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New Advances in Geospatial Property Fire Risk Modeling: Management / Industry Perspectives

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October 2015

Scoping the Problem: a huge opportunity for insurers

The "80:20 Rule" is alive and well in the personal and commercial property insurance business

- – Fire is a very low frequency but very high severity loss driver
- – Fire is typically Top 2 loss cost driver but lowest frequency event
- – Statistics by company vary - typical commercial property fire loss results are 5-7% of claim counts and 30-40% of total loss costs

- – However, US fire departments respond to a fire every 23 seconds
- – A structure fire every 85 seconds and outside fire every 46 seconds

- – In 2011, total industry fire losses were from HO (55%), CMP (22%) and Commercial Property (23%) – 484,500 structure fires in 2011

2011: Property fire losses = $23.5 billion ($75.35 / capita)

Source: Insurance Information Institute 2013 Insurance Industry Fact Book

Scoping the Problem: a huge opportunity for insurers

STRUCTURE FIRES BY TYPE OF USE, 2011[1]

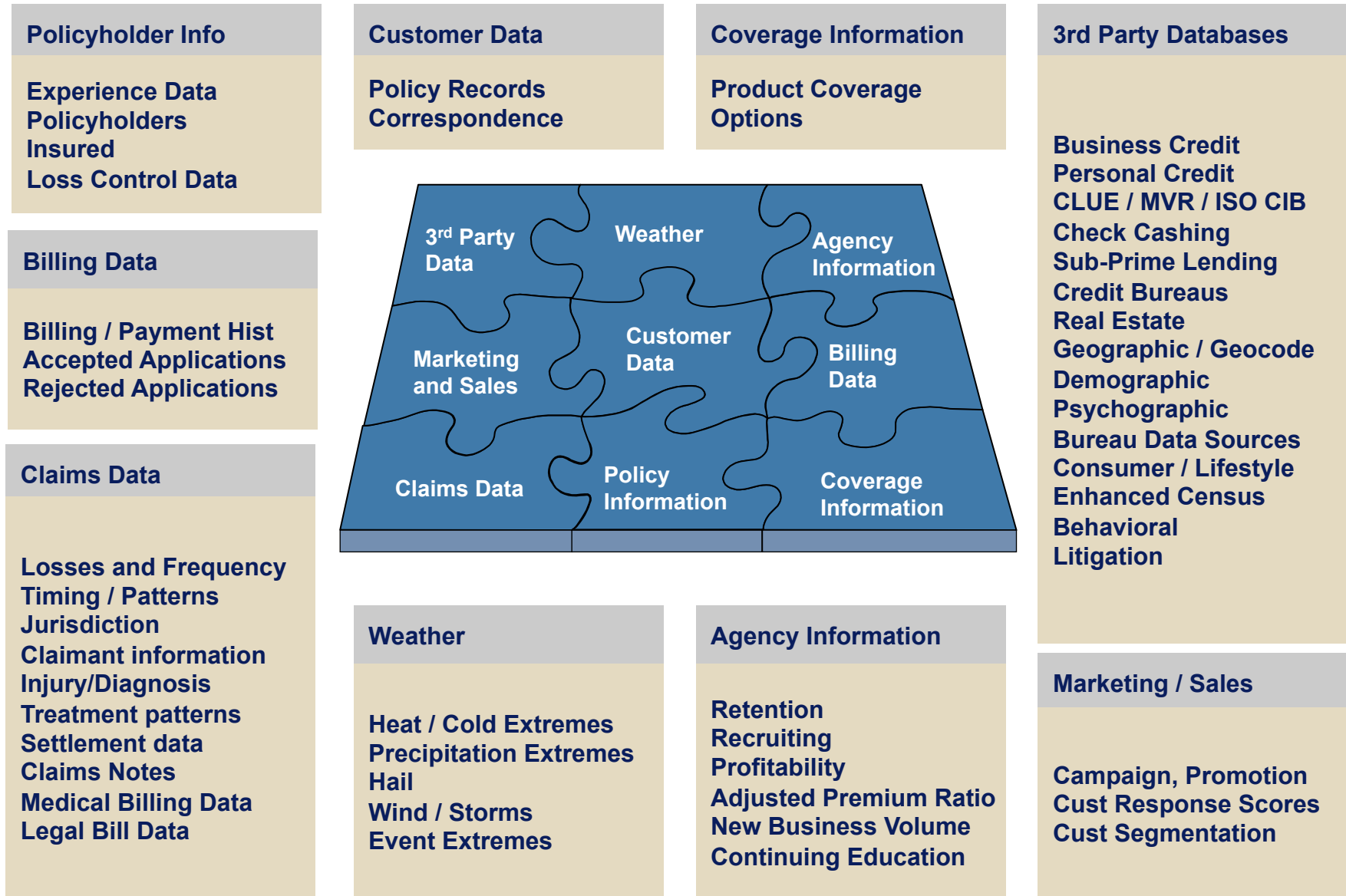| Property use	Estimated number of fires	Percent change from 2010	Property loss[2] ($ millions)	Percent change from 2010
Public assembly	12,500	4.2%	$446	5.9%
Educational	5,000	-9.1	44	-42.1
Institutional	6,500	18.2	52	40.5
Residential	386,000	0.5	7,054	-0.4
1 and 2 family homes[3]	274,500	-1.6	5,746	-2.5
Apartments	95,500	5.5	1,168	13.1
Other[4]	16,000	10.3	140	-7.3
Stores and offices	18,500	2.8	625	-14.4
Industry, utility, defense[5]	10,000	11.1	620	20.4
Storage in structures	27,000	-3.6	721	-4.6
Special structures	19,000	-5.0	131	28.4
Total	**484,500**	**0.5%**	**$9,693**	**-0.2%**

[1]Estimates based on data reported by fire departments responding to the 2011 National Fire Experience Survey. May not include reports from all fire departments. [2]Includes overall direct property loss to contents, structures, vehicles, machinery, vegetation or any other property involved in a fire. Does not include indirect losses, such as business interruption or temporary shelter costs. [3]Includes manufactured homes. [4]Includes hotels and motels, college dormitories, boarding houses, etc. [5]Does not include incidents handled only by private brigades or fixed suppression systems.

Source: National Fire Protection Association.

# How have insurers tried to solve the problem to date?

- Bureau multi-company data pooling
- No experience rating usage (unlike GL) – past not predictive of future?
- Historical loss experience by territory, building type, type of business / usage, etc.
- Analysis of physical, structural, and proximity characteristics
  - Wood, Brick, Masonry, Roof Composition etc
  - Distance to hydrant, fire house, emergency drive time
  - Surroundings for catastrophic events (wildfire locations)
  - Equipment age, electrical, boiler, code compliance
  - Personal credit (proxy variable widely used for other loss predictions and fraud)
- Assumption that fire loss & cat loss is random – bad luck?

Varied Data Sources for Improved Segmentation

Policyholder Info

Experience Data
Policyholders
Insured
Loss Control Data

Billing Data

Billing / Payment Hist
Accepted Applications
Rejected Applications

Claims Data

Losses and Frequency
Timing / Patterns
Jurisdiction
Claimant information
Injury/Diagnosis
Treatment patterns
Settlement data
Claims Notes
Medical Billing Data
Legal Bill Data

Customer Data

Policy Records
Correspondence

Coverage Information

Product Coverage
Options

3rd Party Databases

Business Credit
Personal Credit
CLUE / MVR / ISO CIB
Check Cashing
Sub-Prime Lending
Credit Bureaus
Real Estate
Geographic / Geocode
Demographic
Psychographic
Bureau Data Sources
Consumer / Lifestyle
Enhanced Census
Behavioral
Litigation

Weather

Heat / Cold Extremes
Precipitation Extremes
Hail
Wind / Storms
Event Extremes

Agency Information

Retention
Recruiting
Profitability
Adjusted Premium Ratio
New Business Volume
Continuing Education

Marketing / Sales

Campaign, Promotion
Cust Response Scores
Cust Segmentation

Puzzle pieces: 3rd Party Data, Weather, Agency Information, Marketing and Sales, Customer Data, Billing Data, Claims Data, Policy Information, Coverage Information
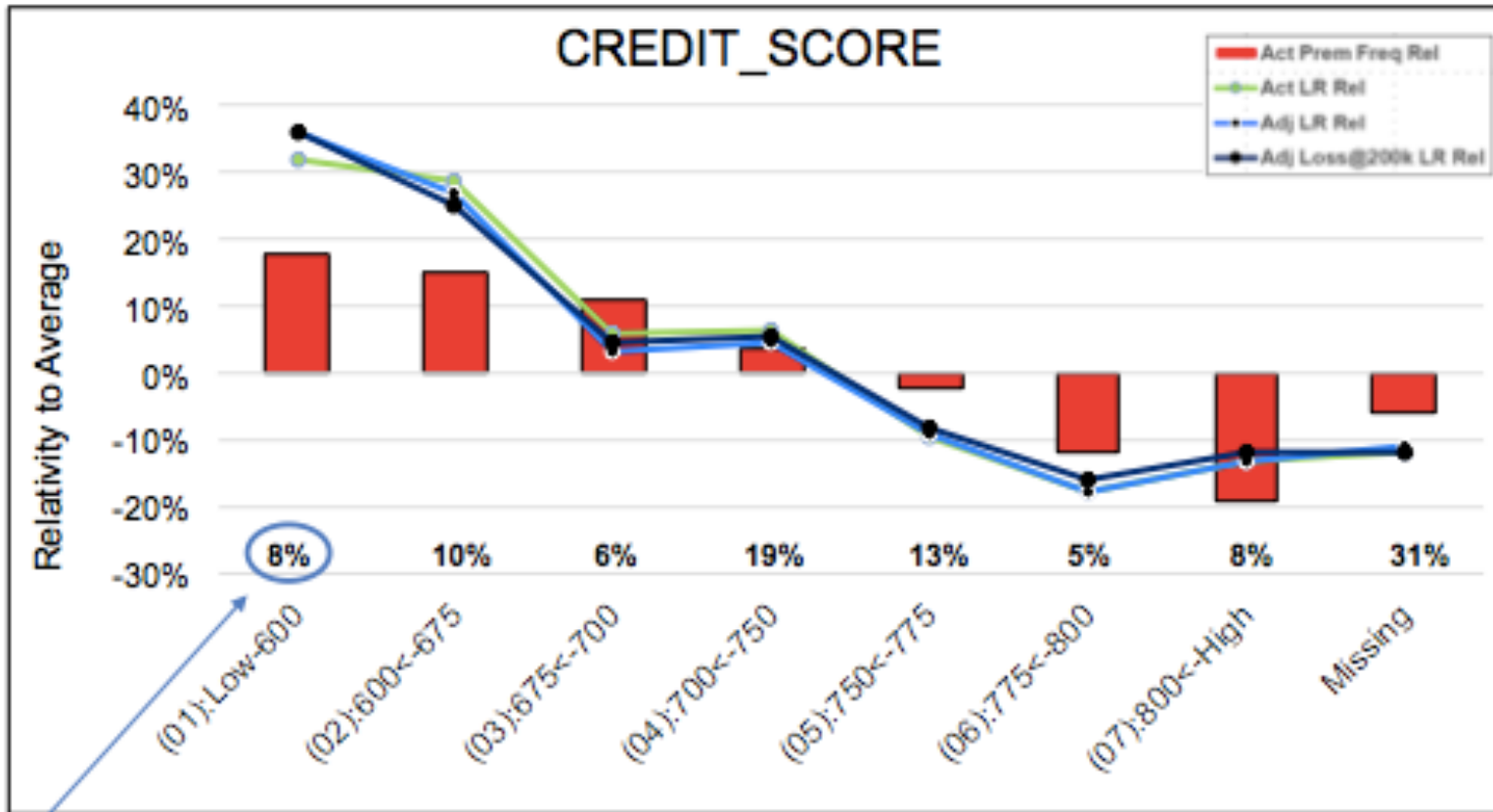
Behavioral factors appear to play an important role

Except for very large cat losses (hurricanes, earthquakes) or extreme large losses due to extraordinary events (area explosions), property losses are correlated with behavioral risk characteristics

Freq Rel Lift Curves
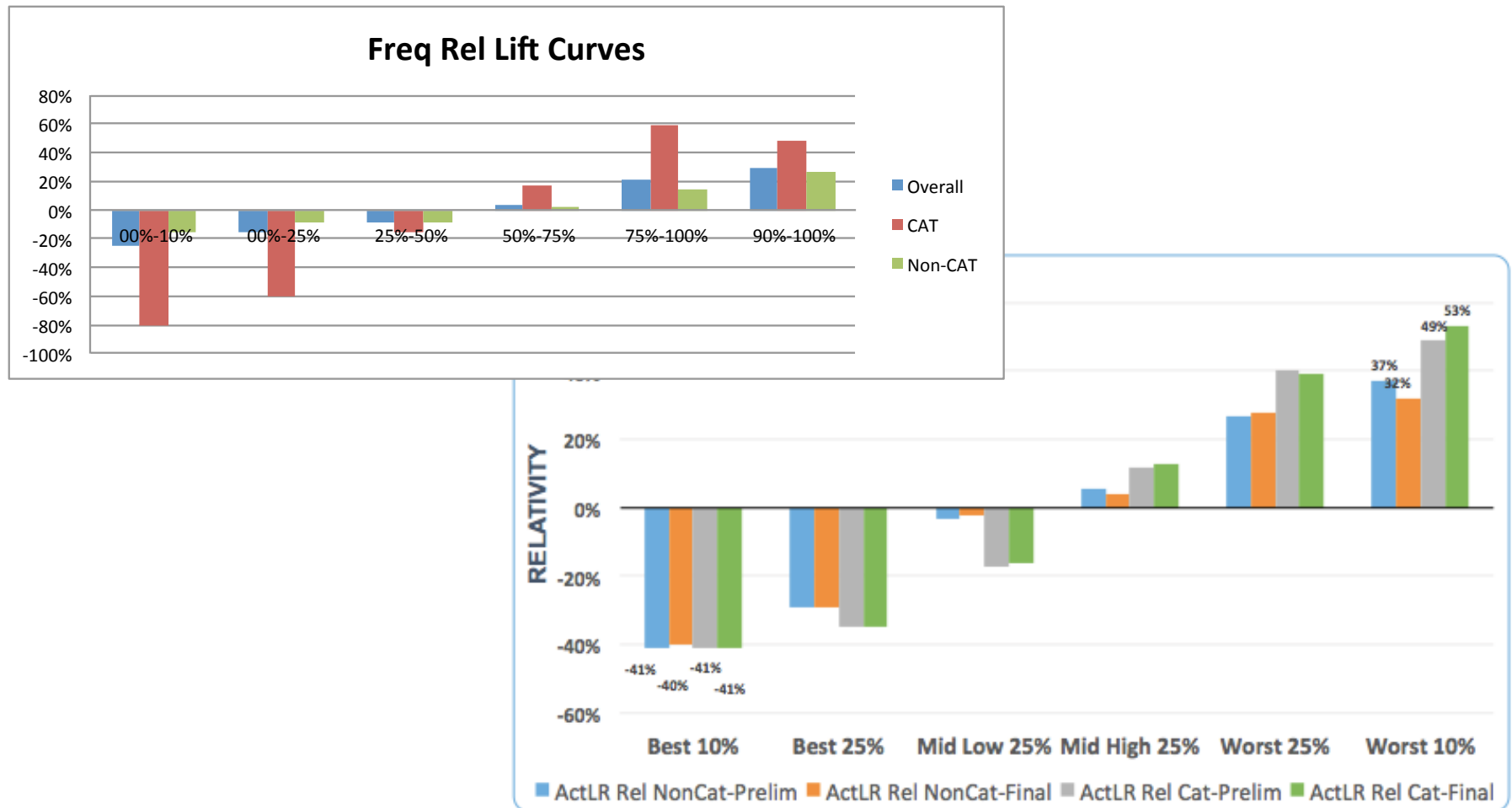
Homeowner Credit – a behavioral proxy for fire losses

The importance of continued innovation and R&D

- There are no single magic bullet variables
- Carriers need to continue to innovate and seek signals – proxies and direct – indicative of fire risk and incorporate them into their multivariate analyses of fire risk
- Clearly the societal benefit to prevent fires is great
- And the financial benefit to appropriately sense and price for fire risk is great as well

 Let's now discuss an example of an interesting new innovation in Geospatial Property Fire Risk Analytics