
50	80	38	**55**
80	100	0	**17**
100	+	17	**17**

15.3%

PSOLD 2012 Distribution of losses

(excluding additional data sources)

Range (millions)		Loss count	
low	high	between	above
1	2.5	6472	12928
2.5	5	4587	6456
5	8	973	1869
8	10	372	897
10	25	304	525
25	50	150	221
50	80	50	71
80	100	2	20
100	+	18	18

33.5%

PSOLD 2012 Distribution of losses

(including additional data sources)

Range (millions)		Loss count	
low	high	between	above
1	2.5	12563	**19566**
2.5	5	4863	**7003**
5	8	1058	**2140**
8	10	427	**1082**
10	25	414	**655**
25	50	161	**241**
50	80	57	**79**
80	100	2	**22**
100	+	20	**20**

51.3%

Total Change from 2010 to 2012

Range (millions)		Total
low	high	Change
1	2.5	**102.0%**
2.5	5	**26.2%**
5	8	**40.8%**
8	10	**50.6%**
10	25	**64.1%**
25	50	**24.8%**
50	80	**43.2%**
80	100	**28.8%**
100	+	**15.2%**

Review Granularity – Results by Occupancy
Paired Average Severity Relativities

New PSOLD RG #	PSOLD RG name	Count of CSP	Sum of 20-year Total Claim Count	Relativity High/Low 20 yr	Relativity High/Low 5 yr
1	Apartment/Condo under 10 units	7	72,360	1.00	1.00
2	Apartment/Condo over 10 units	8	76,568	1.64	1.74
6	Hotels and Motels - With Restaurant	4	11,871	2.19	1.91
7	Hotels and Motels - Other	7	58,438	1.00	1.00
15	Other Mercantiles - Retail/Wholesale	4	79,980	1.81	1.78
16	Other Mercantiles - Other	17	440,504	1.00	1.00
25	Agricultural - Greenhouses	1	3,177	1.00	1.00
26	Agricultural - Grain Elevators	6	2,982	6.75	5.75
27	Food Processing - Other	7	16,221	1.00	1.00
28	Food Processing - Severe	3	1,324	1.98	2.82
31	Light Manufacturing - Printing	1	14,274	1.00	1.00
32	Light Manufacturing - Other	5	12,551	2.00	2.48
33	Heavy Manufacturing - Wood	4	23,910	1.48	1.73
34	Heavy Manufacturing - Other	7	32,300	1.00	1.00
36	Highly Protected Risks - Low	17	4,453	1.00	1.00
37	Highly Protected Risks - Medium	15	7,950	2.47	1.66
38	Highly Protected Risks - Heavy	46	4,703	8.28	5.41
Grand Total		230	2,520,239		

Underlying actual average severities by Rating Group range from 9k (Billboards), to over 500k (Petro)

Review Macro Industry Application for Validation (US)

Summary – Actual vs. Expected # of Claims (All Occupancies vs. Severe)

	All Occupancies 20 year				Severe Occupancies * 20 year		
	NFPA	PSOLD 2012		PSOLD 2010	PSOLD 2012		
Threshold (mm's)	Actual	2.5mm Scaled	Fitted Range	2.5mm Scaled	2.5mm Scaled	Fitted Range	Severe /All Occupancies
500	*3*	*0.5*	*0 - 1*	*0.4*	*0.3*	*0 - 0*	66.3%
400	*6*	*1.4*	*1 - 2*	*1.3*	*0.9*	*1 - 1*	66.1%
250	12	7.1	6 - 11	*7.7*	4.6	5 - 6	65.5%
200	13	12.4	11 - 19	*13.9*	8.0	8 - 11	64.8%
150	19	21.8	19 - 33	*24.6*	13.7	14 - 19	62.9%
100	40	43.7	38 - 67	*47.5*	25.2	25 - 35	57.7%
80	52	59.1	51 - 91	*62.1*	31.8	32 - 44	53.9%
50	89	108.4	93 - 166	*106.5*	47.4	47 - 65	43.7%
25	182	314.0	270 - 481	*292.1*	84.0	84 - 116	26.7%

Actual claims from National Fire Protection Association largest claims 1991-2010
- trended to 2012, but not developed beyond 1st report; does not include indirect losses such as TE
- does not include potential protection improvement credits (9 of the 13 >=200mm are from 1990s-trended)

Fitted using all rating groups (38) and states combined; adj. for 50% market share (last 20 year 40-60%)

* Severe Manufacturing/Petroleum & Highly Protected Risks-Heavy (52 CSP Classes; PSOLD RGs-35,38)

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
2. **Assess whether each item would favorably or unfavorably impact expected loss results compared to the US**
   - e.g. 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

Same procedure can be applied for Ground-up Loss Costs

Further Validate Proxied Curves to Actual Claims

Summary – Actual vs. Expected # of Claims (All Occupancies) (Illustrative)

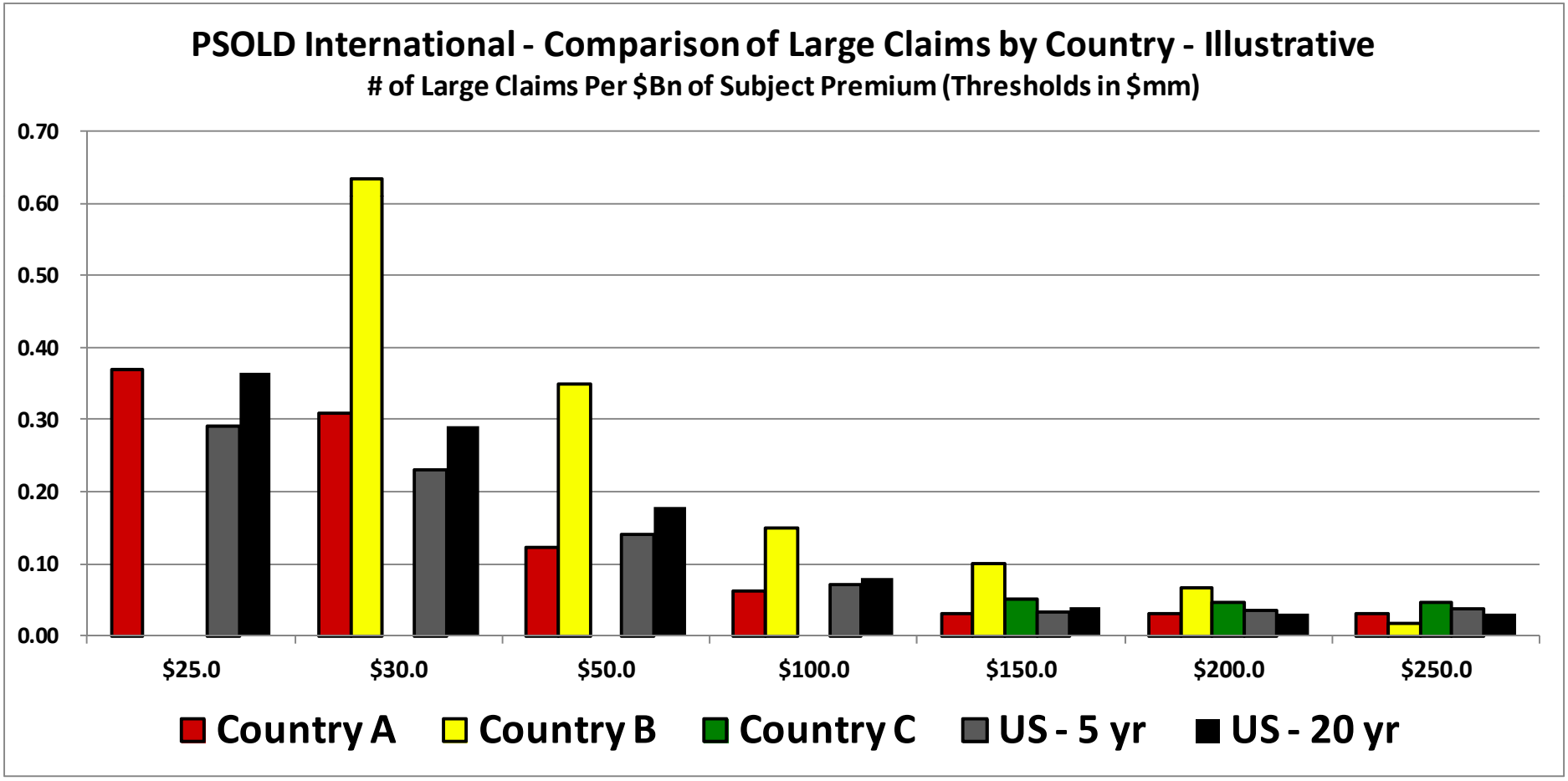
Threshold (GBP)	Threshold ($mm)	Actual		PSOLD Int'l		
		Raw	Trended	Low	Med	High
3.1	5			21.39	31.84	42.86
6.3	10	4.8	7.2	7.09	10.88	15.09
12.5	20	2.4	2.6	2.25	3.45	4.80
15.6	25	2.0	2.4			
18.8	30	1.2	2.0			
31.3	50	0.6	0.8	0.69	0.96	1.24
62.5	100	0.4	0.4	0.24	0.38	0.51
93.8	150	0.2	0.2			
125.0	200	0.2	0.2	0.03	0.09	0.14
156.3	250	0.0	0.2			
218.8	350	0.0	0.0			

Assumptions: All Industry using 4bn GBP; 40% attritional LR; Bldgs plus contents plus Time Element (BI); All perils x minor and major Cat; All industry AOI and Occupancy based on PSOLD US CP distributions; Time element cap of 300% (PSOLD US Default); Overall loss scalar of .8 to reflect COPE analysis vs. US; Differences in COPE uses various sources including AIR's Industry Exposure Database

Range varies overal Loss Scalar, Attritional LR, and Time Element cap

Actual losses from Axco Insurance Information Services - 2012- trended using 3% per year

PSOLD International
Cross Country Comparison (Illustrative)



Case Study – UK, FR Hotels

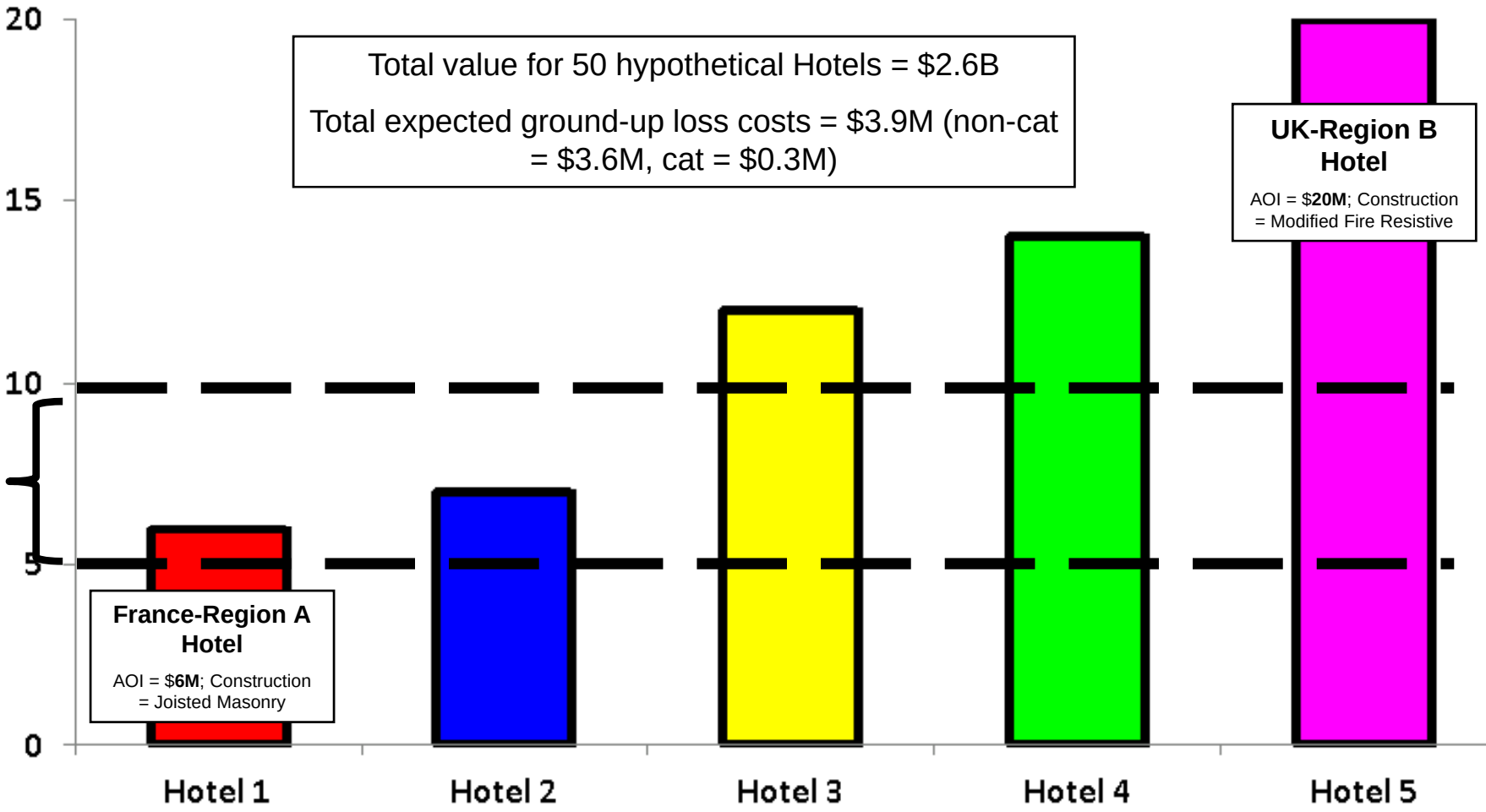
- **Steps to Price: Case Study**
- **Ground-up Loss Costs**
  - Can use US as proxy to estimate non-US class based loss costs, using similar COPE and LOI scaling procedure used in PSOLD International
  - Can use Portal values and PSOLD International Utilities
- **Excess Pricing**
- **Cat Pricing**

Illustrative Case Study
Large European Hotels

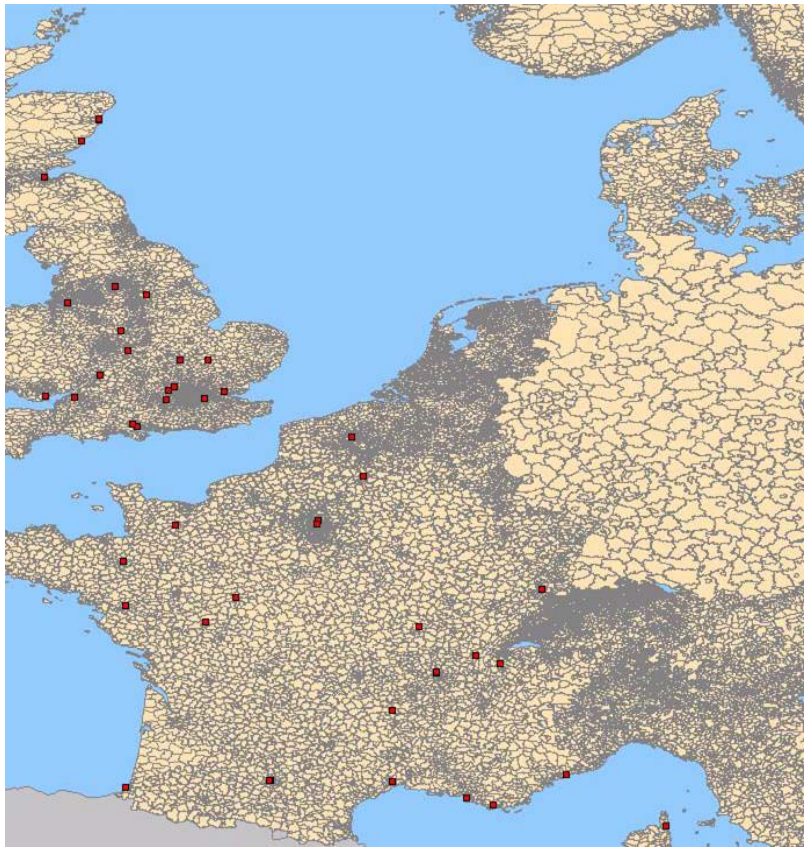
- A hypothetical hotel chain needs insurance on 50 hotels spread over UK and France
- Individual property values range from $6M to $120M; aggregate value: $2.6B
- Coverage: “All Risks of Direct Physical Loss, Damage,
or Destruction….”; terrorism exclusion
- Layers starting: $5M xs $5M, …, $200M xs $100M
- Sublimit of $100M for Earthquake peril only

Illustration of Excess Layering: $5M excess of $5M

*What are the expected cat and **noncat** losses for this layer?*



Case Study: 50 European Locations



Cat / Non-Cat Inputs

Loc ID	Country	City	Region (Prot)	Cresta	Stories	YearBuilt	Construction Desc	Total Value
33	FR	Paris	A	75009	5	1988	Reinforced Concrete	5,873,617
69	FR	Toulon	B	83000	12	1984	Light Metal	7,067,592
1	FR	Biarritz	C	64200	8	1987	Steel	11,979,678
35	UK	Cheltenham	A	GL52 8SF	2	1989	Precast Concrete	14,394,014
64	UK	Edinburgh	B	EH9 3JL	9	1986	Reinforced Concrete	24,049,661
61	UK	Montrose	C	D10 9SL	7	1982	Light Metal	36,282,526
3	FR	Le Puy	A	43000	5	1985	Reinforced Masonry	37,006,477
70	FR	Limonest	B	69760	10	1984	Reinforced Concrete	37,097,538
68	FR	Marseille	C	13005	17	1987	Unknown	37,299,874
67	UK	Cardiff	A	CF4 7YJ	8	1981	Reinforced Concrete	37,532,053
							Total - 50 Hotels	2,645,540,948

Cat / Non-Cat Results

	Cat Expected Losses		NonCat Expected Losses		Combined	
Loc ID	Total (GroundUp)	5xs5	Total (GroundUp)	5xs5	Total	5xs5
33	245	24	25,000	190	25,245	214
69	869	72	12,075	373	12,944	445
1	865	89	14,140	1,102	15,005	1,191
35	1,777	120	12,425	866	14,202	986
64	3,525	153	7,210	724	10,735	877
61	19,576	1,004	11,655	1,302	31,231	2,306
3	1,064	94	27,510	1,193	28,574	1,286
70	755	71	32,235	1,612	32,990	1,683
68	2,746	213	43,505	3,826	46,251	4,039
67	3,812	260	43,680	3,363	47,492	3,622
	334,008	24,004	3,566,510	281,113	3,900,518	305,117

About 90% of GU and 1st Layer LC are Noncat in UK and FR

Case Study Basic Components

- **US ground-up Loss Costs can be used as proxy for outside the US**
  - Adjust for differences such as construction, occupancy, protection, exposure, amounts of insurance, etc. (COPE-ARM)
- **PSOLD International uses the COPE-ARM procedure to adjust for outside the US**
  - Currently four countries released for Europe (UK, Germany, France, Australia) with others such as Netherlands, Brazil, and Japan being validated
  - Excess layer validations made to large known claims up to 200mm
- **AIR provides catastrophe models covering over 90 countries around the world**
  - Covers perils such as Tropical Cyclones (Hurricanes), Extratropical Storms(Winter Storm), Earthquake, Severe Thunderstorm (Tornado / Hail / Straight-line Wind), Inland Flood, Wildfire, Agriculture, and Terrorism in various countries

Property Excess Rating: Noncatastrophe Losses
First Loss Scale Illustration — $5M Excess of $5M

% 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)

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 $5,000,000 of building value [$5,000,000= 25% x 20,000,000]

75% of the ground-up losses pays the losses for the first $10,000,000 of building value [$10,000,000 = 50% x 20,000,000]

Therefore, would want to collect 15% (75.0%-60.0%) of the total ground-up expected loss costs for the $5M excess of $5M layer

*** PSOLD has over 1 million individual curves for 60 AOI bands, 38 occupancies, 50 states, 4 sets of perils, etc.**

Step 1: Will Want to Estimate Ground-up Loss Costs Using Proxy Basis

- **ISO's advisory loss costs**
  - Licensed by 1,500 U.S. insurers — 90% of the Commercial Lines market and 45% of Personal Lines market
  - Broad database with credible data at a very detailed level
  - Useful benchmark for underwriting, pricing, and compliance with solvency regulations
- **Can be used to estimate other costs on proxy basis**
  - Ground-up loss costs on class basis in absence of other information
  - Comparison to actual charged or expiring premiums

Loss Cost Table: Sample (Basic Group 1)
UK – Territory B (Use Phoenix, AZ as Proxy)

Arizona Motel/Hotel - Simplified Illustration

State	AZ
Territory	Balance of State
CSP Class Code (Occupancy)	744 Motels and Hotels with Restaurant - Over 30 Units

Building	250K	10M	50M
(1) BG1 base class loss cost	0.089	0.089	0.089
(2) Amount of insurance	250,000	10,000,000	50,000,000
(3) Limit of insurance factor	1.000	0.950	0.900
(4) BG1 Loss Cost	**223**	**8,455**	**40,050**

	Construction Type
0%	(1) Frame
100%	(2) Joisted Masonry
0%	(3) Non Comb
0%	(4) Mas. Non-Comb
0%	(5,6) Mod FR or Fire Res
100%	

Contents	50K	750K	2.5M
(1) BG1 base class loss cost	0.099	0.099	0.099
(2) Amount of insurance	50,000	750,000	2,500,000
(3) Limit of insurance factor	1.000	0.950	0.900
(4) BG1 Loss Cost	**50**	**705**	**2,228**

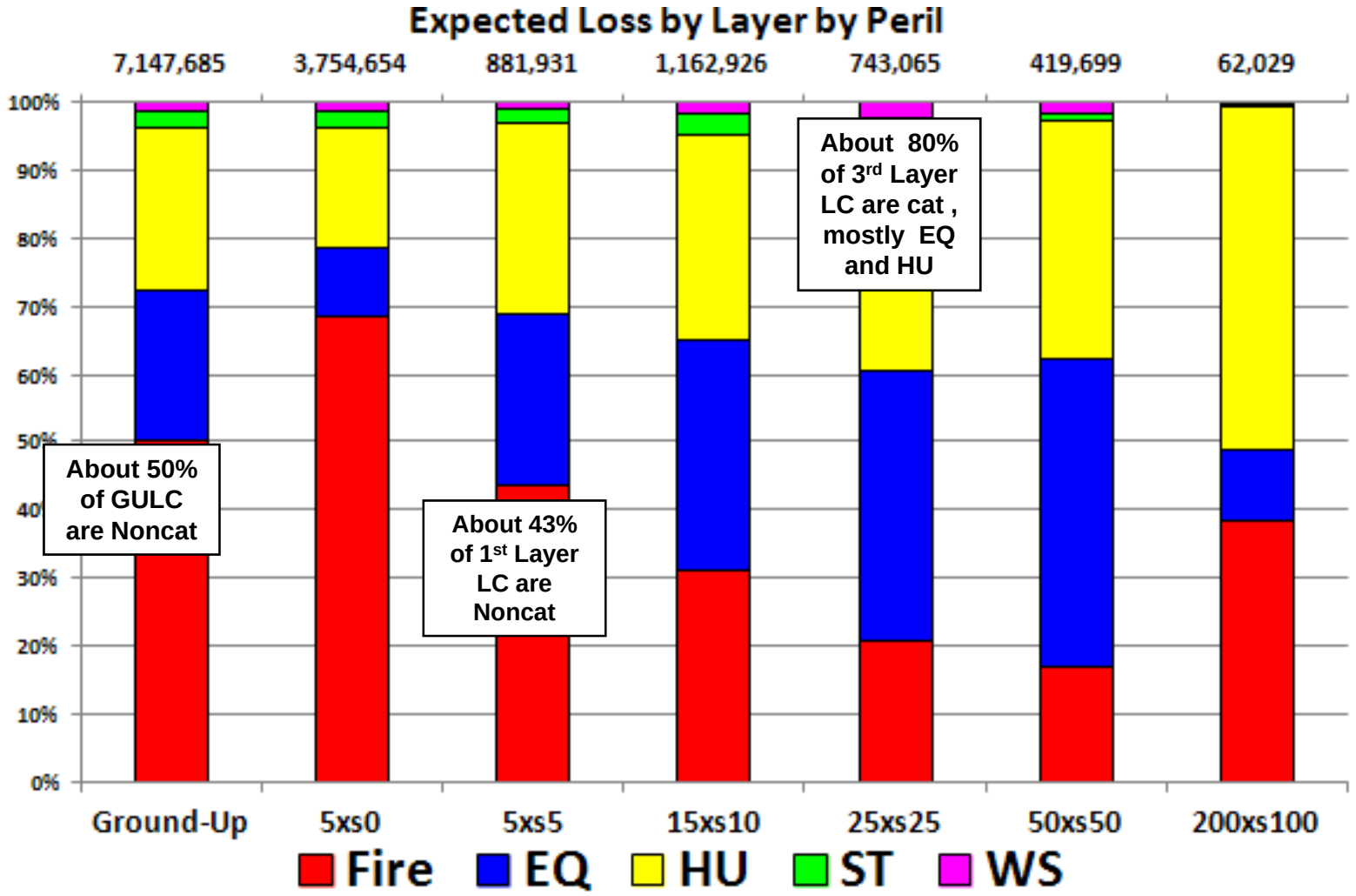
Buildings and Contents - BG1	**272**	**9,160**	**42,278**	**Balance of State**
Buildings and Contents - BG1	**463**	**15,600**	**71,999**	**Phoenix**

Basic Group 1 Perils: Fire, lightning, explosion, vandalism, and sprinkler leakage.

Step 2: Estimate Excess Layer Expected Losses

- **ISO's Property Size of Loss Database (PSOLD)**
  - o PSOLD curves based on 20 years of U.S. claims data reported to ISO with loss detail linked to exposure information by amount of insurance, state, occupancy, coverage, peril, etc.
  - o Combines very detailed distributions in appropriate mix reflecting location-level ground-up losses
  - o Linkage to primary CSP industry and AIR cat model occupancies
- **Macro industry validation for working and high excess layers**
  - o Validation to NFPA data on all-industry basis to 200M
- **PSOLD has over 1 million individual curves**
  - o 60 AOI bands, 38 occupancies, 50 states, 4 sets of perils, etc.

Case Study: 50 U.S. Location Results: By Peril

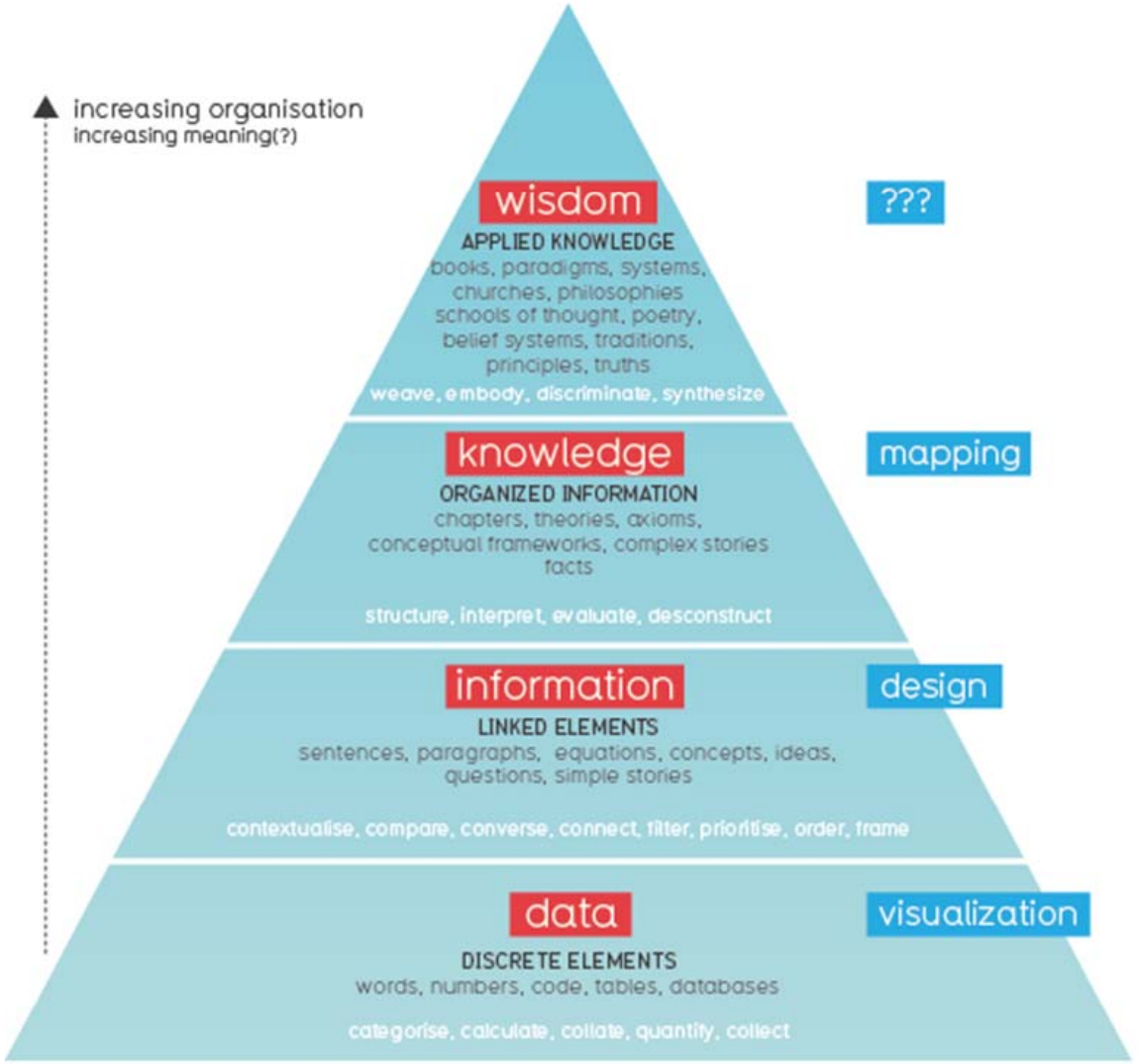


Review both Cat/Non-cat analyses results in tandem
By Location

Location ID	Cat Expected Losses			Non-Cat Expected Losses		
	Full Cover	5xs5	…	Full Cover	5xs5	…
33	**999**	88	…	**25,000**	1,422	…
69	**16,828**	467	…	**12,075**	1,111	…
1	**1,759**	252	…	**14,140**	1,417	…
35	**1,959**	452	…	**12,425**	1,280	…
64	**2,559**	254	…	**7,210**	744	…
61	**154,302**	22,923	…	**11,655**	1,400	…
3	**1,510**	141	…	**27,510**	2,939	…
70	**7,597**	709	…	**32,235**	3,857	…
…	…	…	…	…	…	…
Total 50 Hotels	**3,581,188**	480,391		**3,566,510**	382,389	…

Appendix

Benchmarking: Data to Wisdom Conversion



David McCandless // v 0.1 // work in progress
InformationIsBeautiful.net

Need for Benchmarking

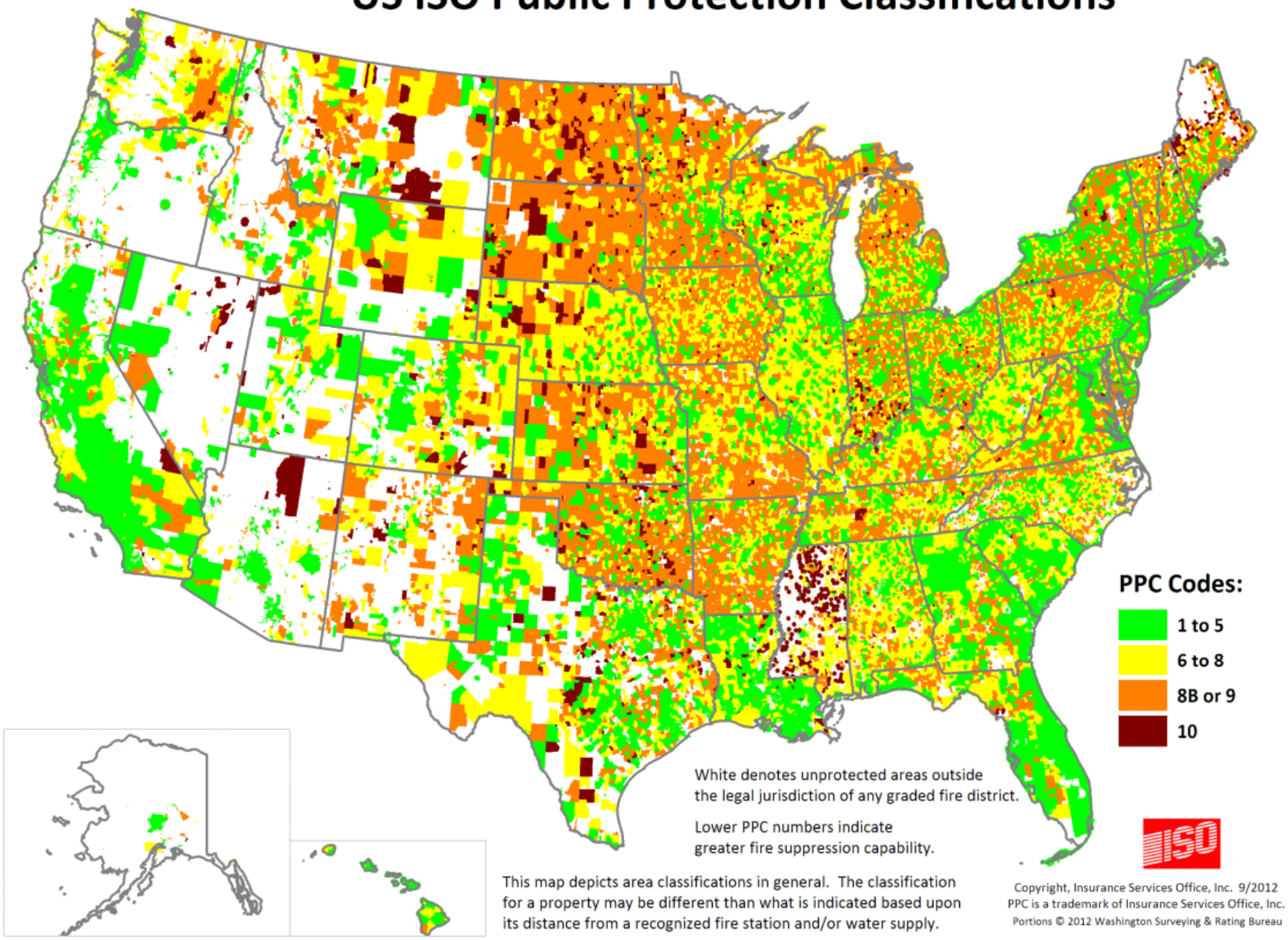
- Overall effort to convert data into information, knowledge, and wisdom
- Obtain relevant internal and external information to establish companywide benchmarks
  - Information can be used not only for individual account puzzle solving, but also as proxy for entry into new lines of business or territories
  - Actuary, underwriter and management vetting of information annually or as needed – helps establish consistency across units
- After the inevitable loss or series of losses, easier with a benchmarking framework to "fix" the issue that has arisen
- Helps identify areas of potential "**Overconfidence**"
  - The impact due to lack of credibility combined with Information lag is significant – e.g. RAA Loss Development Study started in the 1960s
  - Byproduct of underestimating the impact is **innocent capacity** by inexperienced companies
- Added company management, regulatory, and Solvency II pressure to establish benchmarking framework

Source: CARe-IT1 – June 2012; Perspectives from America – May 2012 by John Buchanan

PSOLD International – Countries

- 2013 Target Lines / Countries
  - Further validate initial countries:
    - 4 initial: UK, Germany, France, Australia
    - Others in process: Brazil, Japan, Netherlands
  - Other potential targets:
    - Belgium, China, Hong Kong, Ireland, Italy, Japan, Mexico, Switzerland, Turkey

US ISO Public Protection Classifications

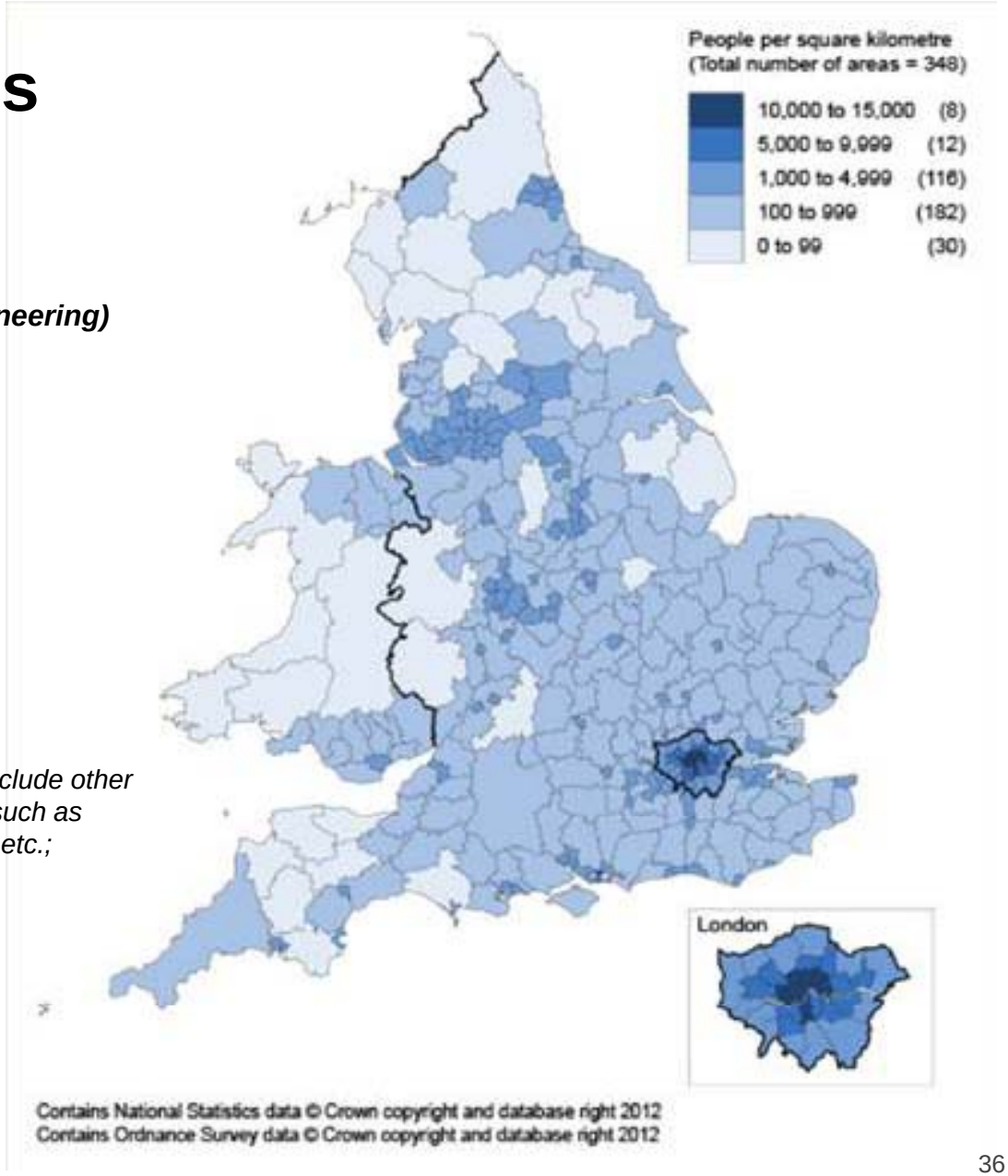


This map depicts area classifications in general. The classification for a property may be different than what is indicated based upon its distance from a recognized fire station and/or water supply.

UK Protection Classes

A. Major Cities ***(and highly maintained fire engineering)***
B. Other Cities
C. Suburban
D. Rural

Distribute PPC Equivalents 1-10 (could be beyond 10); include other general expected fire protection engineering differences such as sprinkler usage / maintenance, industrial park pipe sizes, etc.;



PSOLD – Adjustments for Construction

ISO Manual – Sample Loss Cost Page by Construction

CSP Class Code	Coverage	Construction (Code)				
		Frame (1)	Joisted Masonry (2)	Non-Comb. (3)	Mas. Non-Comb. (4)	Mod. F.R. (5) Or Fire Res. (6)
0701	Building (1)	0.025	0.023	0.020	0.017	0.015
	Contents (2)					
	A	0.028	0.025	0.024	0.021	0.020
	B	0.042	0.037	0.035	0.031	0.029
	C	0.032	0.029	0.028	0.024	0.023
0702	Building (1)	0.053	0.048	0.042	0.034	0.032
	Contents (2)					
	A	0.063	0.057	0.053	0.047	0.043
	B	0.087	0.079	0.074	0.065	0.061
	C	0.078	0.070	0.066	0.059	0.054
0742	Building (1)	0.099	0.089	0.080	0.064	0.061
	Contents (2)	0.109	0.099	0.093	0.082	0.077
0743	Building (1)	0.099	0.089	0.080	0.064	0.061
	Contents (2)	0.109	[illegible]	0.093	0.082	0.077
0744	Building (1)	0.099	0.089	0.080	0.064	0.061
	Contents (2)	0.109	0.099	0.093	0.082	0.077
0745	Building (1)	0.043	0.039	0.034	0.028	0.026
	Contents (2)	0.047	0.043	0.040	0.036	0.033
0746	Building (1)	0.043	0.039	0.034	0.028	0.026
	Contents (2)	0.047	0.043	0.040	0.036	0.033
0747	Building (1)	0.043	0.039	0.034	0.028	0.026
	Contents (2)	0.047	0.043	0.040	0.036	0.033

Global Benchmarking – Data Collection

- **Further Validate with Company Data Collection**
  - Market Size / concentration
  - Submissions: individual large claims
  - Aggregated exposure information
  - Estimate actual and expected claim counts and ratios for various layers
  - These ratios could be used to further scale up or down the US Proxy curves

Application to International Risks

- **Start with ISO's advisory loss costs**
  - o May be Used in ISO Occupancy Class Code Detail
  - o May be Aggregated --- Mapped to AIR Level of Detail
  - o Detailed Starting Point Available for US
    - Match Attributes of Risk
- **Employ COPE Adjustments**
  - o Use Adjustments based on Comparisons with Other Countries
- **Supplement with Local/Risk Specific Knowledge**
- **Use Country-Specific PSOLD Curves (as previously described)**
- **Run Country-Specific CAT Model**

Portal to ISO US Information

- **Provides ISO's advisory loss costs and Rating Factors**
  - o Full Detail Available
  - o State/National Averages Also Available
  - o Available in level of detail used in CAT Modeling
- **Make appropriate adjustments for COPE (ARM)**
- **Primarily for Non-Admitted Market**
  - o Updated twice yearly
- **Ease of Use**
  - o Quick Access to Information
  - o May be downloaded/exported

Portal Initial Screen

Portal Sample Heat Map

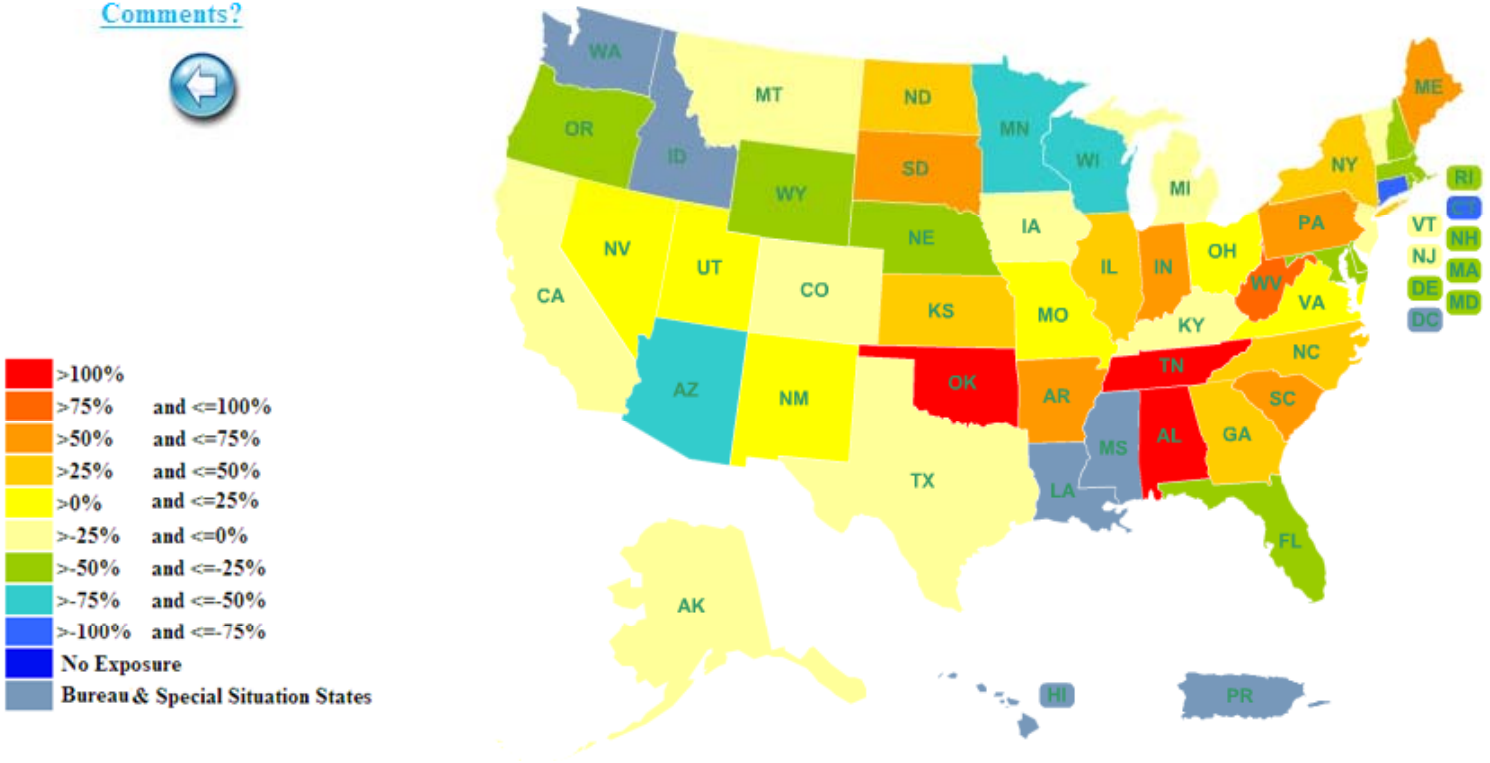
ISO®
A Verisk Analytics Company

Protection: 5 | Deductible Level: $500 | Limit of Insurance: 250,000 | Exposure Basis: Per $100
Coverage/Exposure:

Logout

304-----Temporary Lodging
Commercial Property-----Basic Group I/Coverage: 1-----Building/Construction: 2-----Joisted Masonry

Comments?



PSOLD / Loss Costs Linkage
PCI Macro - Required and Optional Inputs

PCI (PSOLD Compatible Import) Macro Inputs		
	Required	***Optional***
ALL	Description AOI Total State *(Region-PSOLD Int'l)* CSP Class Code *(PSOLD Occupancy)* Deductible *(or Net of Deductible)* Coverage (B only, C only or B+C)	*Actual Premium* *AOI Buildings* *AOI Contents* *AOI TE* *ZIP Code* *Full Address (SPI)* *Coinsurance* *GULC COPEA Scalar*
BG1	CSP Class Code	*PPC* *BG1 Construction* *Sprinklered*
BG2		*BG2 Symbol*
SCL	CSP Class Code	
TE	Type of Risk	
EQ	CSP Class Code	*Building Construction* *# of Stories* *Sprinklered*

PSOLD / Loss Costs Linkage

PCI Macro – Hypothetical Sample Inputs

Sample Input

Description/ Record Index	BUILDING Amount of Insurance ($)	CONTENT Amount of Insurance ($)	TIME ELEMENT Amount of Insurance ($)	TOTAL Amount of Insurance ($)	Deductible ($)	State	Zip Code	CSP	PSOLD Occupancy
69	26,286,612	3,716,076	5,335,274	35,337,962	5,000	Texas	77030	0744	06
1	26,107,941	3,683,358	6,147,734	35,939,033	5,000	Alabama	35209	0744	06
35	26,061,457	3,635,410	6,288,168	35,985,035	5,000	Illinois	60148	0744	06
64	26,514,598	3,749,609	5,810,285	36,074,492	5,000	Tennessee	37214	0744	06
61	24,143,590	2,285,410	9,853,526	36,282,526	5,000	South Carolina	29401	0744	06
3	27,882,479	3,074,449	6,049,549	37,006,477	5,000	Arizona	85016	0744	06
70	26,958,699	3,474,103	6,664,736	37,097,538	5,000	Texas	78723	0744	06
68	26,385,898	2,909,102	8,004,874	37,299,874	5,000	Texas	78701	0744	06
67	30,237,876	3,242,124	4,052,053	37,532,053	5,000	Texas	78230	0744	06
48	28,576,273	3,792,717	6,311,667	38,680,657	5,000	North Carolina	28217	0744	06
17	30,993,394	2,254,106	5,750,053	38,997,553	5,000	California	92629	0744	06
70	120,300,000	21,030,000	19,579,033	160,909,033	5,000	New York	10036	0744	06

TOTALS	50	$ 2,230,588,303	$ 247,237,011	$ 427,696,627	$ 2,905,521,941

Description/ Record Index	Coverage	PPC (Optional)	Sprinkler? (Optional)	BG1 Construction	BG2 Symbol	Actual Premium
69	BOTH	7	Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	26,287
1	BOTH	5	Non-Sprinklered	MODIFIED FIRE RESISTIVE	WIND RESISTIVE	99,690
35	BOTH	5	Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	76,548
64	BOTH	5	Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	67,190
61	BOTH	7	Non-Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	47,541
3	BOTH	5	Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	44,259
70	BOTH	5	Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	17,438
68	BOTH	5	Non-Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	55,416
67	BOTH	7	Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	20,887
48	BOTH	5	Sprinklered	MASONRY NON-COMBUSTIBLE	SUPERIOR WIND RESISTIVE	100,930
17	BOTH	5	Non-Sprinklered	JOISTED MASONRY	SUPERIOR WIND RESISTIVE	97,409
70	BOTH	5	Sprinklered	MODIFIED FIRE RESISTIVE	SEMI WIND RESISTIVE	211,360

50	$ 4,354,321

needed for PSOLD

additional needed for Loss Costs-BG1

additional needed for Loss Costs - other coverages

PSOLD / Loss Costs Linkage

PCI Macro - Comparison of Actual and Portal Class Based Loss Costs

Sample Input						
Description/ Record Index	State	Zip Code	CSP	*Actual Premium*	Portal Class Based Loss Costs	Portal ELC / Actual Prem
69	Texas	77030	0744	***26,287***	**43,581**	**1.66**
1	Alabama	35209	0744	*99,690*	81,419	0.82
35	Illinois	60148	0744	*76,548*	41,779	0.55
64	Tennessee	37214	0744	*67,190*	79,693	1.19
61	South Carolina	29401	0744	*47,541*	66,815	1.41
3	Arizona	85016	0744	***44,259***	**20,531**	**0.46**
70	Texas	78723	0744	*17,438*	30,619	**1.76**
68	Texas	78701	0744	*55,416*	29,443	0.53
67	Texas	78230	0744	***20,887***	**36,357**	**1.74**
48	North Carolina	28217	0744	*100,930*	52,211	0.52
74	New York	10036	0744	*211,360*	155,943	0.74
50				**$ 4,354,321**	**$ 3,435,367**	0.79

PSOLD US and International – Occupancy Definitions

PSOLD12 RG#	PSOLD12 RG Name	International RG#	International RG Name
1	Apartment/Condo under 10 units	2	Commercial/Industrial
2	Apartment/Condo over 10 units	2	Commercial/Industrial
3	Dwelling	1	Small Business
4	Group Institutional Housing	2	Commercial/Industrial
5	Hospitals and Nursing Homes	2	Commercial/Industrial
6	Hotels and Motels - With Restaurant	2	Commercial/Industrial
7	Hotels and Motels - Other	2	Commercial/Industrial
8	Entertainment and Recreation	1	Small Business
9	Restaurants and Bars	1	Small Business
10	Emergency Services	7	Local Authority
11	Government Services	7	Local Authority
12	Churches	1	Small Business
13	Schools	2	Commercial/Industrial
14	Offices and Banks	2	Commercial/Industrial
15	Other Mercantiles - Retail/Wholesale	2	Commercial/Industrial
16	Other Mercantiles - Other	1	Small Business
17	Gasoline Stations	1	Small Business
18	Auto repair	1	Small Business
19	Parking	1	Small Business
20	Billboards	1	Small Business
21	Personal and Repair Services	1	Small Business
22	Buildings Under Construction	5	Technical Risk
23	Air/Airplane Hangars	8	Other
24	Storage	2	Commercial/Industrial
25	Agricultural - Greenhouses	6	Agriculture
26	Agricultural - Grain Elevators	6	Agriculture
27	Food Processing - Other	2	Commercial/Industrial
28	Food Processing - Severe	3	Heavy
29	General Indu/Metal Manufacturing	3	Heavy
30	Chemical Manufacturing	3	Heavy
31	Light Manufacturing - Printing	2	Commercial/Industrial
32	Light Manufacturing - Other	2	Commercial/Industrial
33	Heavy Manufacturing - Wood	3	Heavy
34	Heavy Manufacturing - Other	3	Heavy
35	Severe Manu/Petroleum	4	Severe
36	Highly Protected Risks - Low	2	Commercial/Industrial
37	Highly Protected Risks - Medium	3	Heavy
38	Highly Protected Risks - Heavy	4	Severe

International RG#	International RG Name
1	Small Business
2	Commercial/Industrial
3	Heavy
4	Severe
5	Technical Risk
6	Agriculture
7	Local Authority
8	Other

Review Curve Fitting Applications

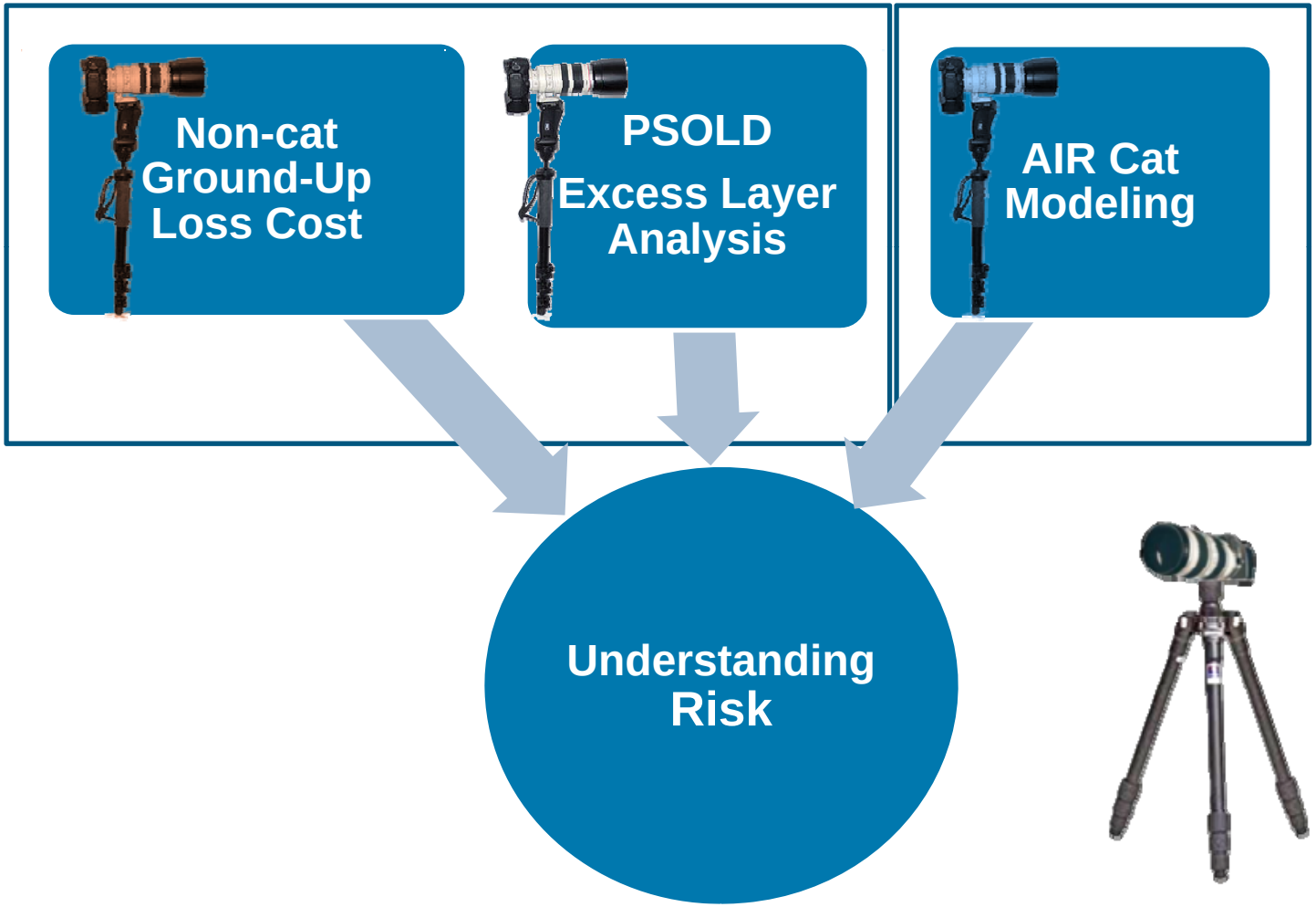
Empirical vs. Fitted – Three Sample AOI Bands

	Avg AOI		Avg AOI		Avg AOI	
Mean	1,368,552		27,255,431		136,185,954	
Loss Size	Empirical	Fitted	Empirical	Fitted	Empirical	Fitted
500,000	0.0172178	0.0171748	0.0176866	0.0215390	0.0222923	0.0234397
600,000	0.0150256	0.0142887	0.0143784	0.0187130	0.0208845	0.0201597
800,000	0.0109457	0.0103353	0.0129809	0.0148345	0.0168243	0.0157731
1,000,000	0.0080962	0.0078440	0.0104765	0.0122890	0.0132677	0.0129889
1,500,000	0.0020511	0.0045626	0.0082228	0.0085986	0.0096213	0.0091371
2,000,000	0.0003422	0.0030018	0.0055385	0.0065622	0.0074156	0.0071112
2,500,000	0.0000129	0.0021048	0.0042232	0.0052358	0.0056390	0.0058152
3,000,000	0.0000000	0.0015378	0.0039346	0.0042981	0.0052654	0.0049014
4,000,000	0.0000000	0.0009013	0.0025593	0.0030694	0.0041492	0.0036959
5,000,000	0.0000000	0.0000000	0.0018377	0.0023086	0.0032391	0.0029362
6,000,000	0.0000000	0.0000000	0.0010690	0.0017950	0.0029111	0.0024114
8,000,000	0.0000000	0.0000000	0.0003996	0.0011570	0.0027151	0.0017330
10,000,000	0.0000000	0.0000000	0.0002325	0.0007939	0.0024732	0.0013206
15,000,000	0.0000000	0.0000000	0.0000694	0.0003805	0.0016055	0.0007901
20,000,000	0.0000000	0.0000000	0.0000000	0.0002214	0.0015689	0.0005421
25,000,000	0.0000000	0.0000000	0.0000000	0.0001420	0.0008368	0.0003992
30,000,000	0.0000000	0.0000000	0.0000000	0.0000960	0.0008368	0.0003075
40,000,000	0.0000000	0.0000000	0.0000000	0.0000487	0.0001046	0.0002010
50,000,000	0.0000000	0.0000000	0.0000000	0.0000278	0.0001046	0.0001442
60,000,000	0.0000000	0.0000000	0.0000000	0.0000174	0.0001046	0.0001097
80,000,000	0.0000000	0.0000000	0.0000000	0.0000081	0.0000000	0.0000700
100,000,000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000481
250,000,000		0.0000000		0.0000000		0.0000072

Sample 2010 PSOLD Curve Fit: All years, excl all cat, Buildings+contents+time element, 300% AOI cap

Tripod Concepts

Cat / Noncat - Verisk (ISO / AIR) Solution



Ongoing Development

- **Enhanced Integration of Ground Up Loss Costs and Excess Layers**
  - o Linkage of GULC and PSOLD excess factors
  - o Extend GULC threshold from 10M up to 100M – 200M
- **Enhanced Scale Adjustment Factors (US and International application)**
  - o Protection / Occupancies comparisons to defaults when using PCImport Facility
  - o COPE and LOI enhancements
  - o PSOLD and Ground Up Loss Costs
- **Integration with AIR Cat Models *(2014)***
  - o Combined Cat/Non-cat information
  - o Location specific information on a combined basis
- **Portal to ISO US Information**
  - o Updated twice a year
  - o State and National Averages

Questions ?