
Commercial Lines Predictive Modeling - BOP

CAS Predictive Modeling Seminar

Las Vegas, Nevada

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Presented by:

Kiera Doster, FCAS, MAAA

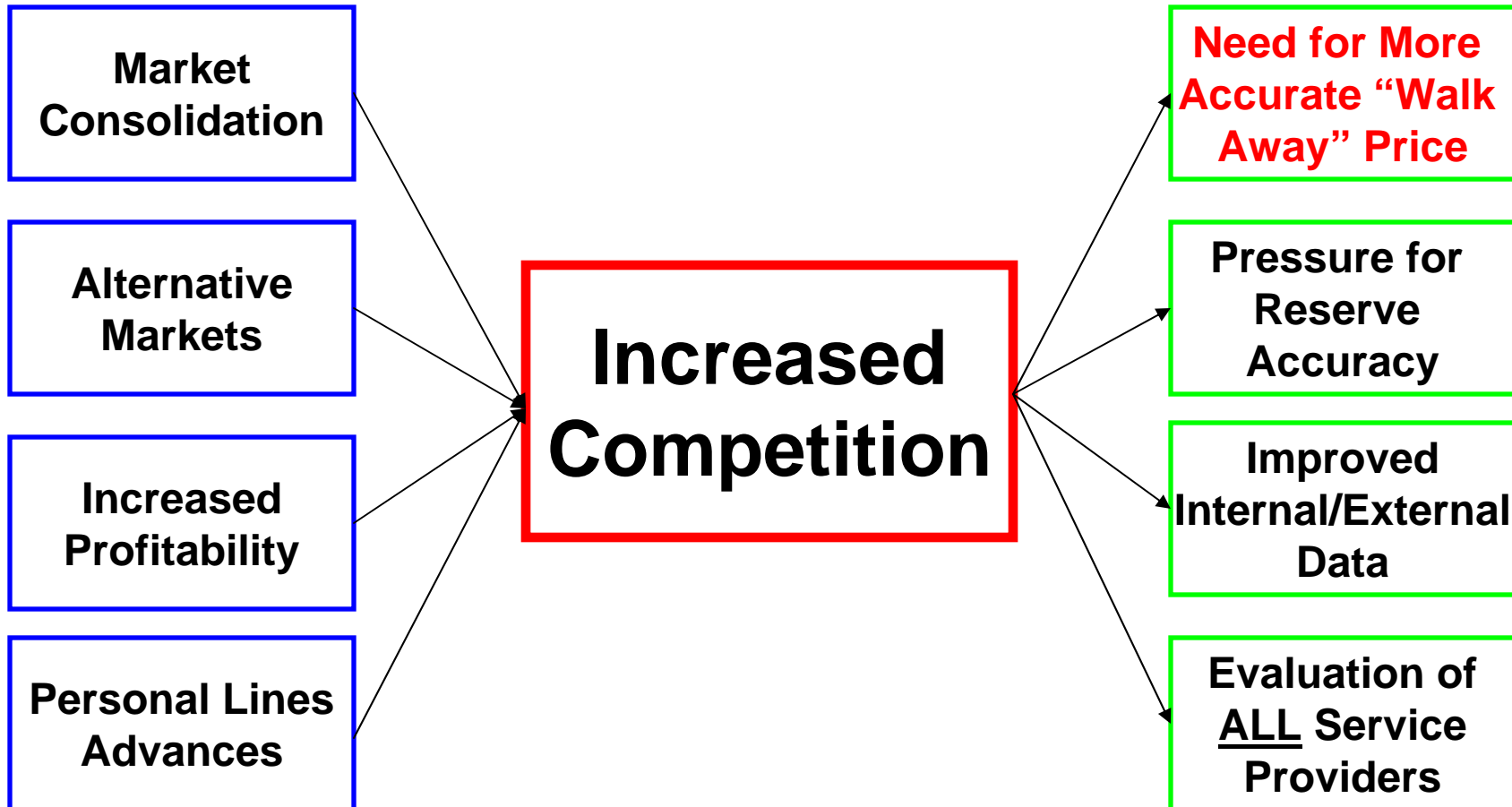
Pinnacle Actuarial Resources, Inc.

Presentation Outline

- Current BOP Market Dynamics
 - Underwriting and Pricing Challenges
 - Improve Current Rating Plan
 - New Rating Variables
 - Tiering
 - Scorecards
 - Other Applications
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Current BOP Market Dynamics

Current Environment & Trends



Personal Lines Market Saturation

**Analysis of Marketshare by Group by Line
2006 Annual Statement Page 14 Data
Other Private Passenger Auto Liability - US**

<u>Rank</u>	<u>Company</u>	<u>Direct Written Premium</u>	<u>Percentage of Total</u>
1	State Farm Group	14,957,608	18.1%
2	Allstate Insurance Group	9,143,577	11.0%
3	Progressive Insurance Group	6,547,589	7.9%
4	Berkshire Hathaway Insurance Group	5,854,126	7.1%
5	Farmers Insurance Group	4,402,781	5.3%
6	Nationwide Group	4,180,778	5.0%
7	USAA Group	2,928,878	3.5%
8	American International Group Inc	2,254,494	2.7%
9	Liberty Mutual Insurance Companies	2,176,449	2.6%
10	Travelers Insurance Companies	1,908,211	2.3%
11	American Family Insurance Group	1,901,676	2.3%
12	Safeco Insurance Companies	1,476,288	1.8%
13	Hartford Insurance Group	1,444,131	1.7%
14	Mercury General Group	1,432,354	1.7%
15	Auto Club Enterprises Insurance Group	1,136,245	1.4%
16	MetLife Auto & Home Group	1,098,678	1.3%
17	California State Auto Group	1,008,211	1.2%
18	Erie Insurance Group	957,511	1.2%
19	Commerce Group	874,471	1.1%
20	GMAC Insurance Group	738,222	0.9%

Commercial Lines Market Penetration

**Analysis of Marketshare by Group by Line
2006 Annual Statement Page 14 Data
Commercial Multi-Peril Liability - US**

<u>Rank</u>	<u>Company</u>	<u>Direct Written Premium</u>	<u>Percentage of Total</u>
1	Travelers Insurance Companies	1,423,092	10.5%
2	Nationwide Group	772,783	5.7%
3	Hartford Insurance Group	753,887	5.5%
4	Liberty Mutual Insurance Companies	674,161	5.0%
5	CNA Insurance Companies	592,949	4.4%
6	Chubb Group of Insurance Companies	565,859	4.2%
7	Philadelphia Insurance Group	564,401	4.2%
8	State Farm Group	485,735	3.6%
9	Allianz of America, Inc	448,692	3.3%
10	Auto-Owners Insurance Group	359,585	2.6%
11	Cincinnati Insurance Companies	346,521	2.6%
12	W. R. Berkley Group	333,896	2.5%
13	Farmers Insurance Group	318,045	2.3%
14	Safeco Insurance Companies	300,306	2.2%
15	Zurich Financial Services NA Group	297,805	2.2%
16	Harleysville Insurance	242,474	1.8%
17	American International Group Inc	221,486	1.6%
18	American Family Insurance Group	185,488	1.4%
19	Erie Insurance Group	177,612	1.3%
20	Hanover Insurance Grp Prop and Cas Cos	175,695	1.3%

Broad Commercial Lines Trends

- Silos to Personal Lines Crumbling
 - Innovators are:
 - Personal Lines Cross Overs
 - “Nimble” Regional Carriers
 - Some National Market Leaders
 - Innovations include:
 - Personal Lines Transplants
(Vehicle Characteristics, Territory, Credit)
 - Commercial Lines “Who” Characteristics
 - Niche Issues (e.g. CLUE and turnover rates on tenants)
-

Underwriting and Pricing Challenges

Traditional BOP Rating Features

- Composite Rating
 - Large, traditional territory definitions
 - Clustering of occupations
 - Clustering of fire protection classes
 - Simple approach to amount of insurance (AOI)
 - Significant U/W discretion (IRPM/Schedule Rating)
-

Traditional BOP Rating Features – cont.

- Market has disagreed on:
 - Which classes to cluster/target
 - Construction Relativities
 - Territory definitions
 - Occupancy factors (malls, single occupancies, multiple occupancies w/ restaurants)
 - Information on application not used in rating
-

Traditional BOP Rating Features – cont.

Company	Tiering Factor	Schedule Max/Min	Percent of Manual
SubStandard I.C.	1.25	+40%	175%
SubStandard I.C.	1.25	-40%	75%
Vanilla I.C.	1.00	+40%	140%
Vanilla I.C.	1.00	-40%	60%
Preferred I.C.	0.85	+40%	119%
Preferred I.C.	0.85	-40%	51%
SuperPreferred I.C.	0.70	+40%	98%
SuperPreferred I.C.	0.70	-40%	42%

**THE
HIGHEST
NET RATE
IS OVER
FOUR
TIMES THE
LOWEST!!**

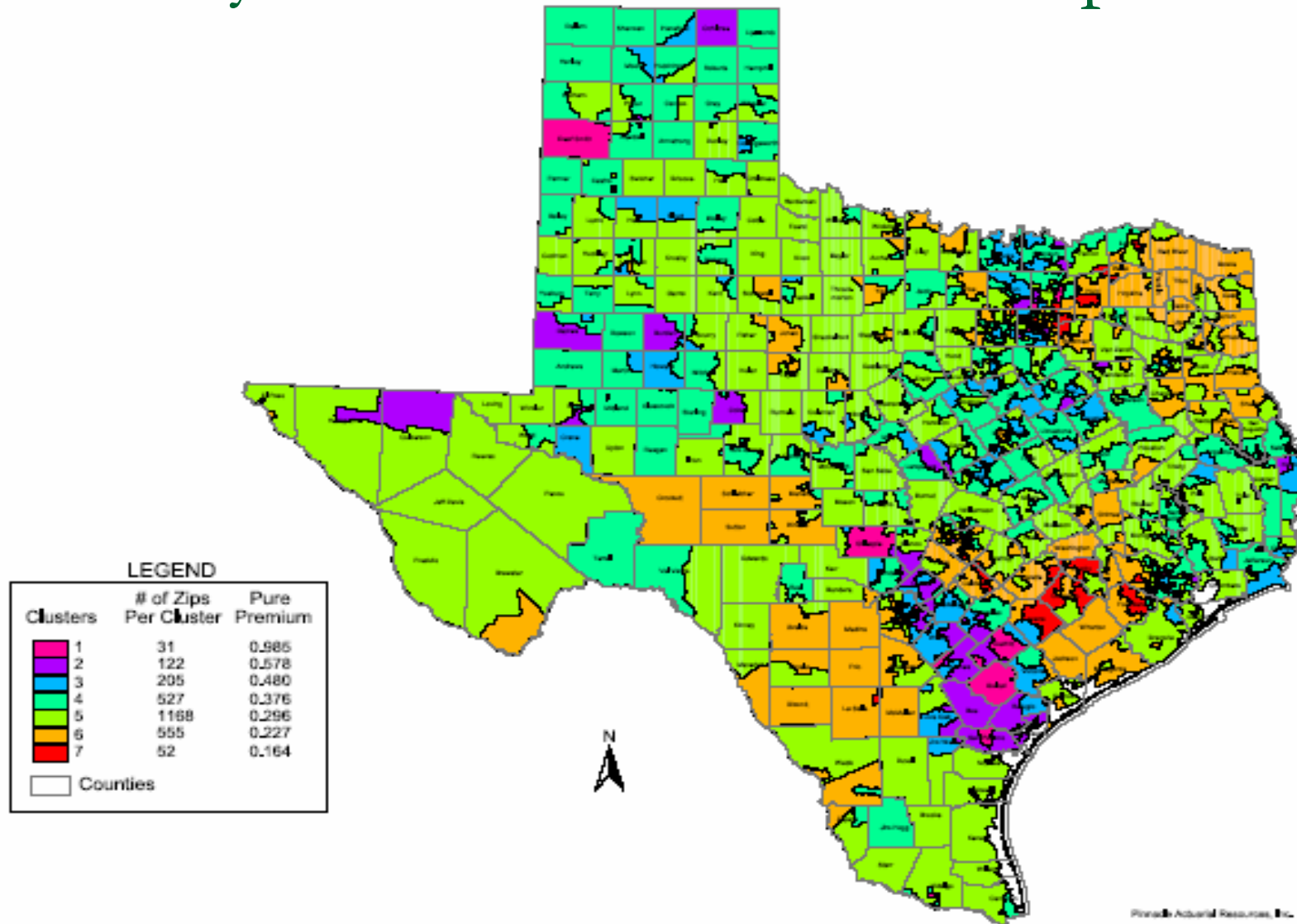
Current Rating Plan Improvement

- By Peril Rating
 - Class Refinement
 - Territory
 - Company Deviation Factors
 - New Rating Variables
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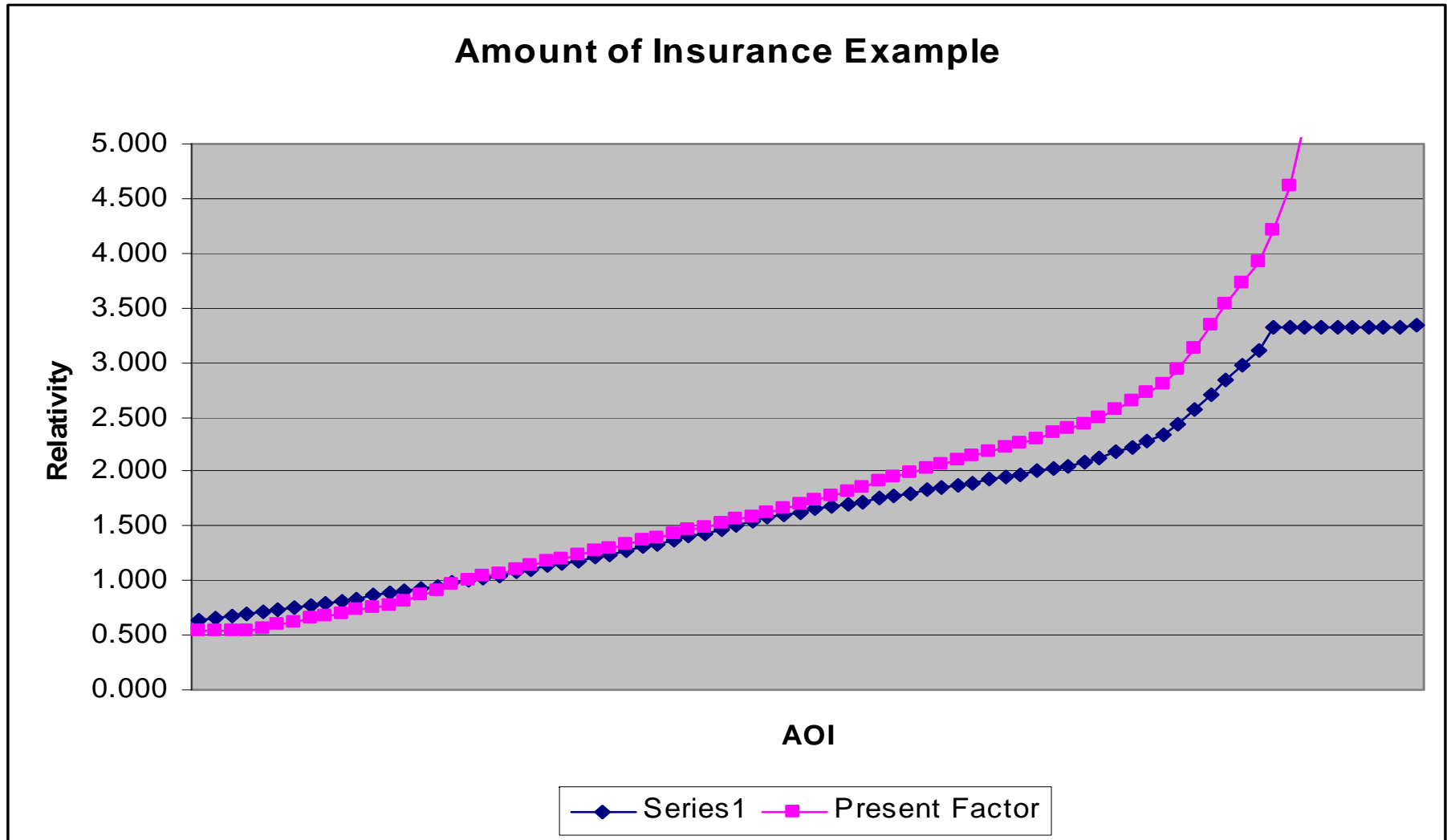
By Peril Rating

Subject of Insurance	Base Rates
Building	\$0.321 Per \$100 Building Value
Business Personal Property	0.439 Per \$100 Business Personal Property Value
B.P.P. Special Increment.....	3.003 Per \$100 Business Personal Property Value
General Liability - Occupant	383.900 Per Employee
- Lessor's Risk.....	0.132 Per \$100 Building Value. (For buildings used solely for warehouse or storage purposes, use BPP value if no Building insurance)

Territory Redefinition – An Example



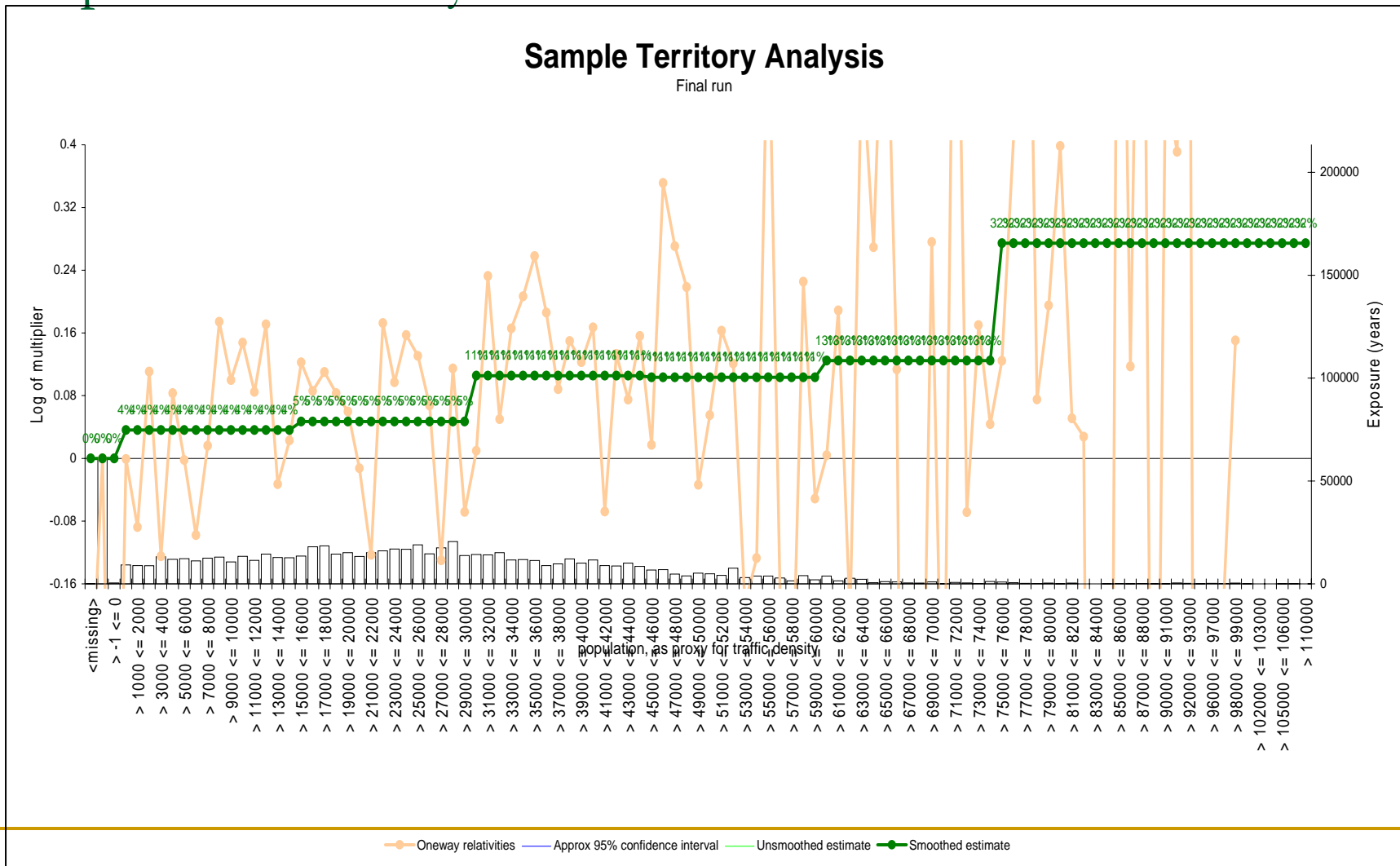
AOI Model Results



Predictive Modeling Applications – New Rating Variables

- Geographic Characteristics
 - SIC/NAICS Codes
 - Package/Multiple Line
 - Premium Discount
 - Endorsed Programs
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Additional Geographic Data – Population Density



Indicated SIC Relativities

SIC 3	Description	Exposure	On-Balance Relativity
171X	Plumbing/HVAC	37,542	1.055
173X	Electrical Contractors	36,629	0.886
175X	Carpentry	32,404	0.969
179X	Misc. Contractors	23,829	0.982
27XX	Printing/Publishing	16,005	0.824
35XX (o/t 357)	Industrial Machinery	19,753	0.838
507X	Hardware Wholesaler	10,866	0.932
514X	Grocery Wholesaler	16,486	1.149
571X	Home Furnishings	11,795	0.918
581X	Restaurants	12,239	0.916
59XX	Misc. Retail	38,818	1.031
64XX	Insurance Agents	13,209	0.921
65XX	Real Estate	30,856	0.986
721X	Laundry/Dry Cleaning	13,341	1.373
734X	Building Services	19,012	1.145
737X	Computer Services	16,663	1.145

Package Discounts

★G. PACKAGE DISCOUNTS

The following discounts apply to Commercial Auto premium when written in conjunction with the following Businessowners products.

Wholesale Distribution Industry	15.0%
Artisan Contractor Industry	5.0
Restaurants	5.0
Retail and Service Industry	5.0
Habitational	5.0
Commercial Real Estate	5.0
Manufacturing Industry Businessowners Policy	5.0
Auto Service and Repair	5.0

The following discounts apply to Commercial Auto Premium when written in conjunction with the following Sentinel Program:

Wholesale Distribution Industry	15.0%
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Multi-Policy Discounts

CATEGORIES

DISCOUNT
applied to the
Businessowners Policy

<u>Commercial Automobile Policies</u>	7%
Commercial Automobile Policies (excluding Garage Liability and Dealers Blanket).	

<u>Commercial Umbrella Policies</u>	4%
Commercial, Econ-O-Pak and Habitational Umbrella policies.	

Life, Health or Annuity Policies 2%

- The following policies written on an owner, partner or corporate officer of the business:
 - Life policy (nongroup) with a face amount of \$100,000 or more or Simplified Issue Life policy with a face value of \$50,000 or more; or
 - Annuity policy with a combined cash value exceeding \$10,000 or more, or
 - Disability Income policy with a monthly benefit of \$1,000 or more; or
 - Long Term Care Policy.

Premium Size Credits

<u>Total Property Premium</u>	<u>Modifier</u>	<u>Maximum Adjusted Premium</u>	<u>Minimum Adjusted Premium</u>
\$0 - \$2,500	1.50	\$3,000	N/A
\$2,501 - \$5,000	1.20	\$5,250	N/A
\$5,001 - \$10,000	1.05	\$10,000	N/A
Greater than \$10,000	0.95	N/A	\$10,000

Premium size adjustment is only applied at policy inception. Additional modifications do not apply to endorsement activity.

Underwriting Tiering and Scorecards

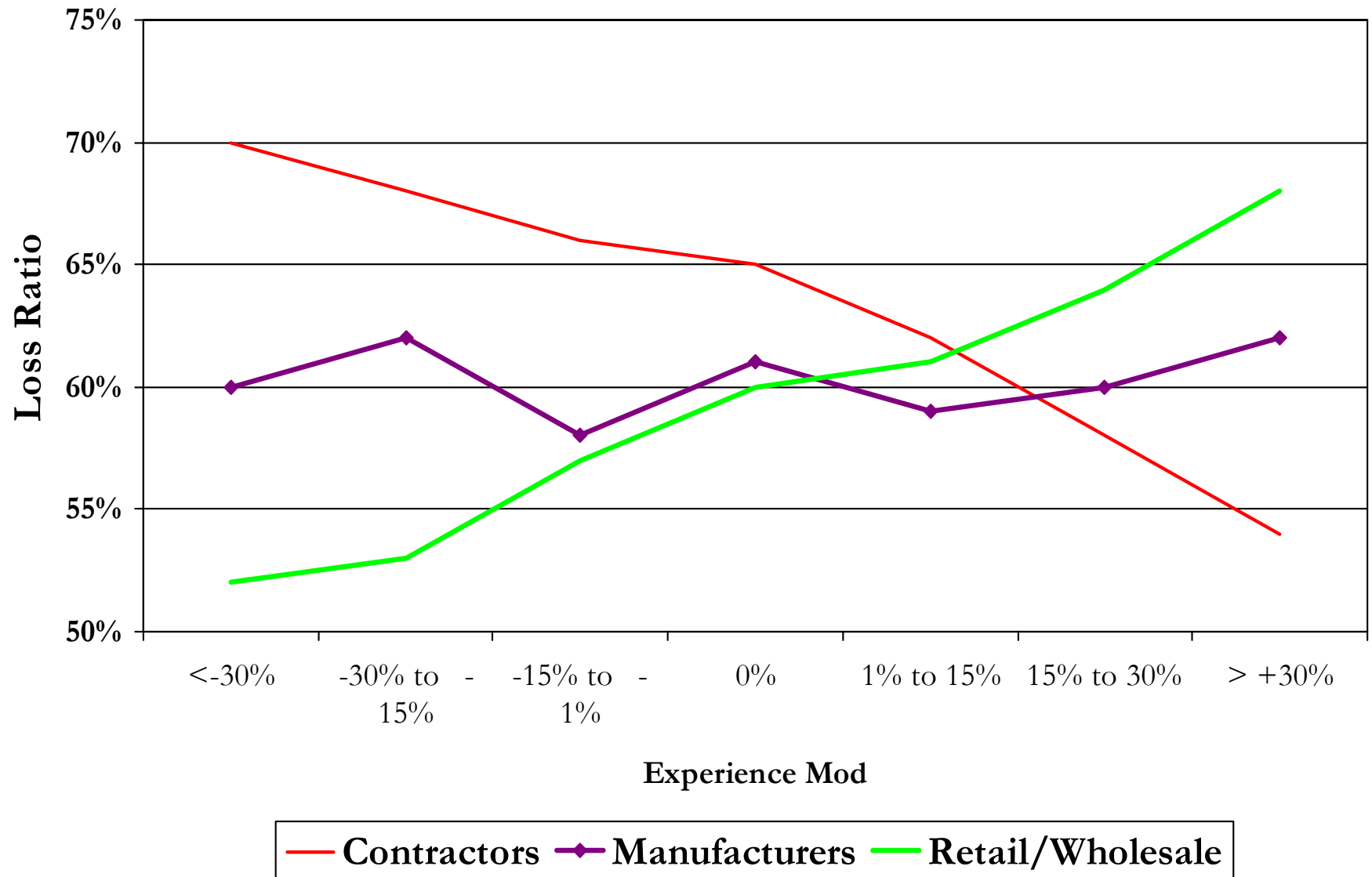
Underwriting

- Lots of ways to incorporate new data:
 - Internal Data
 - “Who” Characteristics
 - External Data
 - Greater Use of Credit

Traditional Underwriting vs. Rating

- Historically Distinct (*and often conflicting*):
 - Underwriting determined eligibility
 - Rating determined manual premium
 - Underwriting then applied IRPM/ Schedule Rating
- Overlap between underwriting, rating, and schedule rating
- Predictive modeling removes these overlaps

Experience/Schedule Rating Interactions



Additional Internal Information

- Percent Occupied
- Years in Business
- Age of Building
- Alarms
- Computer Back Ups
- Building Height
- Swimming Pools
- Safety Program
- Elevators
- Years of Same Mgt.
- Updated Systems
- Sole Occupancy
- Hours of Operation
- Deliveries?
- Franchise?
- # of Employees/Leasing

Not to mention – Billing history, account experience

It's not “What” but “Who”

- Employees

- Shifts
- FT/PT
- Outsourcing
- Turnover
- Drug Testing
- Driving Records

- Organizational

- Credit
- Ownership
- Yrs. In Business

- Safety

- Return to Work Program
 - Equipment
 - Safety Committee
-

Additional External Information

- Credit Score
 - Commercial
 - Owner
 - Lots of Operational Info
 - Niche Specific, too
 - Professional Credentials/Memberships
 - Tenant Information
 - Adjacent Properties/Tenants
 - Driving Records
 - Geographic Data
 - Economic Data
-

Why Scorecards?

- Regulatory
 - Underwriting Guidelines
 - Preserve Competitive Advantage
 - To File or Not to File?
 - Many Small Factors
 - Can be Class Specific
 - Ability for Underwriter/Agent Feedback
 - Similarity to Credit Scoring (Intuitive)
-

Underwriting Guidelines

- Example 1: Vague Wording

Company selection is determined by multiple variables which work together. They include the following:

- Property Premium – Risks with very small premiums are written in Company A
 - Protection Class – Unprotected risks are not eligible for Company B
 - Age, Construction type, and Sprinkler Protection – viewed with other variables to impact company placement
 - Years in business under current ownership
 - Financial Strength
-

Underwriting Guidelines

- Example 2: More Distinct Criteria

<u>Criteria</u>	<u>Superior</u>	<u>Preferred</u>	<u>Standard</u>
Quality of Management	In business at least five years and No Losses	In business at least 3 years with no more than 2 losses	Experienced in management with similar business for at least 3 years
Property	Effective Age of Building – 15 years (effective age includes a fully gutted to studs or structural supports and re-habbed) or Updates to Electrical, Plumbing, Heating and Roof within 15 years	Effective Age of Building – 25 years (effective age includes a fully gutted to studs or structural supports and re-habbed) or Updates to Electrical, Plumbing, Heating and Roof within 25 years	Building is in good condition and has been well maintained
General Liability	Offsite Operations is less than 10% (other than Contractors) and Subcontracting is less than 10%	Offsite Operations is less than 15% (other than Contractors) and Subcontracting is less than 15%	If Offsite Operations (other than Contractors) or Subcontracting exceeds 15%
Habitational – Apartments and Condominiums	No Swimming Pools; Condominium is 85% Owner Occupied and the Smoke or Fire Detectors are Hardwired	No more than 1 swimming pool; Condominium is 80% Owner Occupied and the Smoke or Fire Detectors are Hardwired or Maintained on a Regular Schedule	More than 1 pool; Condominium is less than 80% Owner Occupied and the Smoke or Fire Detectors are Battery operated

Lots of Small Factors

Criteria and Point Allocation

For ALL Natures of Business, the following apply:

- Percent Building Occupied
95-100% = 4 pts; 90-65% = 2 pts; all else = 0 pts.
- Years in Business
Over 10 = 16 pts; 5 to 10 = 8 pts; all else = 0 pts.
- Age of Building
Less than 10 = 16 pts; 10 to 25 = 10 pts; 26-50 = 2 pts; over 50 = 0 pts.
- Alarms
Local = 4 pts; Central Station (U.L. Appd) = 16 pts;
Central Station (Other) = 8 pts; None = 0 pts.
- Building Appraisal Received - owner occ. only
Yes = 4 pts; No = 0 pts.
- EDP: Off-Site Backup
Yes = 2 pts; No = 0 pts.
- Building Height (# stories) - owner occ. only
Less than 3 = 8 pts; 3 to 6 = 4 pts; all else = 0 pts.
- Parking Lot or Garage at premises - owner occ. only
Yes = 0 pts; No = 4 pts.



Underwriting Scorecard Example

Credit Score				
Credit Score	Exposure	Indicated Relativity	On Balance Indicated	Score Points
A	359,376	1.000	0.988	32
M	153,873	1.081	1.068	9
NS	90,760	1.045	1.032	19
S	106,681	0.902	0.891	62
U	26,131	1.114	1.101	0

Underwriting Scorecard Example

Years of Current Control	Score Points	Percent Building Occupied	Score Points
>10	150	>95%	100
6-10	75	65-95%	50
0-5	0	<65%	0
Part Time/ Full Time	Score Points	Safety Program	Score Points
<33%	50	Formal	50
33% - 67%	25	Informal	25
>67%	0	None	0
Building < 25 Yrs Old	25 Pts	Owner on Premises	15 Pts
Central Alarm	25 Pts	Franchise	10 Pts
No Parking Lot	10 Pts	Closed by 9 pm	10 Pts
Offsite EDP Backup	5 pts	No Delivery	5 pts

Credit Score Look & Feel

A Pricing Track Factor will then be assigned based on the total points as follows:

<u>Point Range</u>	<u>Pricing Track Factor</u>
0 - 99	1.00
100 - 199	.92
200 - 299	.84
300 - 399	.76
400 - 499	.68
500 - 599	.60
600 - 700	.52

Underwriting Scorecards With Interactions

Multivariate analysis allows the modeling of interactions and facilitates implementing more complex tiering systems

Years of Current Control	Score Points					
	Contr.	Habit.	Off.	Rest.	Ret./Serv.	Wholes.
0-3	60	115	120	70	95	100
4-6	100	130	125	85	100	110
7-10	120	135	135	100	120	125
10+	150	150	150	150	150	150

Class-Specific Scoring

In addition to the above, the following objective criteria are used, depending on the nature of business of the occupancy.

Habitational

- Owner/Manager on Premises
- Athletic Courts
- Clubhouse
- Exercise Room
- Playground
- Pool with Diving Board
- Woodstove
- Fireplace
- Restaurant on Premises

Office-All Other, Office-Medical

- Sole Occupancy
- Restaurant on Premises

Funeral Home

- Sole Occupancy

Retail/Service/Wholesale

- Sole Occupancy
- Closing Time Before 9pm
- Chain or Franchise
- Theft Monitoring Devices
- Restaurant on Premises
- Off-Premises Repair/Installation < 10%
- Delivery Operations
- Inventory Skidded

Restaurant

- Sole Occupancy
- Closing Time Before 9pm
- Chain or Franchise
- Delivery Operations
- Inventory Skidded

BOP Underwriting Scorecard

Risk Characteristic Pricing Element	Response	Point Value
Years in Business at this Location	New in Business	5
	Less than 1 Year	4
	1-2 Years	3
	2-3 Years	1
	3-4 Years	0
	4-5 Years	-1
	5-6 Years	-2
	6 Years or More	-3
Responsible for Parking Lot	Yes	2
	No	0
Wiring Year	25 Years or More	4
	20-24 Years	0
	11-19 Years	-2
	10 Years or Less	-4

BOP Underwriting Scorecard

Location of Business	Attached to Habitational Structure	10
	Stand-alone Building	3
	Strip Shopping Center	0
	Enclosed Mall	-3
Hours of Operation Open to Public	21-24 Hours	10
	16-20 Hours	5
	12-15 Hours	0
	Less than 12 Hours	-5
Percentage of Sales from Catering Services	Over 10%	10
	1-10%	5
	None	0
Total Percent of Sales from Liquor Sales	More than 20%	5
	1-20%	2
	None	0
Drive Thru	Yes	0
	No	0
Credit Score	All Responses	0

BOP Underwriting Scorecard

Debit or Credit Factors

Point Values				Debit or Credit Factors
Over		70	points	1.15
66	to	70	points	1.14
61	to	65	points	1.13
56	to	60	points	1.12
51	to	55	points	1.11
46	to	50	points	1.10
41	to	45	points	1.09
36	to	40	points	1.08
31	to	35	points	1.07

Other Applications

Predictive Modeling Applications – Other Applications

- Data Collection For Future Use
 - Agency Management
 - Claims Applications
-

Loss Control Survey as Scorecard Input

Core Section	Questions	Points	# of N/A
1. Frequency and Severity Trends	3	10	0
2. Loss Prevention Direction	13	41	1
3. Substance Abuse	1	4	
4. Accident Investigation	2	6	0
5. Claims Management	3	12	0
6. Emergency Response	5	11	1
7. Regulatory Compliance	14	21	6
8. Liability	4	7	2
9. Motor Vehicle	4	14	0
10. Ergonomics	4	2	2
TOTALS	53	128	12

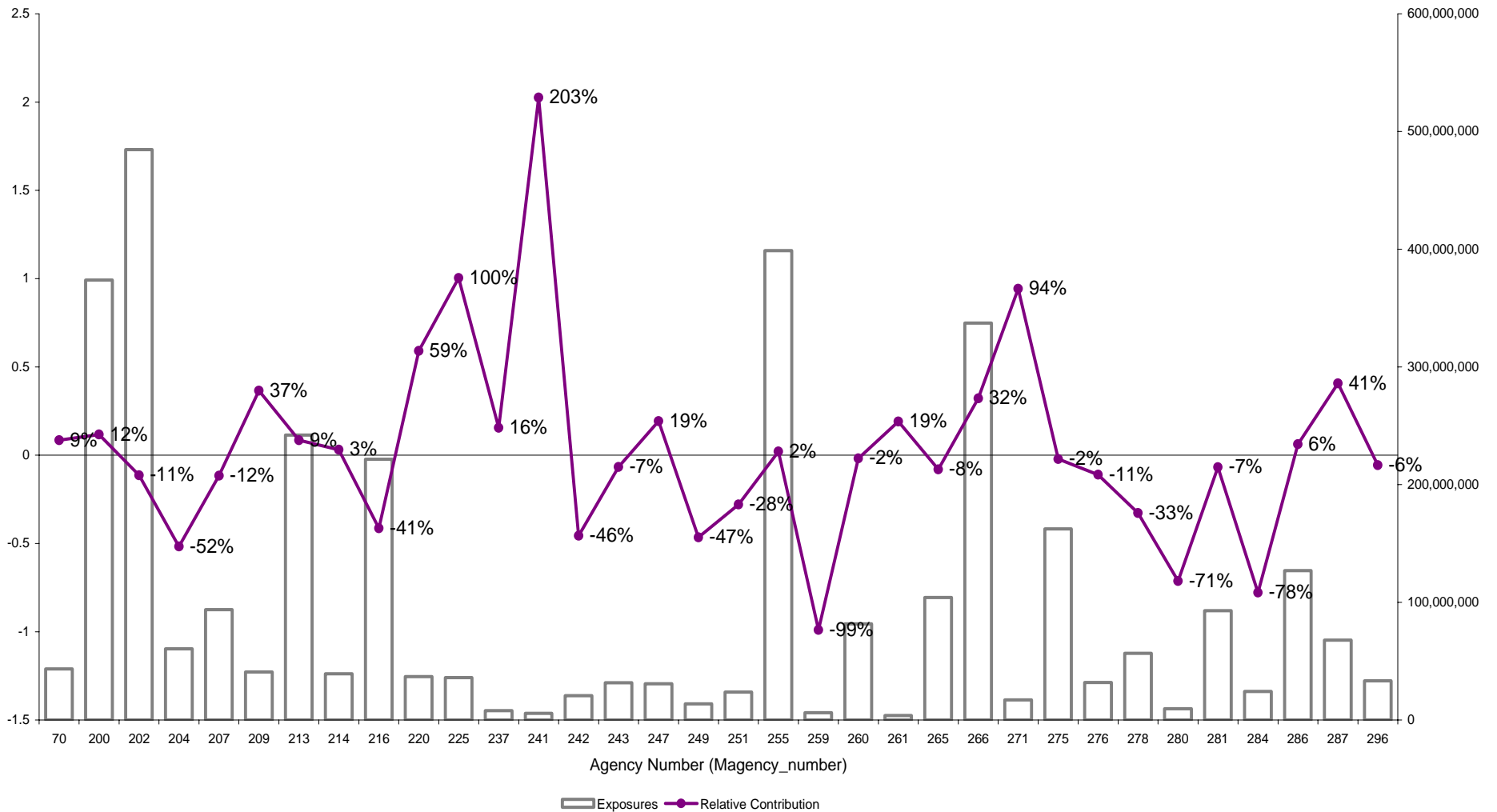
Supplemental Section	Applicable Sections	Questions	Points	# of N/A
A. Construction	<input checked="" type="checkbox"/>	20	50	5
B. Distribution	<input type="checkbox"/>	6		
C. Health Care	<input type="checkbox"/>	6		
D. Quarries	<input type="checkbox"/>	12		
E. Service Companies	<input type="checkbox"/>	4		
F. Transportation	<input type="checkbox"/>	7		
TOTALS		20	50	5

$$\left(\frac{73}{\text{Total Questions (Core \& Supplemental)}} - \frac{17}{\text{\# of N/A}} \right) \times 4 = \frac{224}{\text{Maximum Points}}$$

$$\frac{178}{\text{Total Points (Core \& Supplemental)}} \div \frac{224}{\text{Maximum Points}} = \frac{79}{\text{Final Score}} \%$$

Agency Management Example

WC Agency Analysis Example



Impact of Attorney Involvement on Claim Severity

