RAPID PORTFOLIO DIAGNOSTIC

CAS RPM Conference

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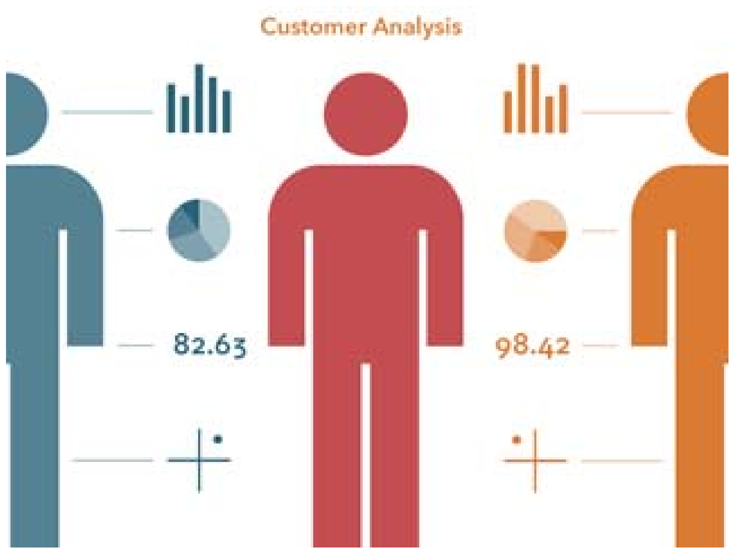
Predictive Analytics Acceleration: Competing for the Best Business is a Reality

Insurers with strong predictive analytics capabilities will gain more market share, produce more profits and have stronger customer retention. Those that don't will be left behind.

What's Driving the Need for Analytics?

- **Market:** Need to generate more profits due to low investment income.
- **Competition**: Avoid adverse selection.
- **Technology**: Advances in computer science and in cloud deployment.



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The Pace of Predictive Analytics Usage is Accelerating

Personal Lines

Early Adopters

Applications:
- Pricing/ Segmentation

PROGRESSIVE GEICO

Expands Beyond Direct Writers

Applications:
- Retention Modeling
- Testing Use in Claims Fraud

Most Carriers Using for Personal Lines

Applications:
- Improving Retention
- Predicting Claims Fraud

Early phases → 2000 → 2004 → 2008 → 2010 → 2011 → Today

Commercial Lines

Initial Testing

Applications:
- Work Comp and Commercial Auto
- Pricing

Expanded Use

Applications:
- Specialty & Work Comp
- Pricing and Underwriting

Predictive analytics is now a critical capability for every carrier.

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Using Predictive Analytics as a Strategic Weapon Works

COMPANY	2000 MARKETSHARE* (AUTO)	2011 MARKETSHARE** (AUTO)	TREND
PROGRESSIVE	4.6%	7.9%	Increasing
GEICO	4.6%	9.1%	Increasing
State Farm	18.1%	18.6%	Stagnating
Allstate	11.7%	10.3%	Declining

"**Progressive** is constantly creating new ways to more precisely assess the risk of each individual customer and consistently generates some of the best returns of the insurance companies we cover."
Morningstar, June 2012

"**GEICO** is differentiated from its peers because of better data quality, real-time data reviews and ability to monitor price points very quickly."
Standard & Poors

Source: *AM Best **Insurance Information Institute

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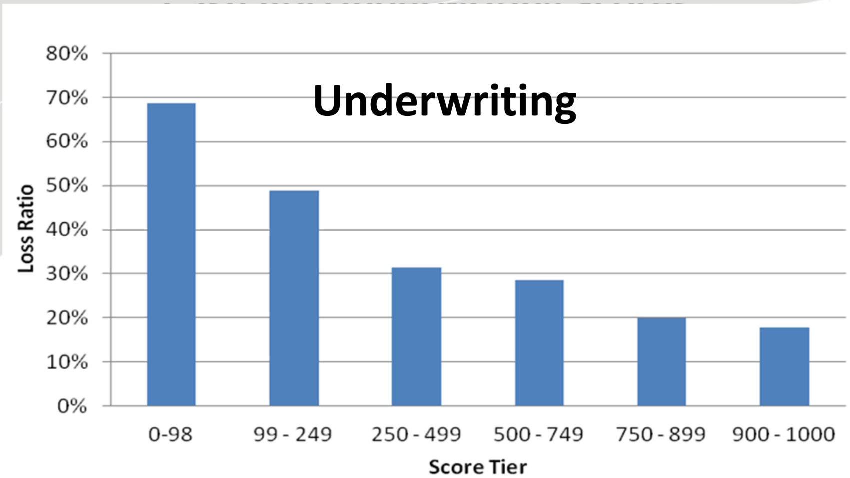
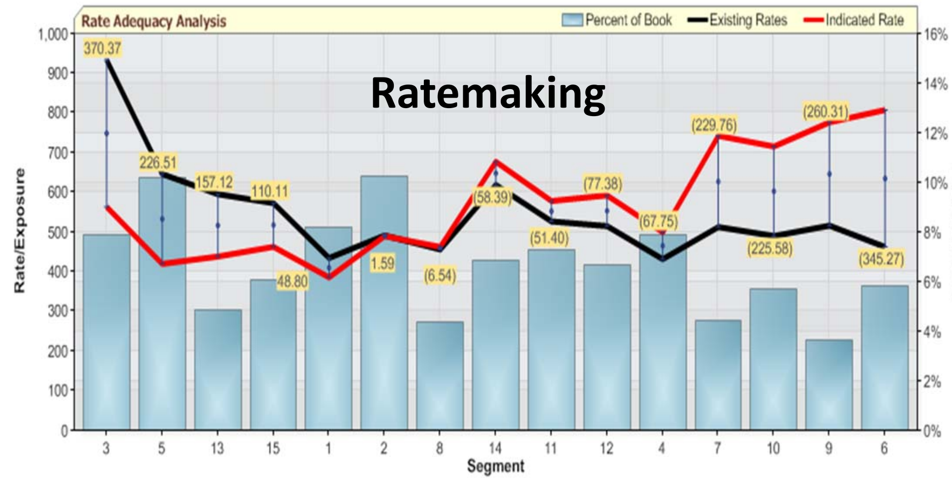
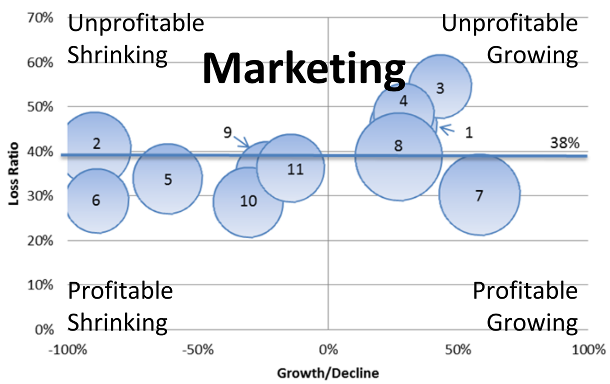
CARRIERS APPLY INSIGHTS ACROSS THE ENTERPRISE

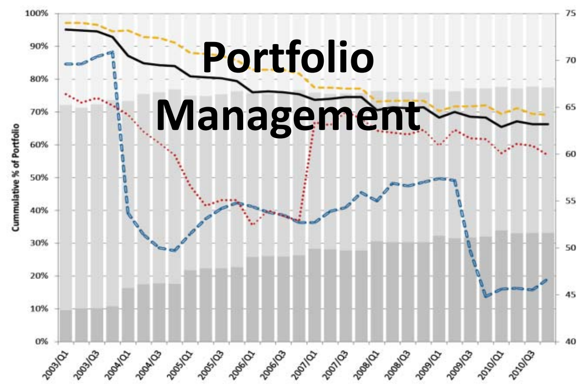


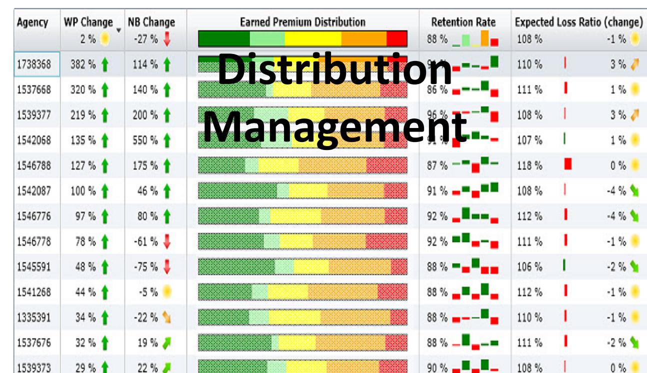


U/W Rules – Reject 0-300 scores; Review 301-500 scores; Accept 501-1000 scores

Adjust rate relativities based on policy level segment descriptions; can be focused on major problem areas







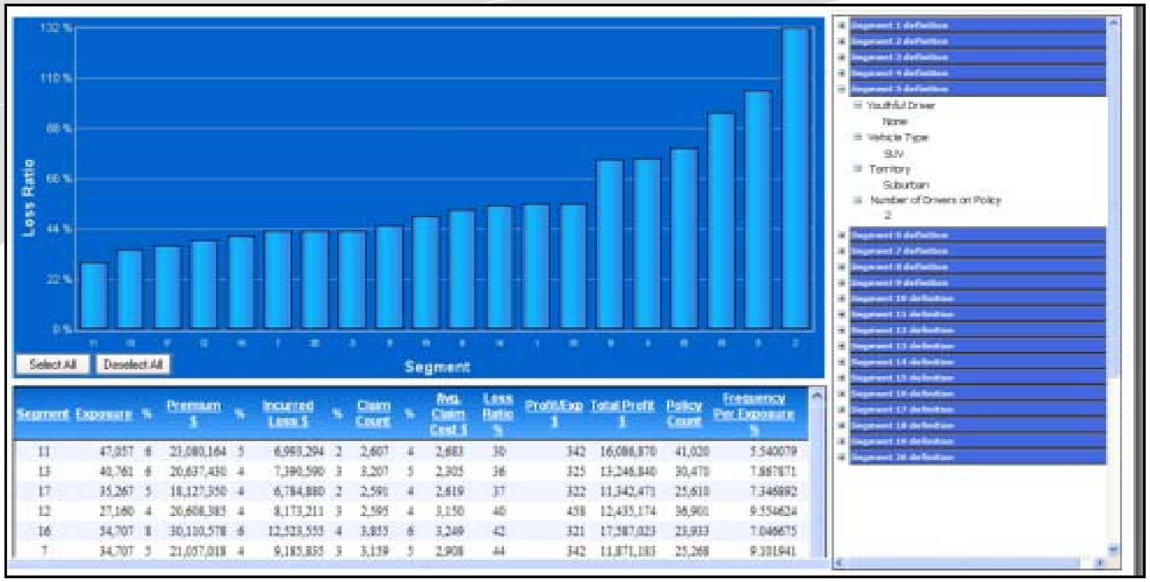
Address profitable but shrinking business and unprofitable and growing business with target marketing

Manage the mis-pricing in your portfolio more accurately and more quickly

Coach distribution to write more good business and less bad business

MACHINE LEARNING ANALYSES

SEGMENTATION ANALYSIS TYPES



Typical Uses:

- Rate plan improvement
- Underwriting rules
- Target marketing

✓ Partitions the whole “universe” into exhaustive and mutually exclusive segments

✓ Possible model targets: loss ratio, pure premium, frequency, severity, profit, retention

✓ Segments:

- Described by significant attributes
- Plain English description, easy to understand and actionable
- “Complex” compound variables

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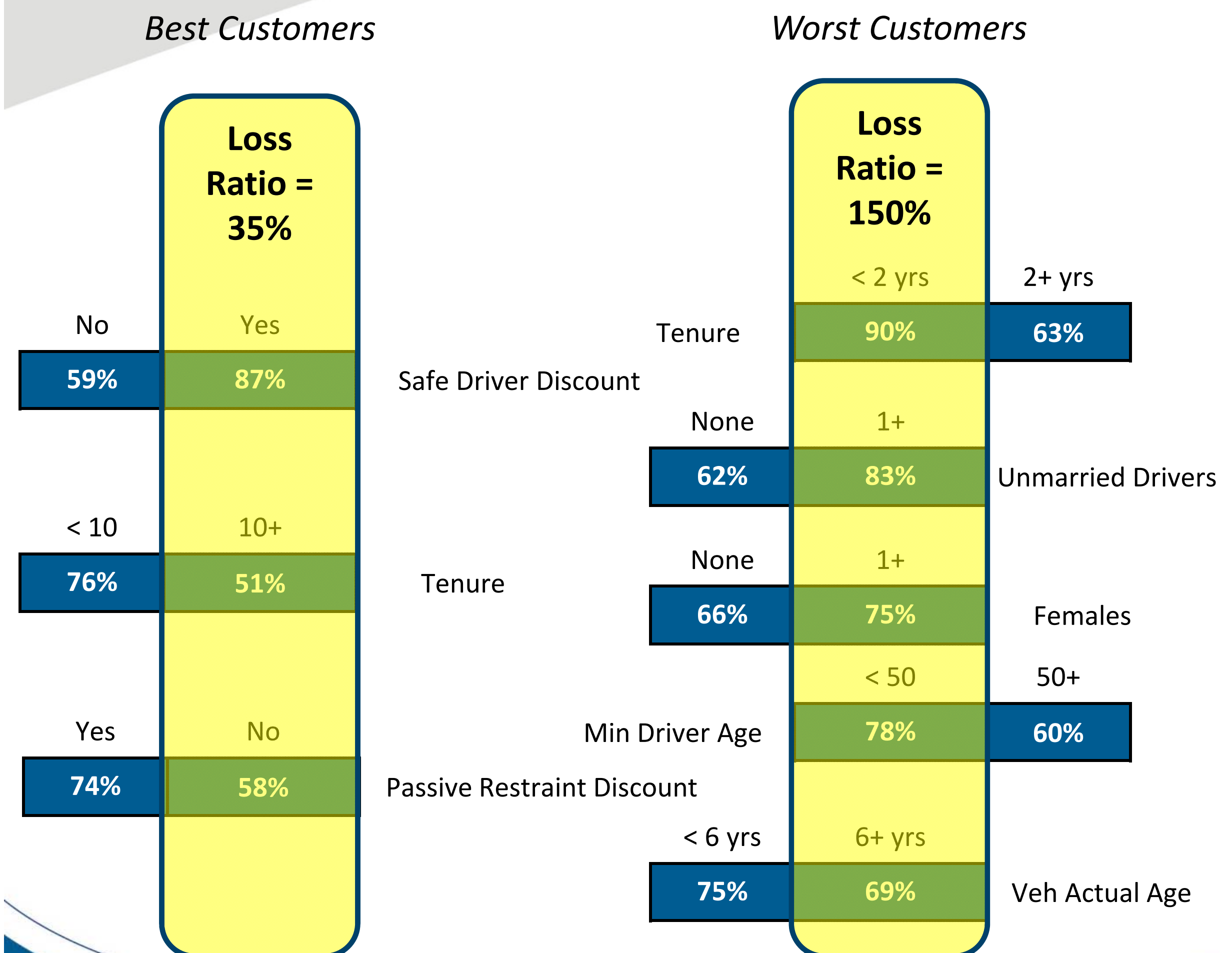
Machine Learning Solutions Reveal Profit Opportunities

Private Passenger Auto
(Total Portfolio Loss Ratio = 71%)



Identifies Patterns in the Data

SOME OF THE BEST CUSTOMERS ARE OVERPRICED

Unique Pattern: Combining

- Safe Driver Discount
- 10 year old policy, or older
- No Passive Restraints

produces lowest loss ratio of 35%, 36 points lower than carrier average.

SOME OF THE WORST CUSTOMERS ARE UNDERPRICED

Unique Pattern : Combining 5 unique variables, including customer tenure, marital status and vehicle age, identifies unprofitable business with loss ratios at 2x carrier average.

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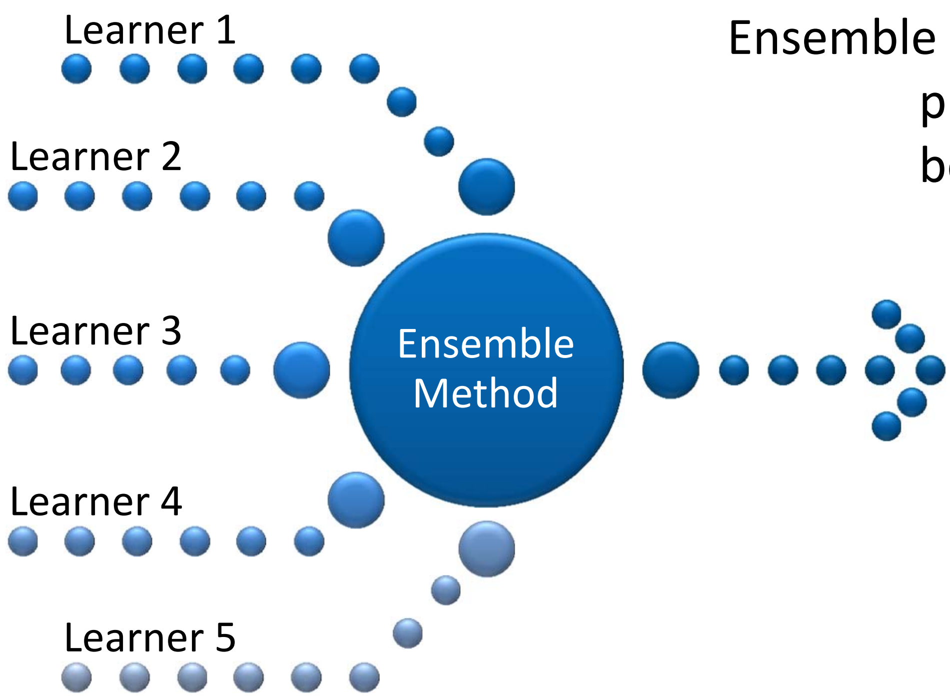
Scoring Ensemble Approach

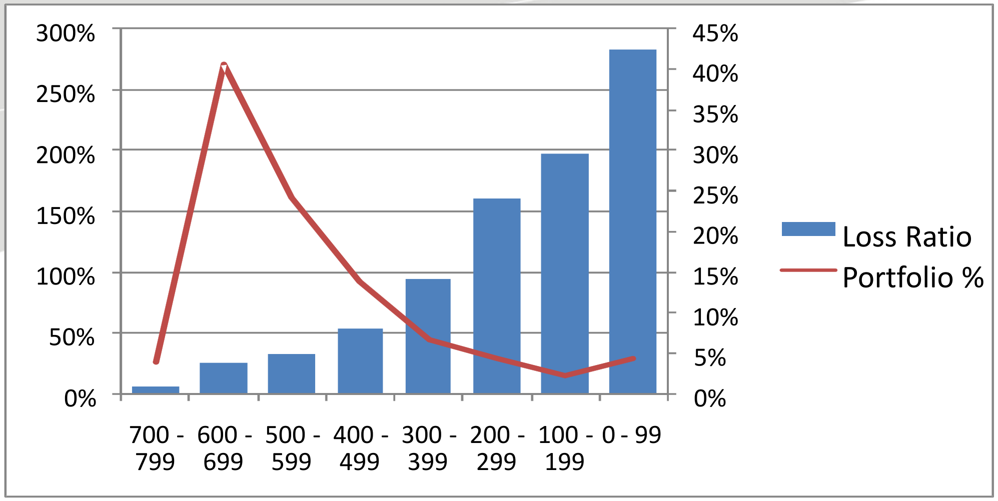
Scoring uses base learners in an ensemble approach.
Rule Induction (Segmentation) is that base learner.

Each base learner provides an estimate of risk. These separate models are combined into a single model. Ensemble methods are shown to provide superior models in both stability and lift over the base learners.



There are various techniques to build models on different versions of the data.

SCORING ANALYSIS



<u>Typical Uses</u>:

- Underwriting rules and tiering
- Rate plan improvements
- Creation of score variables
- Portfolio oversight
- Distribution management

✓ *Ensemble learning*: combines multiple "base" learners to provide an even stronger model than segmentation or credit score

✓ Final model prediction is a weighted average of the predicted values for each base learner

✓ Assigns a score between 0 and 1000 to each record in the dataset

✓ Lower values for the score correspond to higher expected values for the response

✓ Can be used for pricing, underwriting applications and portfolio/distribution oversight

RPD ANALYSES

Getting Started: Rapid Portfolio Diagnostic Provides Results in Nine Weeks

RPD Analyses

- Intended to provide a snapshot of the health of a company's portfolio.
- Purpose is to identify actions that can be implemented fairly quickly to improve profitability
- Identifies areas for future study.

Methodology

- Created scoring models to allow company to predict the future loss ratio of their policies.
- Created segmentation models to identify differences in customer profitability.
- Combined results with other tools to investigate distribution channels, retention opportunities, and targetable prospects.

SITUATION, GOALS, and CHALLENGES

- Company wanted to understand the overall quality of their Property book.
- Wanted to improve the profitability of their current business and understand how to grow profitably.
- Needed to understand which types of business to attract and which types of business to avoid.
- Management and staff needed:
    - Better management reporting tools to understand overall business performance
    - Analysis tools and access to data to allow detailed understanding of the book of business

RPD ANALYSIS – DATA & DETAILS

Data

- Homeowners forms HO-3, HO-4, and HO-6, Mobile Home, and Farm.
- 5-years of policy experience. Premium is earned and at current rate level.
- Losses & ALAE are undeveloped and un-trended. Excludes losses coded as catastrophes, but includes large losses.

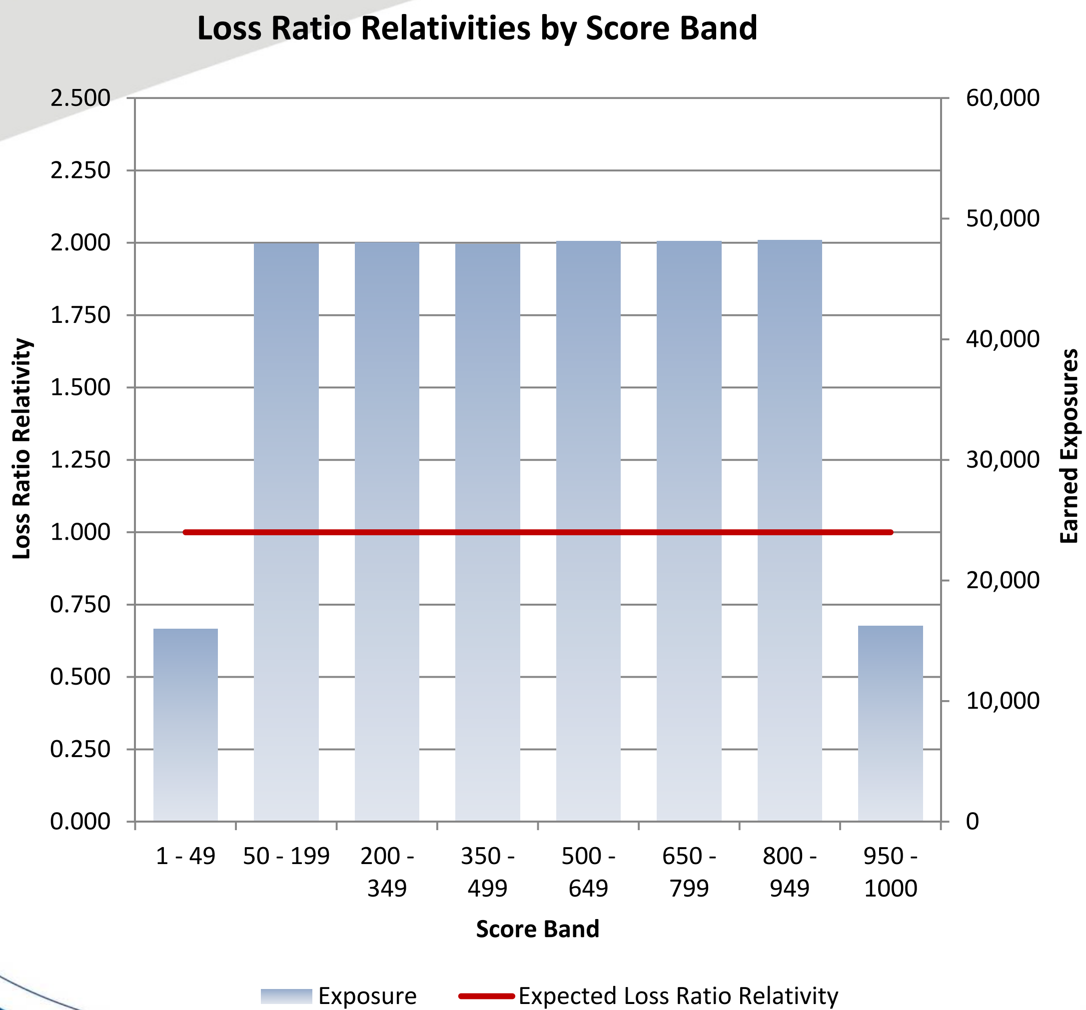
Catastrophes

- Catastrophes are significant risks for Property.
- Classified as severe windstorms for this insurer.
- Removed catastrophe losses & ALAE from data along with associated risk premium.

Third Party Data

- Attached Census information to data through zip code.

EXPOSURES WITHIN SCORE BANDS



Commentary

- **Scoring model was run on 5 years of Company experience.**
- **A score was assigned to each policy relative to the Company exposure distribution.**
- **Exposure distribution is 5% in the top and bottom Score bands and 15% in all other Score bands.**
- **If all policies priced correctly then would expect loss ratio relativities in each scoring band to be close to the red line.**

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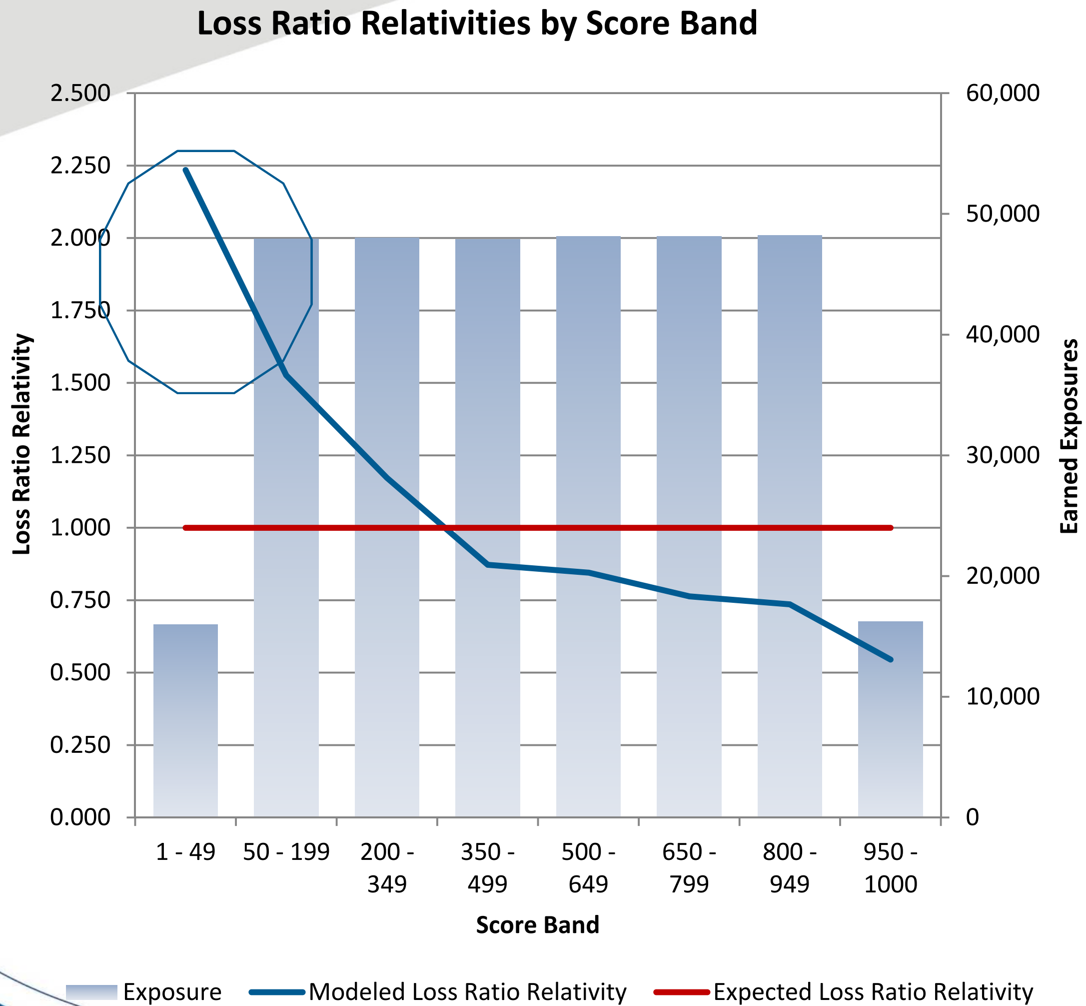
RESULTS SHOW OPPORTUNITIES FOR IMPROVED PERFORMANCE…



Commentary

- ***The Scoring model found a sizeable spread in loss ratio relativities in Company's data.***

Assuming that, on average, the portfolio is correctly priced then:

- **20% of the exposures are under-priced by more than 40%** (Score bands 1 - 199).
- **35% of the premiums are over-priced by more than 24%** (Score bands 650 - 1000).

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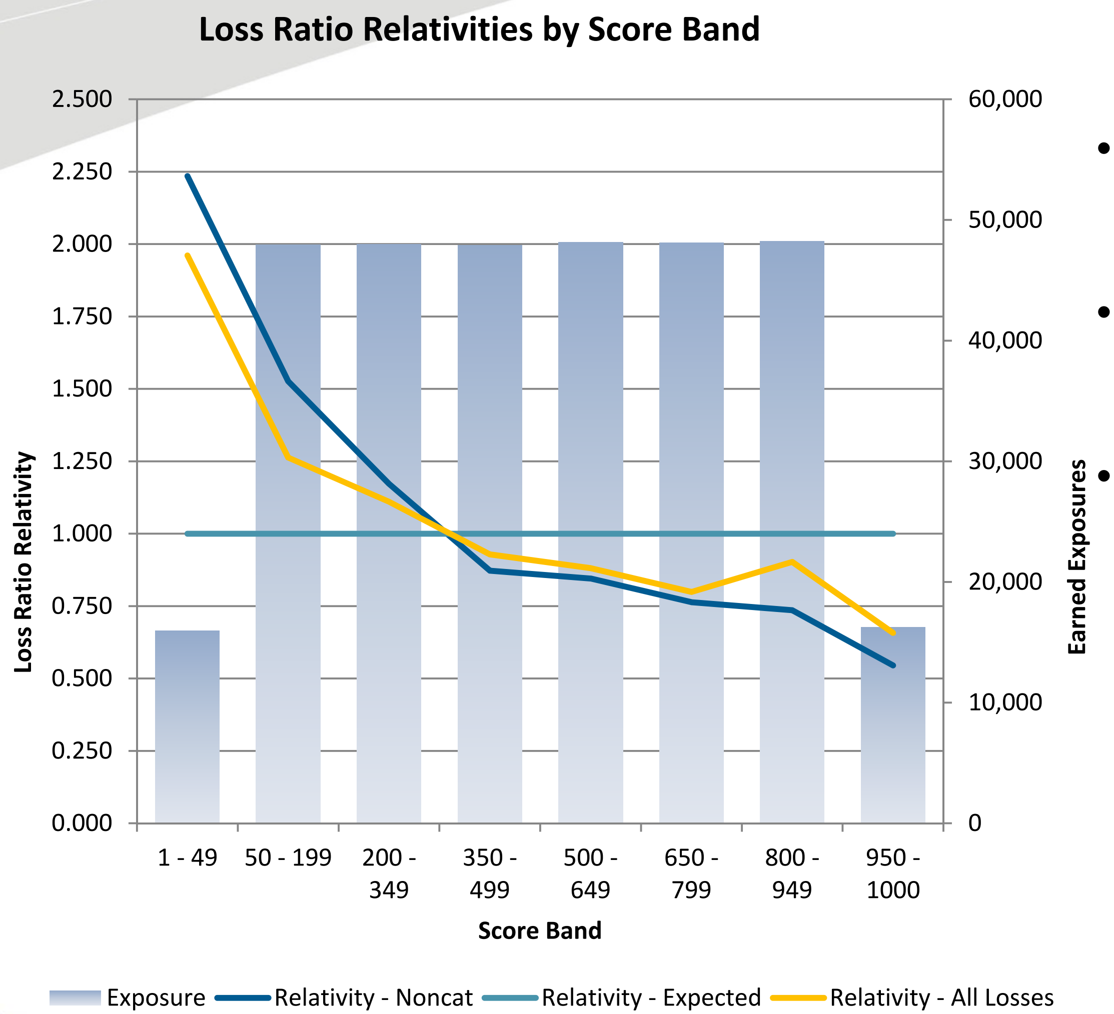
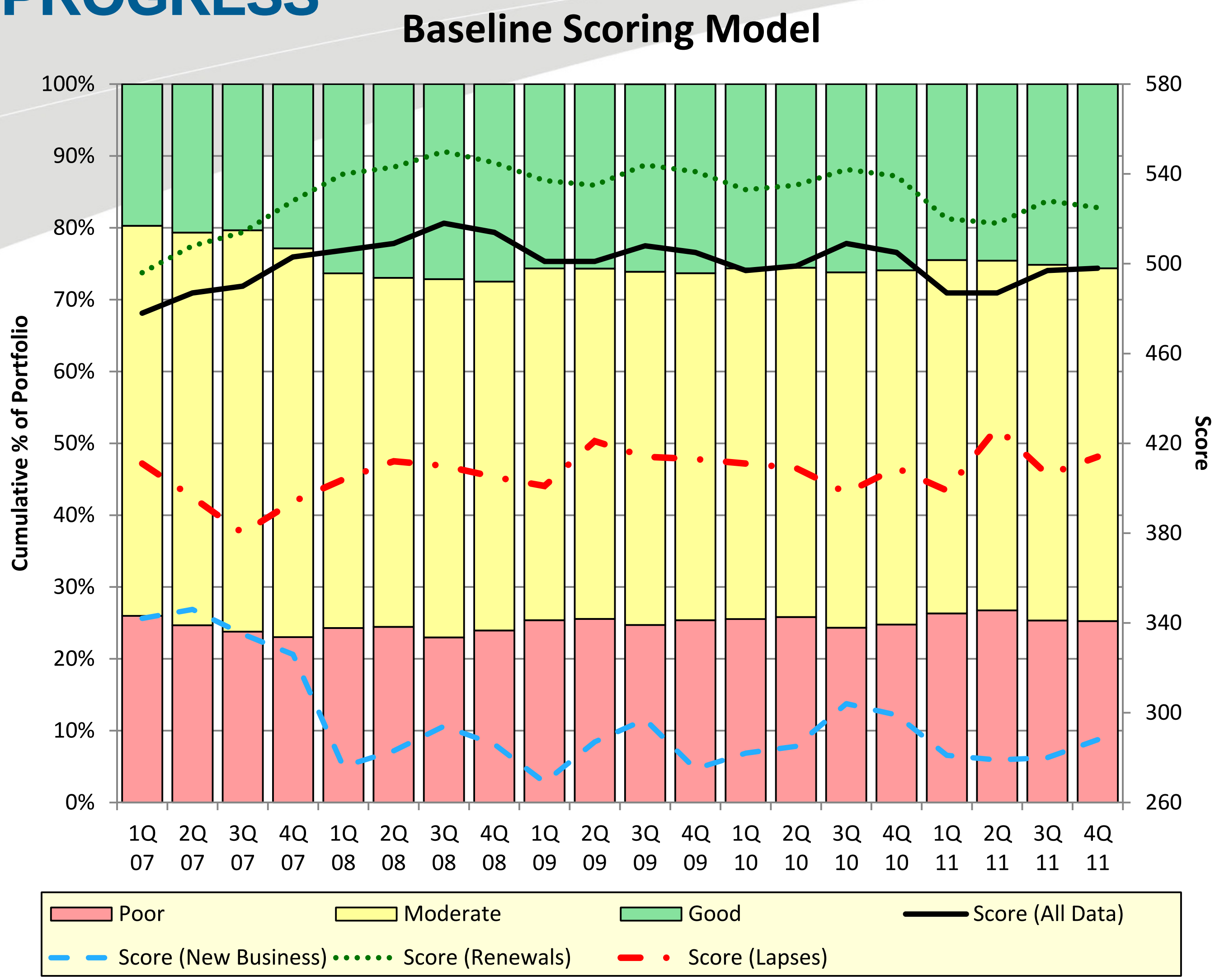
RESULTS SHOW CATS HAVE LITTLE IMPACT ON OVERALL MODELS



Commentary

- **Do CAT losses impact the effectiveness of the Scoring model? Only a little.**
- CAT losses are attached to scored polices and loss ratio relativity recalculated.
- Additional CAT losses do not significantly affect the shape of the Scoring curve.

PORTFOLIO MANAGEMENT – MONITOR THE PROGRESS



Colored bars show top 25% (green), middle 50% (yellow) and bottom 25% (red) of the modeled exposure.

Policy scores have been fairly steady during this time.

The overall score (black line) has been holding steady around 500. The low-scoring new business (dotted blue line) is due to “policy age” being used in the scoring model.

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SEGMENTATION ANALYSIS

Segment	2	6	4	5	1	7	3
Rank by Loss Ratio	1	2	3	4	5	6	7
Loss Ratio	25.36%	28.44%	33.86%	38.45%	40.03%	45.01%	53.73%
Premium Distribution	17%	14%	16%	11%	19%	14%	9%
Significant Attributes Below							
Median Household Income	36,781 or more	36,781 or more	36,781 or more	36,781 or more	0 to 36,780 (inclusive)	36,781 or more	0 to 36,780 (inclusive)
Deductible	1000, 250, OTHER	1000, 250, OTHER	--	500	--	--	--
3-Year Cumulative Loss Ratio by Zip Code	0.00 to 0.30 (upper exclusive)	0.00 to 0.30 (upper exclusive)	0.30 or more	0.00 to 0.30 (upper exclusive)	--	0.30 or more	--
Total_Acres	-1, or 0, 1	2 or more	-1, or 0, 1	--	--	2 or more	--
Inflation_Guard	--	--	--	--	Y	--	N

Short Term

Target zip codes with median household income greater than $37k

- Have shown to be a significantly lower risk grouping in our analysis.
- Can further refine target by identifying zip codes with better historical loss ratios.

Segment	2	6	4	5
Rank by Loss Ratio	1	2	3	4
Loss Ratio	25.36%	28.44%	33.86%	38.45%
Premium	51,935,183	44,006,706	50,949,802	33,126,505
Premium Distribution	17%	14%	16%	11%
Significant Attributes Below				
ZIP_V3_IncomeMedHouse	36,781 or more	36,781 or more	36,781 or more	36,781 or more
Deductible	1000, 250, OTHER	1000, 250, OTHER	--	500
ZIPLRCUM3	0.00 to 0.30 (upper exclusive)	0.00 to 0.30 (upper exclusive)	0.30 or more	0.00 to 0.30 (upper exclusive)
Total_Acres	-1, or 0, 1	2 or more	-1, or 0, 1	--
Inflation_Guard	--	--	--	--

SHORT TERM

Reduce exposures in policies that do not include Inflation Guard

- Presence of Inflation Guard on policies has differentiated better performing business, particularly in zip codes with median income less than $37k. Should determine whether this is a behavioral issue or a pricing issue.

Segment	2	6	4	5	1	7	3
Rank by Loss Ratio	1	2	3	4	5	6	7
Loss Ratio	25.36%	28.44%	33.86%	38.45%	40.03%	45.01%	53.73%
Premium	51,935,183	44,006,706	50,949,802	33,126,505	57,764,767	42,742,274	28,334,378
Premium Distribution	17%	14%	16%	11%	19%	14%	9%
Significant Attributes Below							
ZIP_V3_IncomeMedHouse	36,781 or more	36,781 or more	36,781 or more	36,781 or more	0 to 36,780 (inclusive)	36,781 or more	0 to 36,780 (inclusive)
Deductible	1000, 250, OTHER	1000, 250, OTHER	--	500	--	--	--
ZIPLRCUM3	0.00 to 0.30 (upper exclusive)	0.00 to 0.30 (upper exclusive)	0.30 or more	0.00 to 0.30 (upper exclusive)	--	0.30 or more	--
Total_Acres	-1, or 0, 1	2 or more	-1, or 0, 1	--	--	2 or more	--
Inflation_Guard	--	--	--	--	Y	--	N

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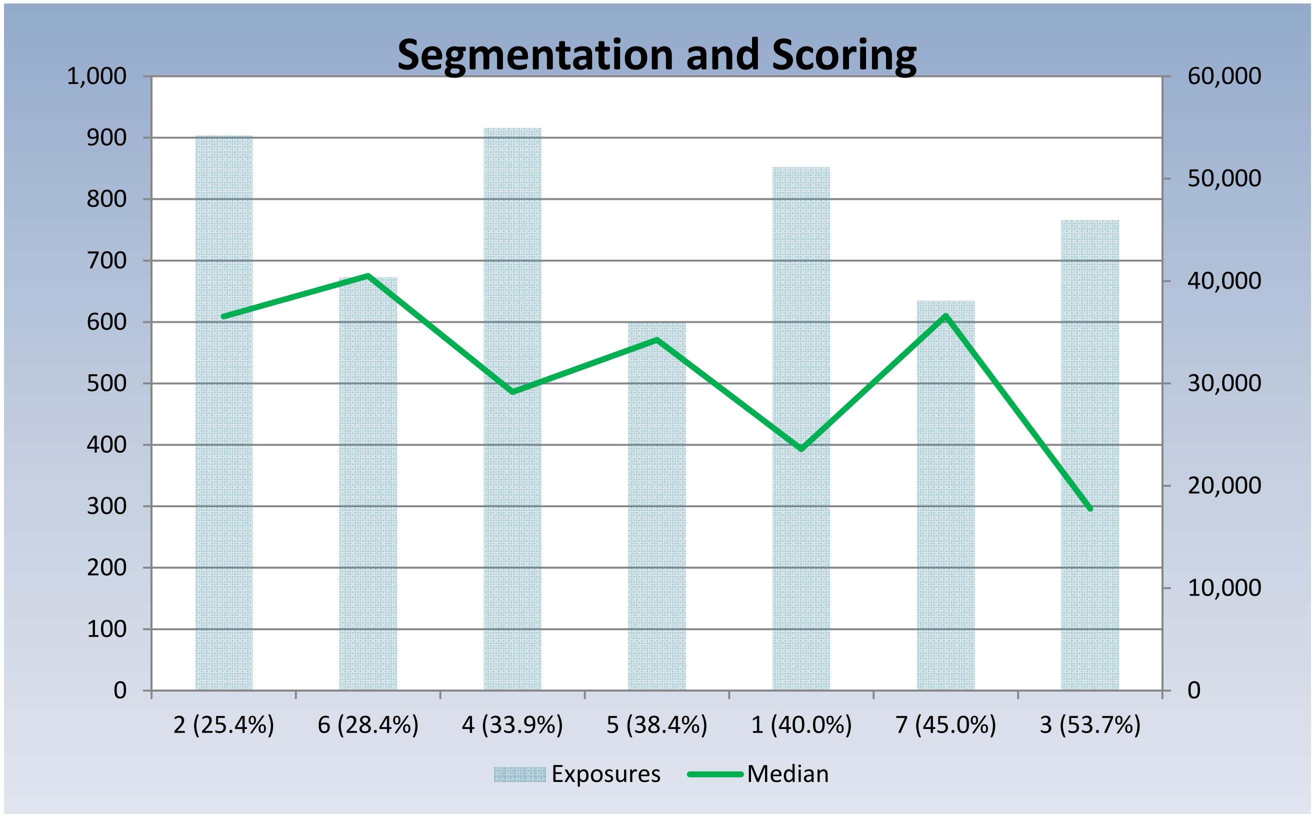
SHORT TERM

Increase volume of policies in selected zip codes

- The analysis shows that Policies in zip codes with higher median household income perform better.



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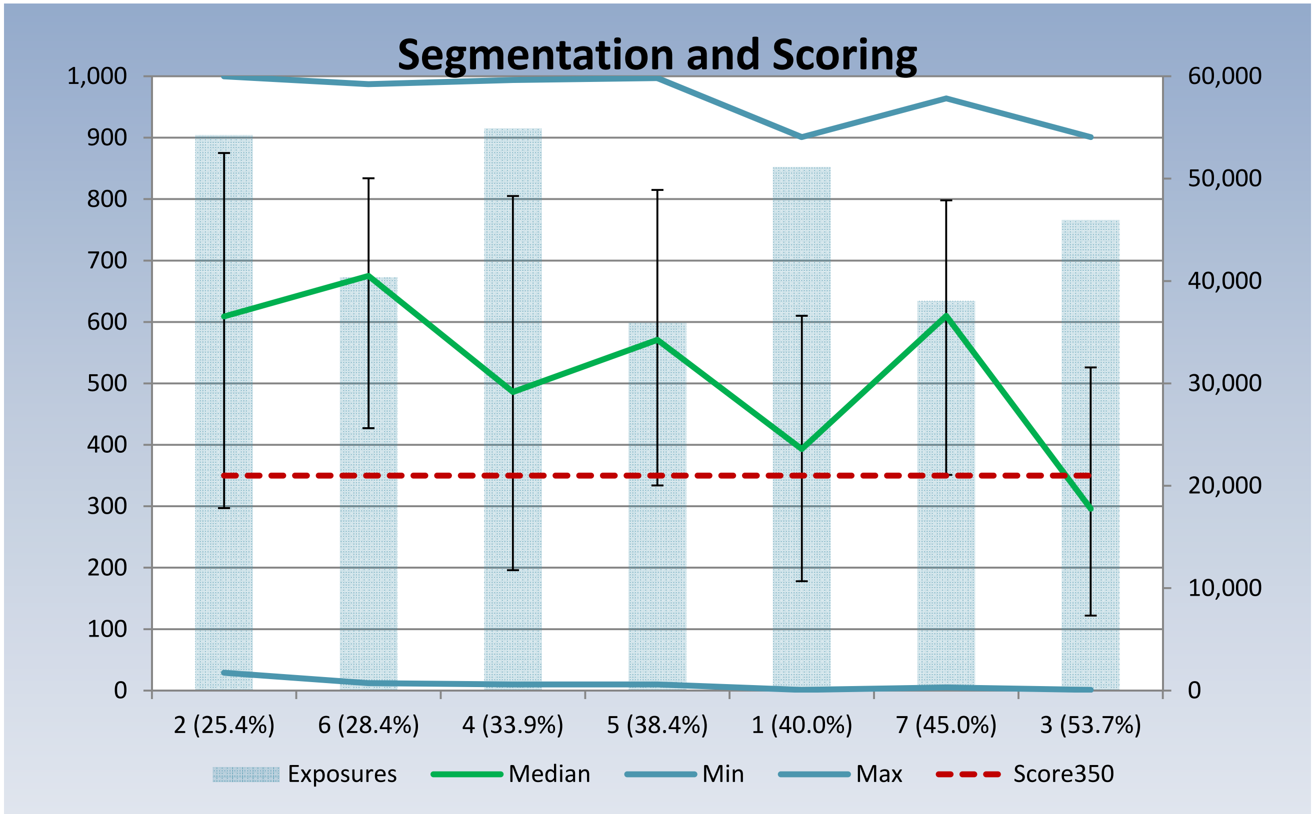
SHORT TERM

Increase volume of policies in selected zip codes

- The analysis shows that Policies in zip codes with higher median household income perform better.

- However, scoring shows that within these zip codes there is a wide range of policyholder expected losses.



72% 83% 63% 72% 54% 75% 42%

The percent of business with scores above 350

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SHORT TERM ACTION

Increase retention of profitable with poor retention business

Achieve target retention of 90% on profitable business leads to a 2.45% increase in total book exposures over 3 years.

The blue box is 23% of policies. This improves profit by $700,000 over three years compared to not increasing retention.

		Talon Retention Score Band												
		96.2%	94.8%	94.5%	93.5%	92.6%	91.1%	89.7%	87.6%	85.7%	81.6%	77.4%	64.8%	
Talon Loss Score Band		1	2	3	4	5	6	7	8	9	10	11	12	Total
82.0%	1	0.00%	0.00%	0.00%	0.05%	0.10%	0.56%	0.79%	1.07%	0.63%	0.42%	0.70%	1.71%	6.05%
56.2%	2	0.00%	0.01%	0.13%	0.55%	0.57%	1.51%	2.30%	2.73%	2.06%	1.31%	1.18%	2.56%	14.91%
43.0%	3	0.00%	0.33%	0.54%	1.09%	1.06%	1.88%	2.58%	2.01%	2.02%	1.11%	1.21%	0.65%	14.49%
31.8%	4	0.10%	0.49%	0.74%	1.34%	1.35%	2.62%	3.04%	1.37%	1.85%	0.81%	0.93%	0.42%	15.06%
30.6%	5	0.62%	0.90%	0.86%	1.61%	1.50%	2.86%	2.45%	1.11%	1.44%	0.67%	0.82%	0.32%	15.15%
28.2%	6	1.78%	1.44%	0.99%	1.81%	1.52%	2.17%	1.88%	0.71%	0.98%	0.32%	0.20%	0.03%	13.82%
26.6%	7	2.48%	1.67%	1.26%	1.91%	1.89%	2.34%	1.46%	0.75%	0.80%	0.15%	0.02%	0.00%	14.73%
19.9%	8	0.07%	0.29%	0.59%	1.44%	1.46%	1.12%	0.40%	0.26%	0.16%	0.00%	0.00%	0.00%	5.78%
36.7%	Total	5.04%	5.13%	5.11%	9.81%	9.44%	15.05%	14.89%	10.02%	9.94%	4.80%	5.06%	5.70%	100.00%

Customers can be identified by producing policy listing to take immediate actions.

Type Analysis: Loss Ratio Analyses with a Retention Analyses overlaid

INTERMEDIATE TERM ACTION

Exclude unprofitable customers who retain well

		Talon Retention Score Band												
		96.2%	94.8%	94.5%	93.5%	92.6%	91.1%	89.7%	87.6%	85.7%	81.6%	77.4%	64.8%	
Talon Loss Score Band		1	2	3	4	5	6	7	8	9	10	11	12	Total
82.0%	1	0.00%	0.00%	0.00%	0.05%	0.10%	0.56%	0.79%	1.07%	0.63%	0.42%	0.70%	1.71%	6.05%
56.2%	2	0.00%	0.01%	0.13%	0.55%	0.57%	1.51%	2.30%	2.73%	2.06%	1.31%	1.18%	2.56%	14.91%
43.0%	3	0.00%	0.33%	0.54%	1.09%	1.06%	1.88%	2.58%	2.01%	2.02%	1.11%	1.21%	0.65%	14.49%
31.8%	4	0.10%	0.49%	0.74%	1.34%	1.35%	2.62%	3.04%	1.37%	1.85%	0.81%	0.93%	0.42%	15.06%
30.6%	5	0.62%	0.90%	0.86%	1.61%	1.50%	2.86%	2.45%	1.11%	1.44%	0.67%	0.82%	0.32%	15.15%
28.2%	6	1.78%	1.44%	0.99%	1.81%	1.52%	2.17%	1.88%	0.71%	0.98%	0.32%	0.20%	0.03%	13.82%
26.6%	7	2.48%	1.67%	1.26%	1.91%	1.89%	2.34%	1.46%	0.75%	0.80%	0.15%	0.02%	0.00%	14.73%
19.9%	8	0.07%	0.29%	0.59%	1.44%	1.46%	1.12%	0.40%	0.26%	0.16%	0.00%	0.00%	0.00%	5.78%
36.7%	Total	5.04%	5.13%	5.11%	9.81%	9.44%	15.05%	14.89%	10.02%	9.94%	4.80%	5.06%	5.70%	100.00%

The poorer performing business in Blue Box is 6.5% of the total exposures and has a track record for continuing renewal business.

Removing these customers would increase profitability by $787,000 over three years.

Customers can be identified by producing policy listing to take actions.

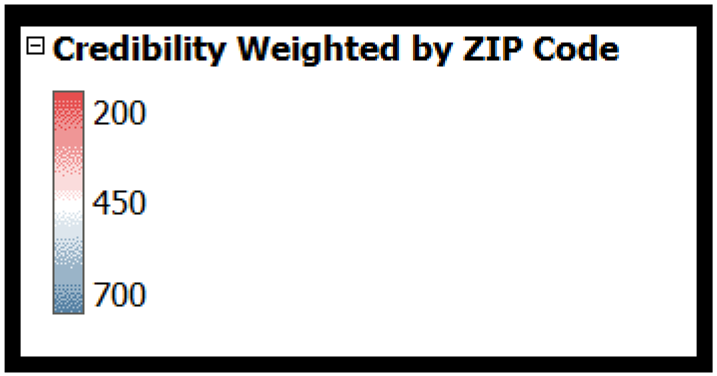
FOCUSED PROSPECTING

Process: Use signal within geographies to identify better business locations

Use Insurance results - premiums and claims

Based on the Scoring Model using Onleveled premiums

Map results:

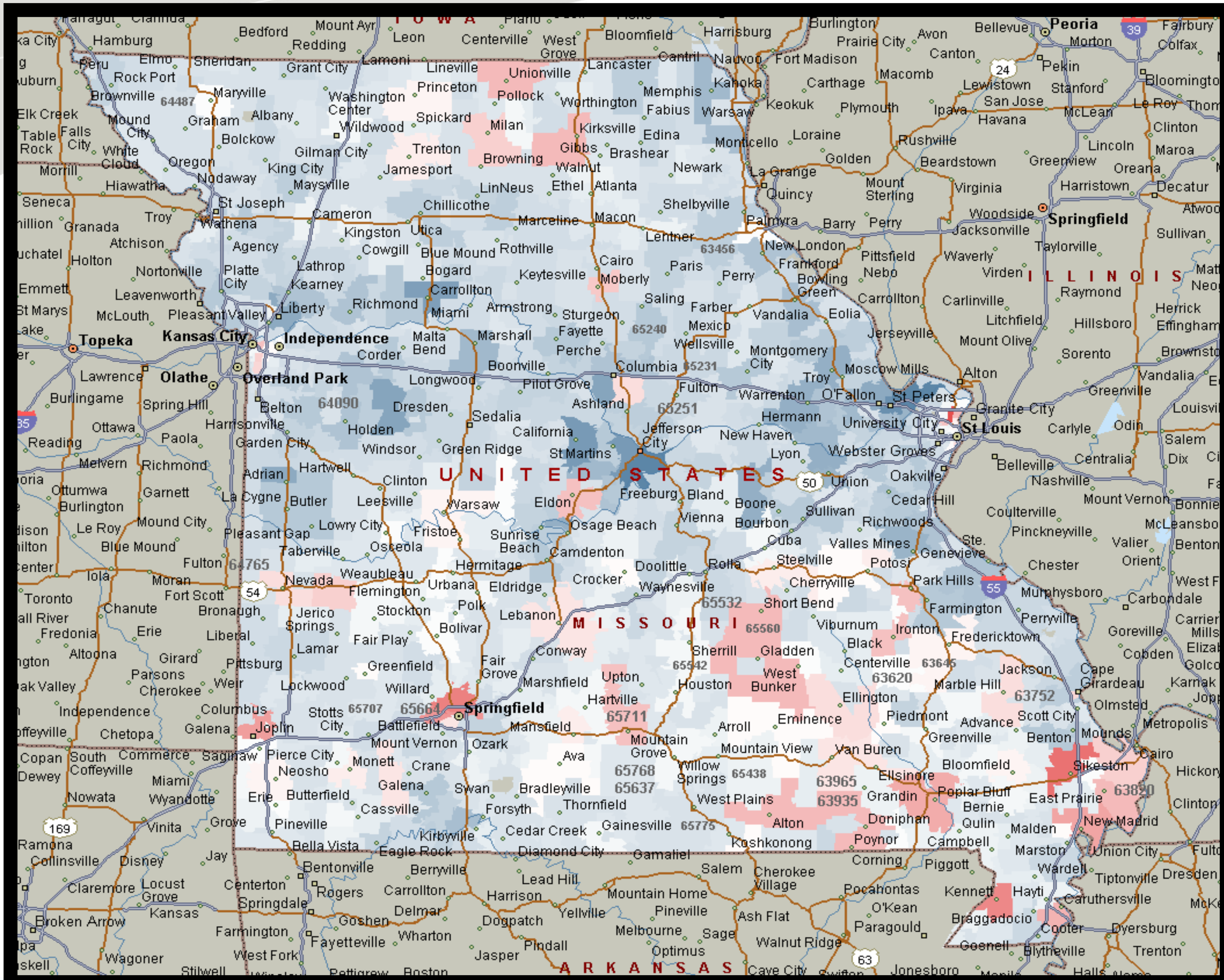


Opportunities:

- **Prospect aggressively in Blue areas**
  To grow more profitable business
- **Review territory rates**

RIFLE FOCUSED PROSPECTING

Utilizing 3 digit zip code analyses overlaid onto Maps technology



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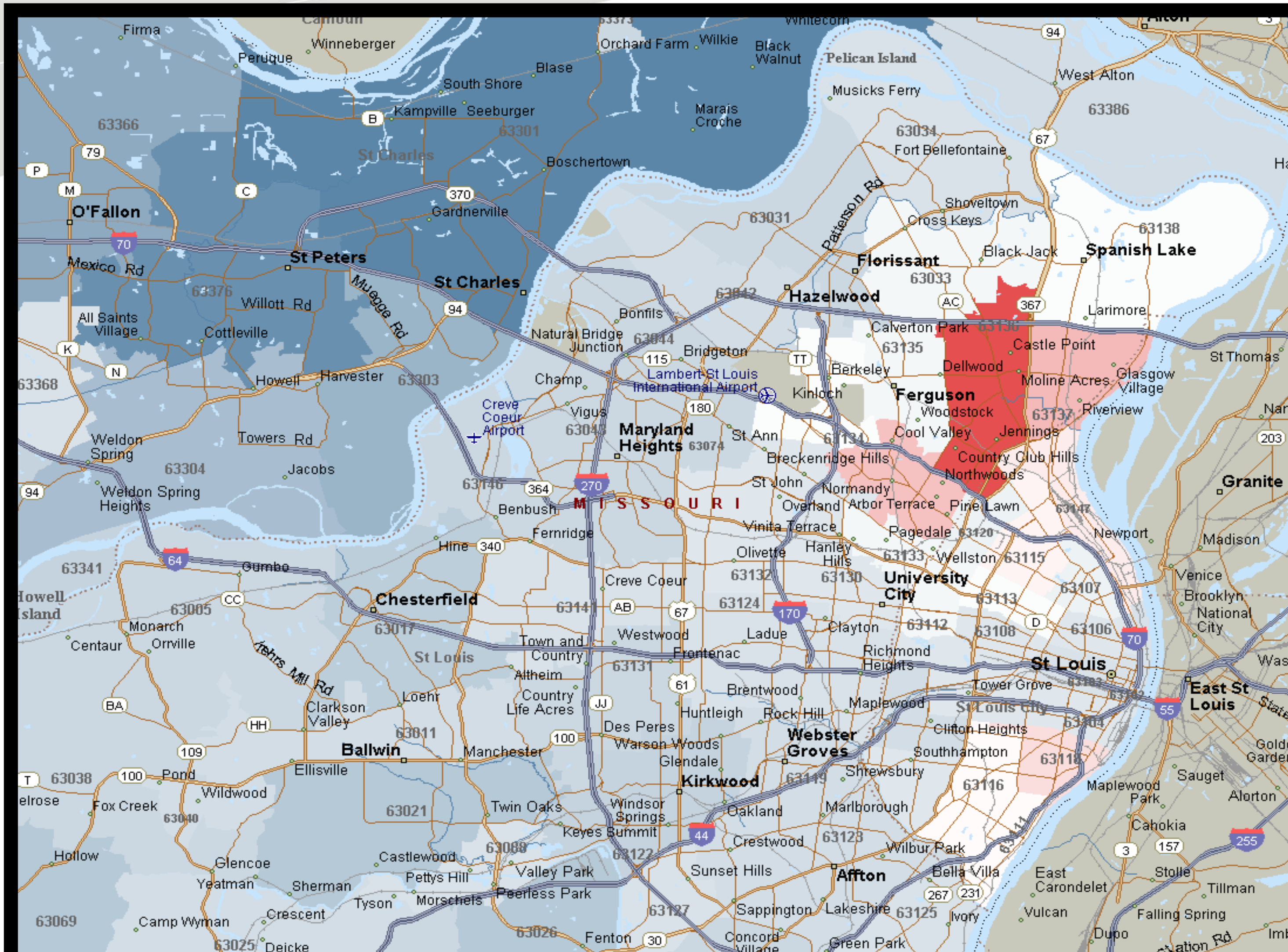
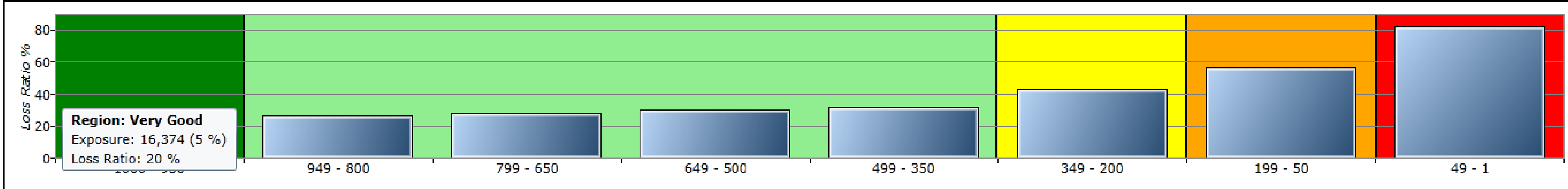
RIFLE FOCUSED PROSPECTING

ST. Louis Area



DISTRIBUTION MANAGER – Top Agents By Exposure

Prior:	Jan 10-Dec 10	
Selected:	Jan 11-Dec 11	01/2007 … 12/2011



Agency	WP Change	NB Change	Earned Premium Distribution	Retention Rate	Exposure	Exp Dist Change	Expected Loss Ratio	(change)	QBI	(change)
	3 %	-8 %		90 %	39,969		37 %	1 %	0.979	-2 %
00095	4 %	-9 %		92 %	475		38 %	1 %	0.971	-3 %
00232	2 %	-18 %		90 %	404		39 %	-1 %	0.945	2 %
00722	7 %	15 %		91 %	397		40 %	2 %	0.917	-4 %
00706	1 %	45 %		89 %	395		38 %	0 %	0.969	0 %
01113	7 %	-9 %		90 %	376		55 %	-2 %	0.668	4 %
00782	11 %	-18 %		93 %	365		43 %	3 %	0.855	-7 %
00945	-4 %	-20 %		88 %	360		32 %	-4 %	1.153	11 %
00929	3 %	-12 %		86 %	354		54 %	1 %	0.684	-2 %
00932	2 %	-8 %		85 %	346		46 %	3 %	0.793	-7 %
00916	10 %	4 %		90 %	341		48 %	1 %	0.770	-2 %
00617	8 %	-25 %		90 %	337		36 %	0 %	1.032	-1 %
00529	-1 %	-17 %		89 %	333		34 %	2 %	1.066	-5 %
00166	0 %	-1 %		87 %	332		35 %	0 %	1.045	-1 %
00709	3 %	11 %		92 %	328		31 %	1 %	1.190	-4 %
00974	15 %	-2 %		88 %	325		38 %	0 %	0.963	-1 %
00869	1 %	17 %		91 %	319		44 %	1 %	0.838	-1 %
00498	-5 %	-13 %		79 %	313		35 %	1 %	1.047	-2 %
01085	24 %	1 %		90 %	311		41 %	0 %	0.888	0 %

No filter. No exposure break. Page 1 of 20

Filter by Zone , Agent, time period, monthly bill, etc. to show effects of book's performance at a micro level.

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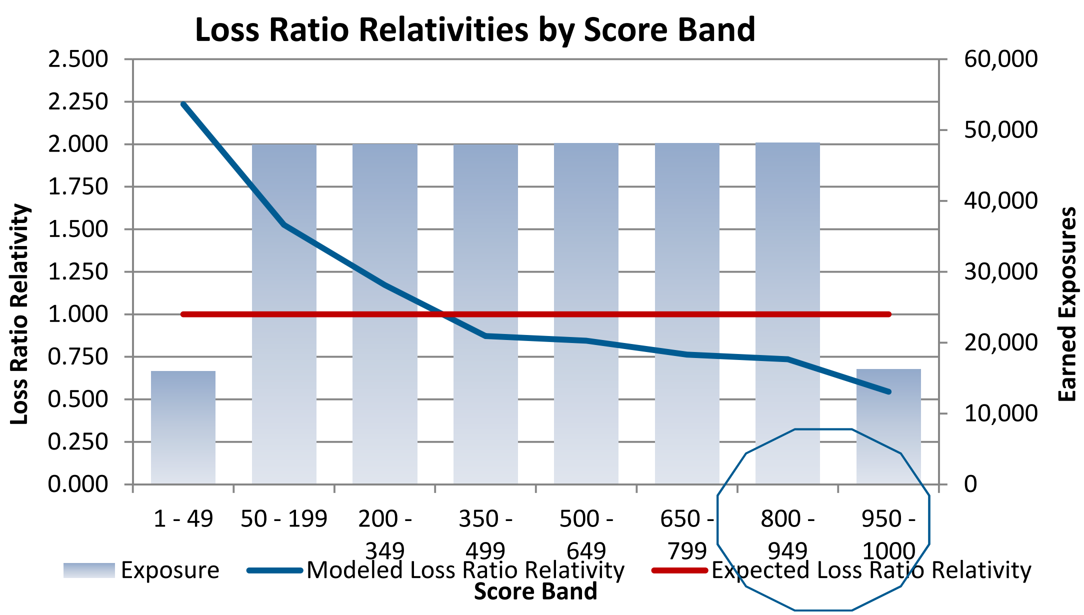
INTERMEDIATE TERM ACTION

- Look at the overpricing component (high score) to find where to incent new business as a new program to grow a more profitable portfolio.

- Broad rate reductions (vs. targeted) on current policies may not result in a large enough retention lift to recapture forfeited premium. However, if a rate reduction is indicated then scoring indicates where reduction could be taken.



Milliman

EagleEye Analytics

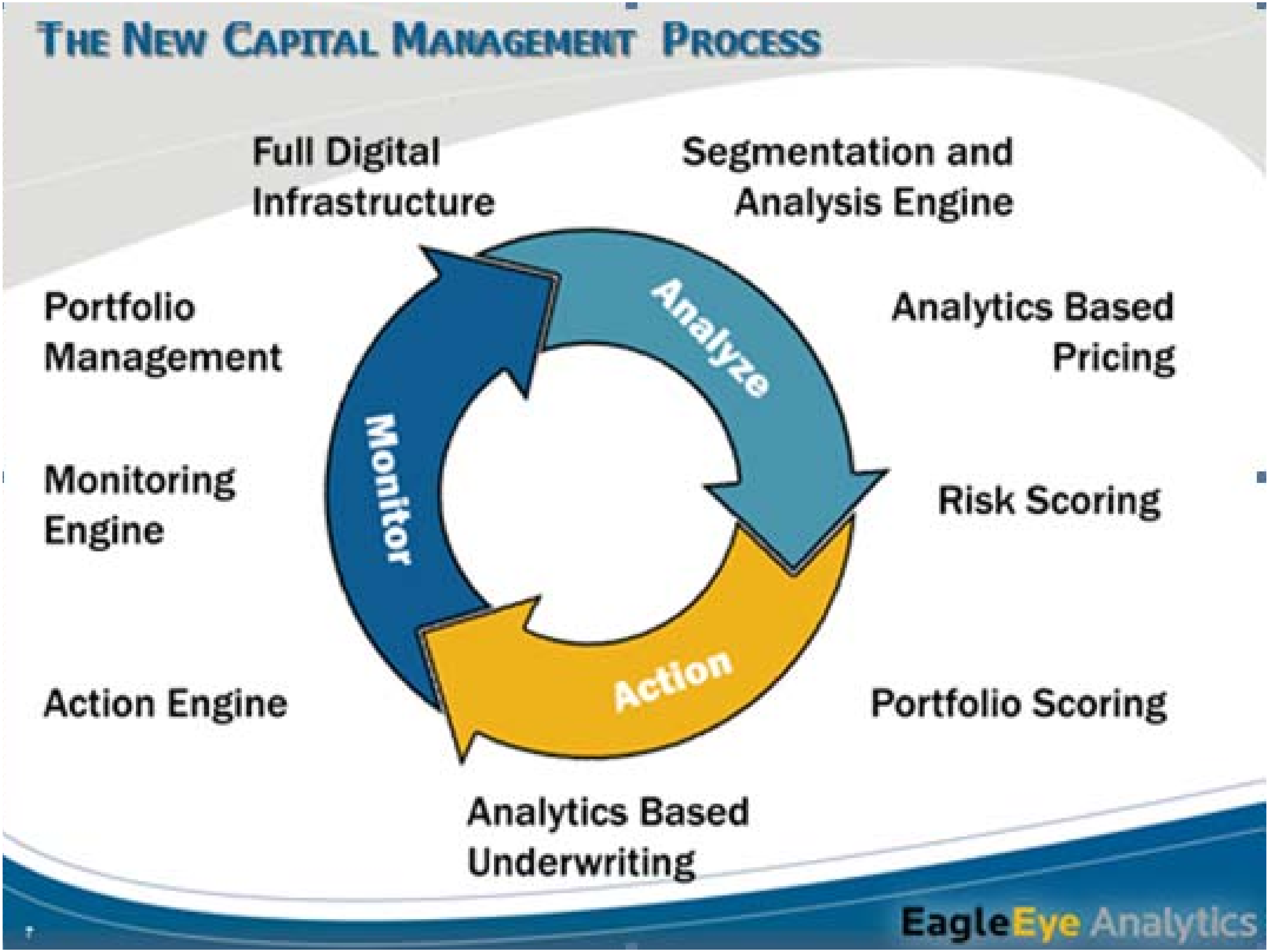
LONG TERM ACTION

Integration of Predictive Modeling into Rating Structure

- Scoring can be incorporated into algorithm as an additional rating factor, similar to credit.
  - Requires regulatory approval
  - Relies on company or publicly available third party data

- Segmentation can be used to establish new rating tiers.

- Once established in company rating structure, rate changes can be targeted at specific segments of company's book to better manage distribution.


THE NEW CAPITAL MANAGEMENT PROCESS
Full Digital Infrastructure
Segmentation and Analysis Engine
Portfolio Management
Analytics Based Pricing
Monitoring Engine
Risk Scoring
Action Engine
Portfolio Scoring
Analytics Based Underwriting
Analyze
Monitor
Action
EagleEye Analytics

QUESTIONS ?

THANK YOU