



Pricing Analytics for the Small and Medium Sized Company

The Road to Advanced Pricing Practices

2014 CAS RPM
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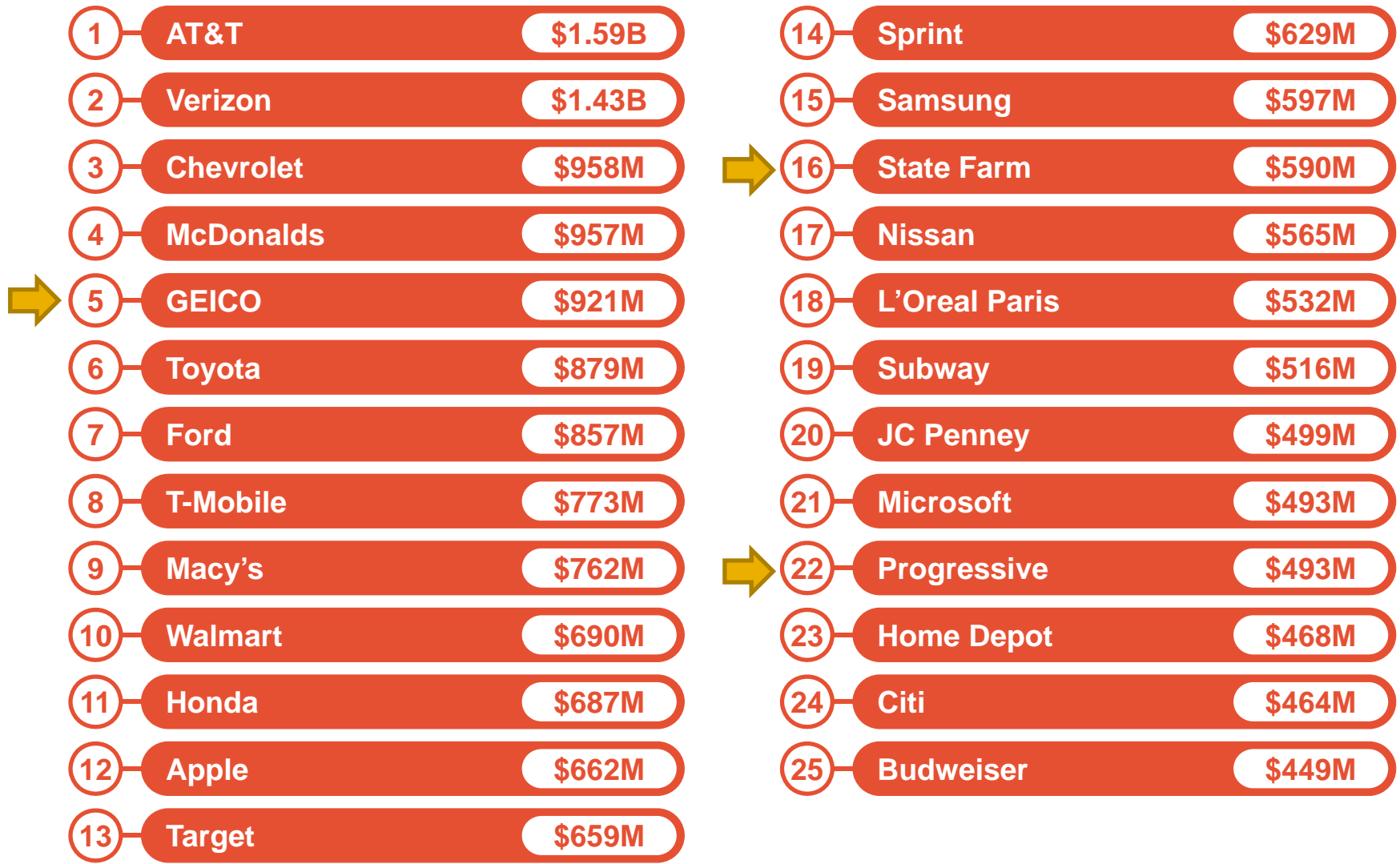
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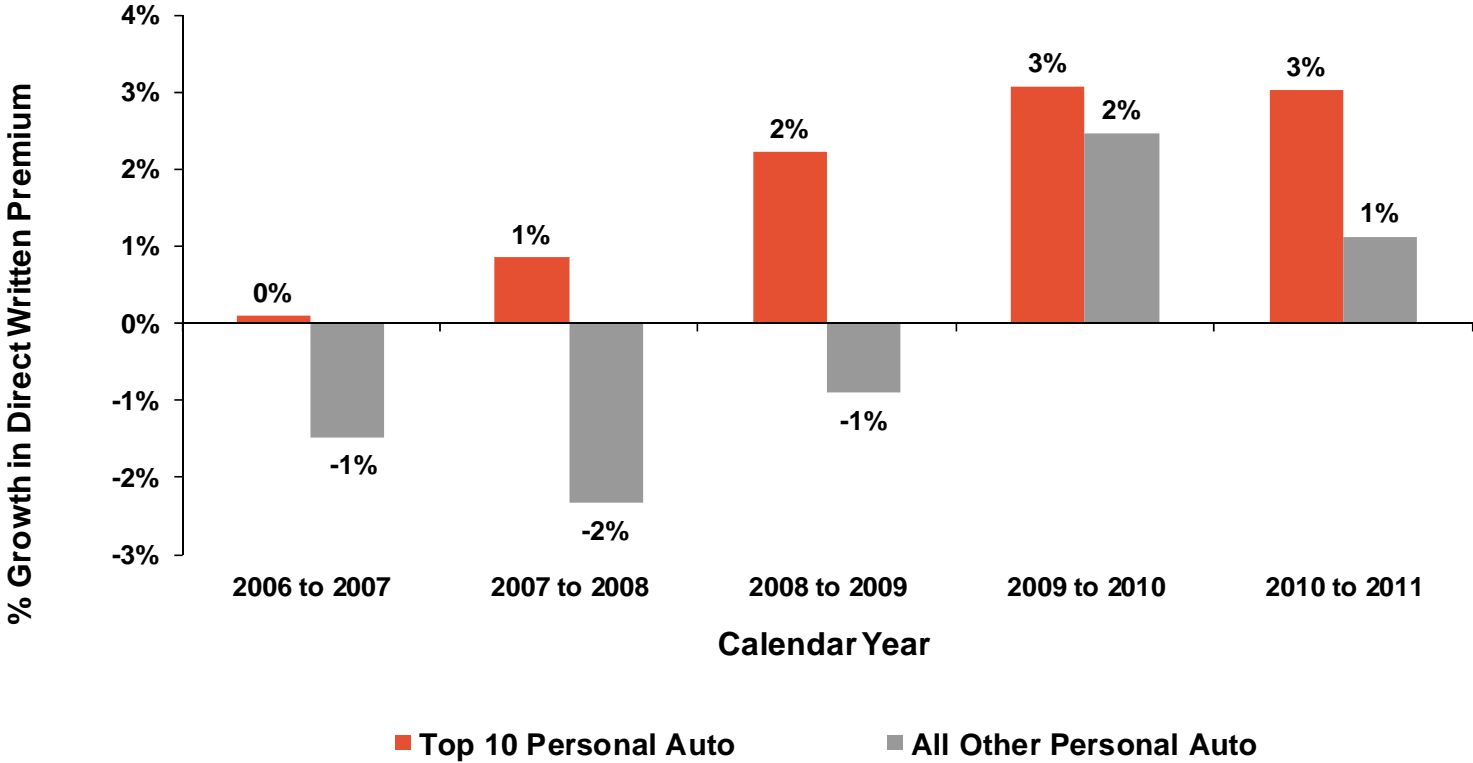
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25 Biggest Megabrands



Top 10 personal auto carriers already own almost 70% of the market...and they are continuing to grow!

Personal Auto Liability Percent Growth of Direct Written Premium

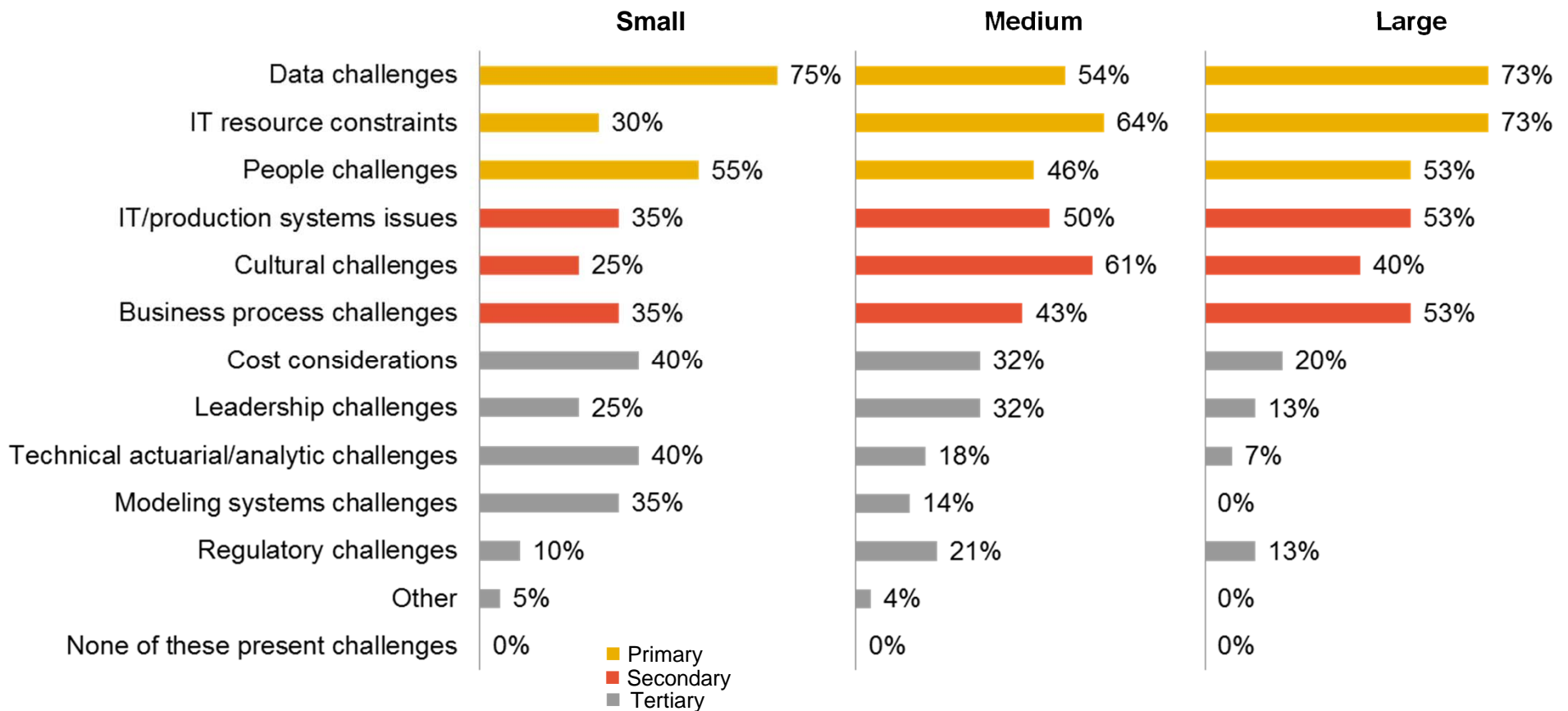


Advanced pricing practices are within reach!

- Three things I want you to get from this presentation:
 - ***Small insurance companies can have sophisticated pricing analytics***
 - ***For small companies, the key to sophisticated pricing is maximizing the pricing information and resources that you have***
 - ***The key to maximizing value of pricing information and efficiently using your pricing resources is integration of your pricing analyses***

...but some challenges are unavoidable regardless of size

Which of the following areas present the greatest challenges for incorporating more sophisticated data modeling techniques into your rating or underwriting plans? (Q.26)



Base: U.S. respondents (small n=20, medium n=28, large n=15)

Ratemaking vs. Pricing

- Actuarial Ratemaking
 - Actuarial Statement of Principles on Ratemaking
 - A rate is reasonable and not excessive, inadequate, or unfairly discriminatory if it is an actuarially sound estimate of the expected value of all future costs associated with an individual risk transfer
- Pricing
 - Taking into account all factors, such as costs, regulatory constraints, business constraints (e.g. competitive constraints) and strategic constraints when setting actual price charged
- Traditionally, actuaries provide the actuarial indication which was an input into the pricing decision
- Today I'm talking about pricing analytics

Foundational components of sophisticated pricing

Program Monitoring

- Ongoing monitoring of important program statistics
- Facilitates early identification of problems and validation of assumptions

Predictive Models

- Models that provide understanding of expected loss costs at the segment level

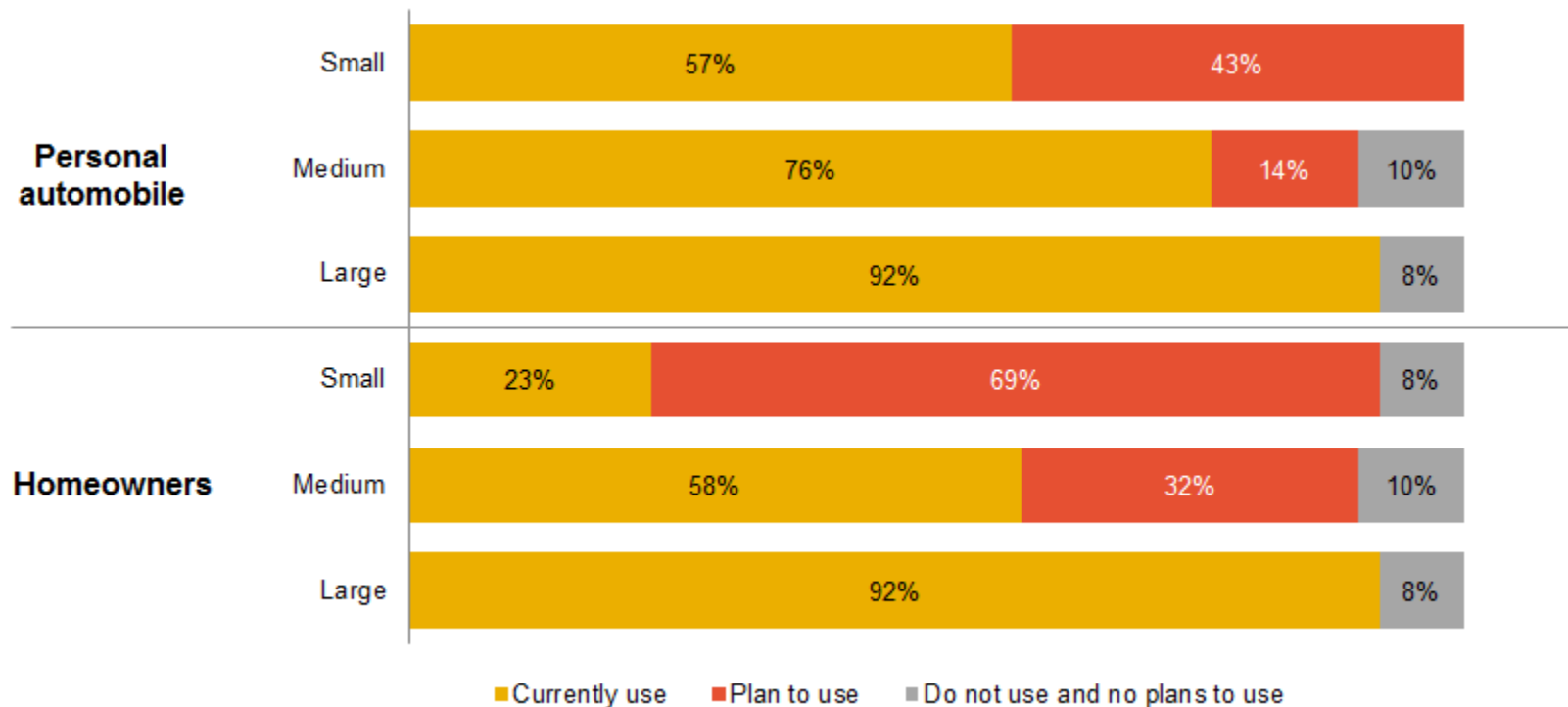
Competitive Market Analysis

- Analysis of competitor prices, providing important information about market dynamics

- Individually, none of these are cutting edge; the majority of companies already have capabilities to do these types of analyses

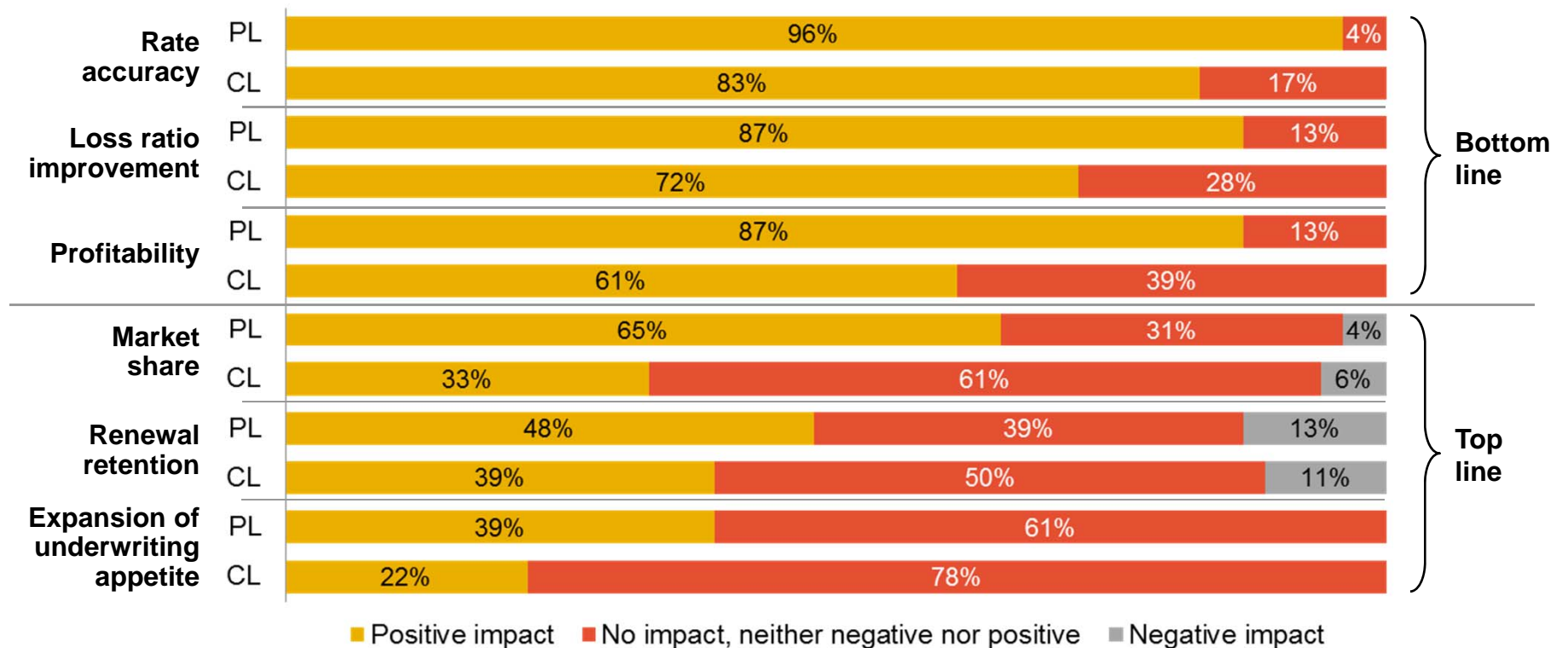
Predictive modeling is an Industry Standard

- Large carriers are using predictive modeling for risk selection and pricing for all lines
- Small carriers have been understandably slower to adopt; however, the majority are now using predictive modeling techniques



Predictive Modeling Improves Performance

- Personal line carriers are seeing a positive impact on both bottom and top line results



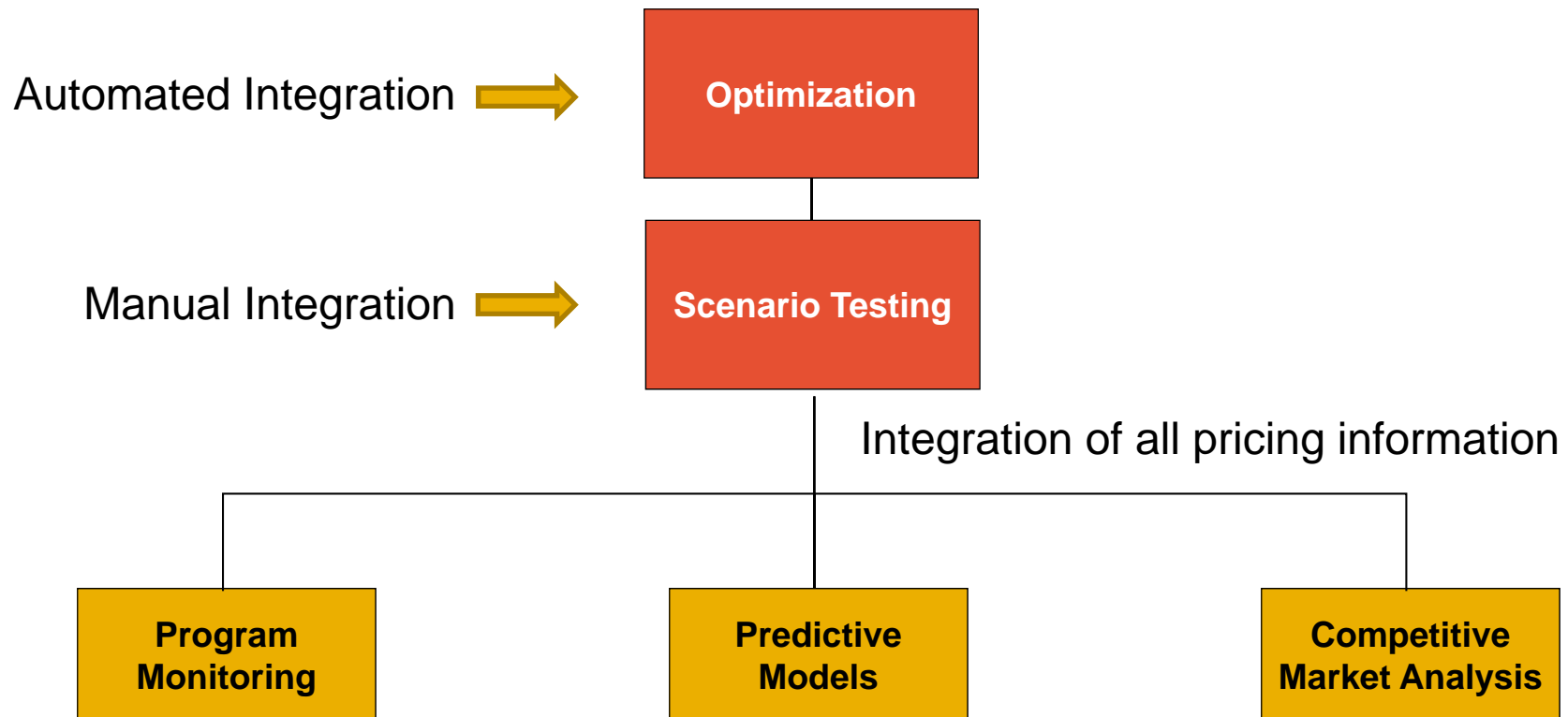
Competitive Market Analysis (CMA) is an Industry Standard

- The majority of companies are using CMA
 - 68% of personal auto carriers monitor competitors' historical and current rate level activity
 - Almost 50% of personal auto carriers rerate their book of business using competitor rating plan to study their competitive position
- CMA results in actionable pricing decisions
 - 74% of personal auto carriers use CMA to identify and inform the investigation of potentially significant variables in a predictive model
 - 65% of personal auto carriers use CMA findings to guide revisions to pricing for specific segments

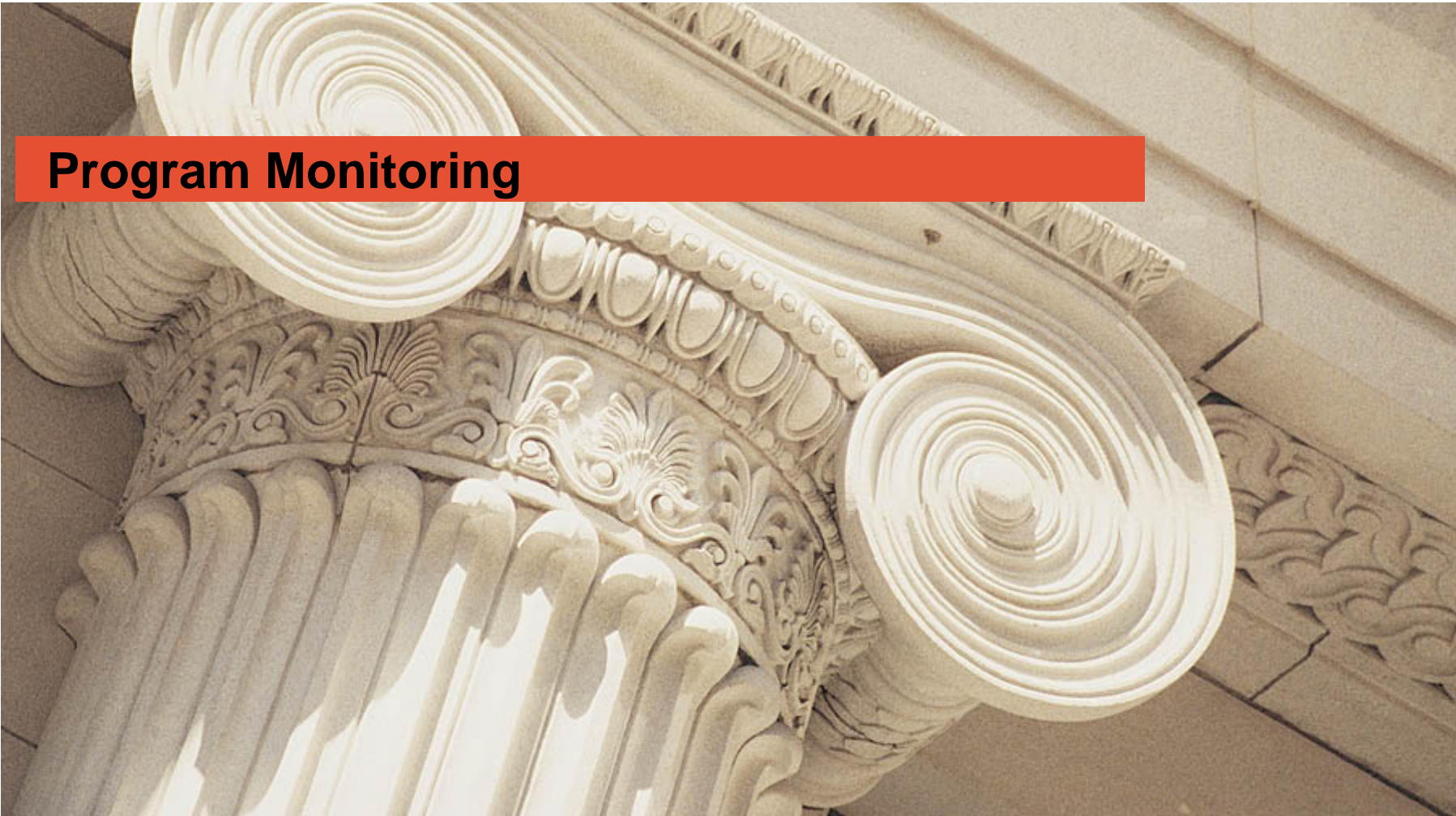
It's unavoidable that small companies are at a disadvantage

- There are a wide range of resources available to develop foundational capabilities
 - With some determination and a little help, most companies can bring these capabilities in-house
- However, small companies have unavoidable disadvantages with these foundational capabilities
 - Predictive models will never be as good as larger companies because you are limited by data volume
 - CMA is limited compared to larger companies because you do not have the resources to thoroughly vet underlying assumptions
- The challenge is maximizing the value of the pricing analyses that you do have available
 - The key is to integrate your monitoring reports, predictive models and CMA

Key to sophisticated pricing is *integration* of all your pricing information



- Integration of these analyses allows for:
 - Identifying potential pricing opportunities
 - Testing implications of pricing strategies



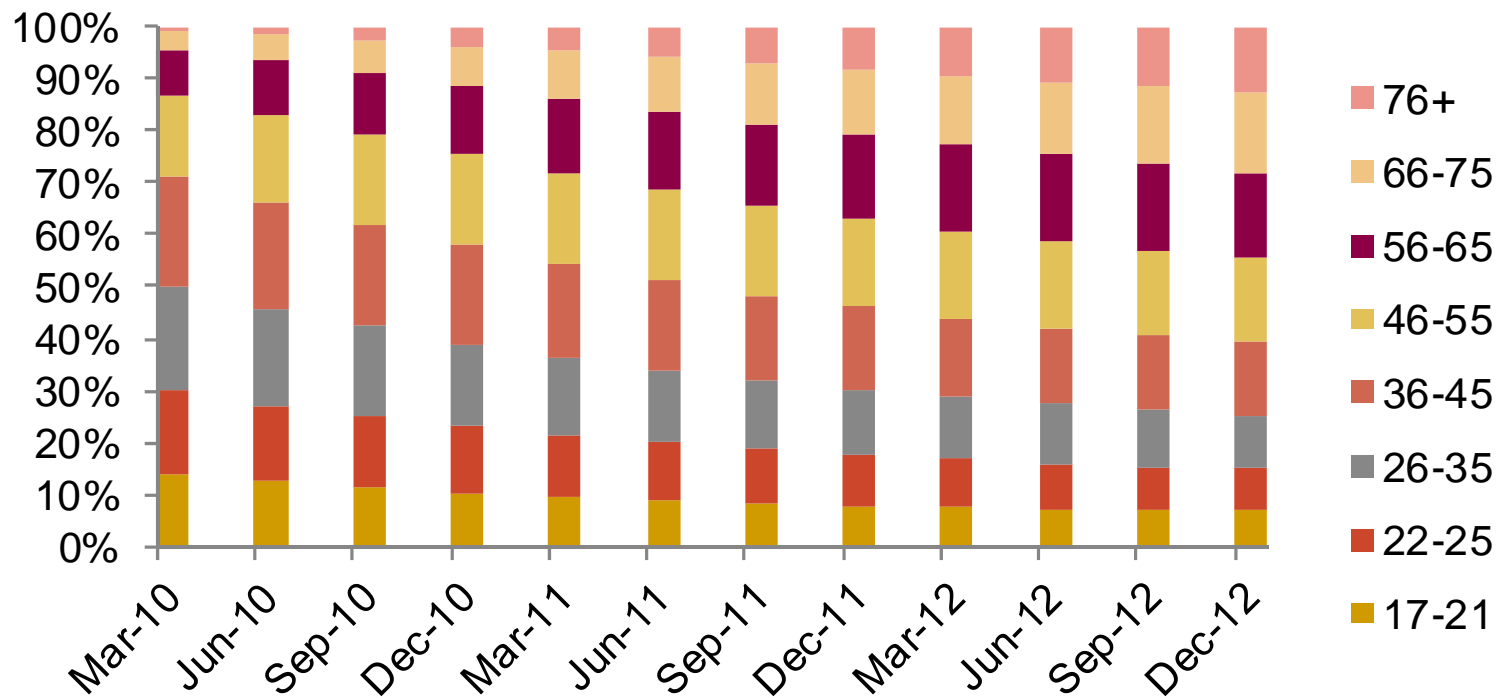
Program Monitoring

Program Monitoring

- A critical component of product management is the ability to easily track and review important product statistics
- Dashboards are often created for this purpose and allow for quick and easy digestion of important program information
- Facilitates early identification of problems and validation of assumptions

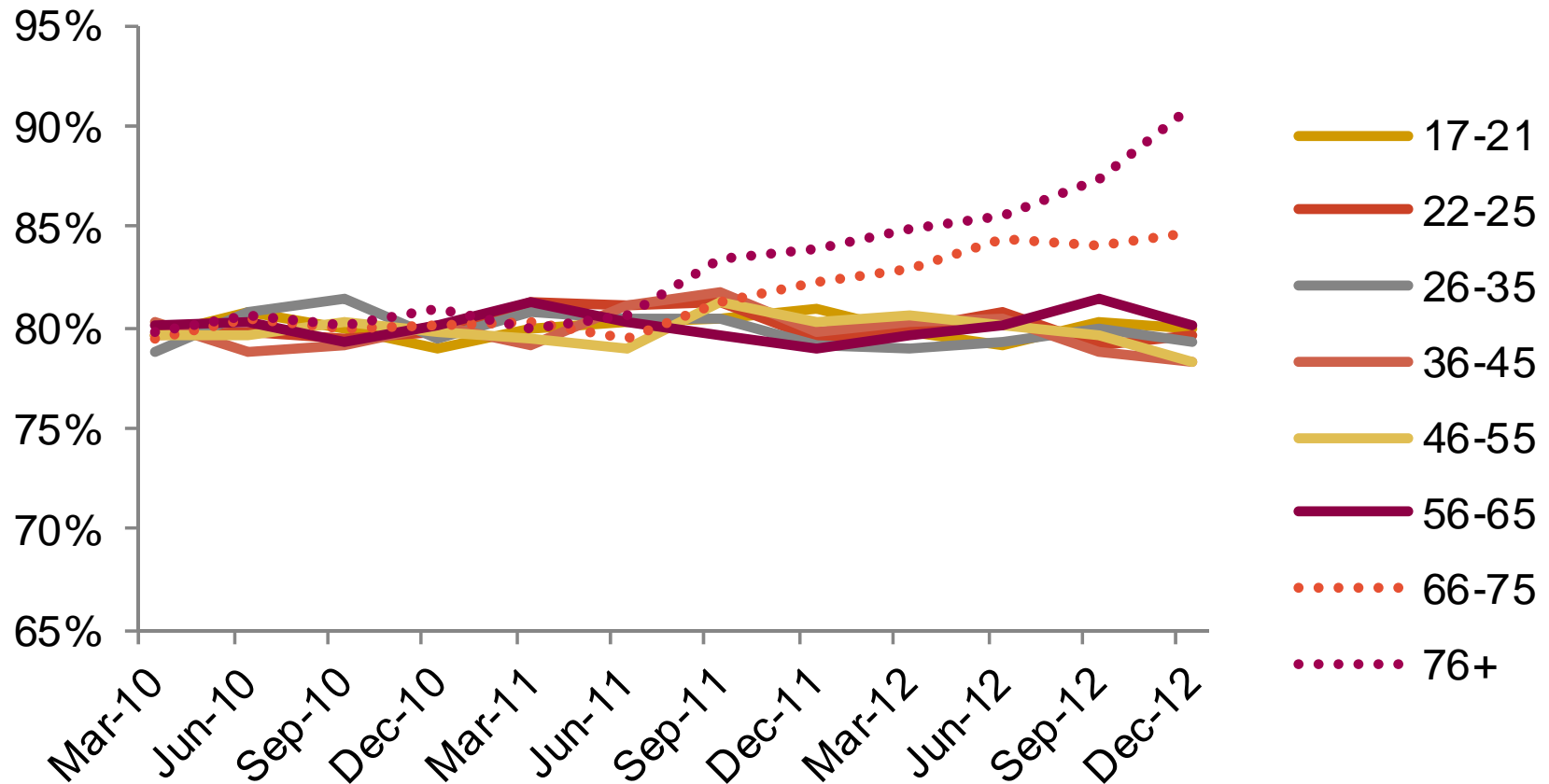
Example Outputs

Exposure Distribution by Age and Evaluation



Example Outputs

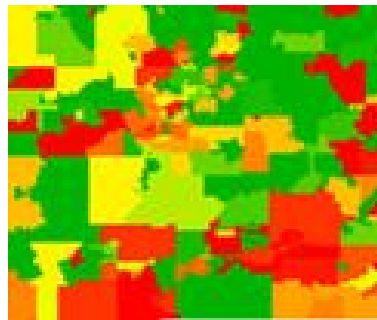
Loss Ratio by Age and Accident Quarter



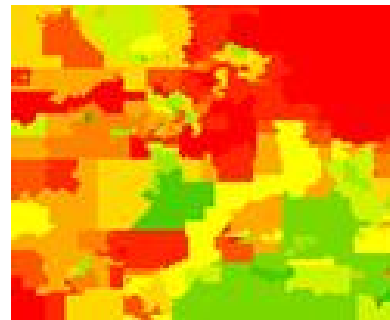
Example Outputs

- Here are some of the metrics you can look at:
 - Imagine others:
 - Frequency and severity by factor and over time
 - Pure Premium by factor and over time
 - Retention/Conversion by factor and over time
 - Volume by factor and over time
 - Expected loss ratio by factor and over time
 - Profit by factor and over time
 - Competitive position by factor and over time
 - Geographic heat maps

Raw



Smoothed



Challenges and Resources

- Challenges
 - Personnel may not have the skills to clean and manipulate data
- Resources
 - Database programming courses
 - Communicating analytical requirements can be difficult; the best results happen when the analytics team is involved with the database programming
 - Database software
 - Excel/Access
 - SAS
 - SQL
 - R
 - Many others...



Predictive Modeling

Predictive Modeling

- A predictive model predicts the expected value of an outcome based on many variables (or “covariates” or “independent variables”) simultaneously
- We can predict for each insured an expected loss based on their individual characteristics

Example Output

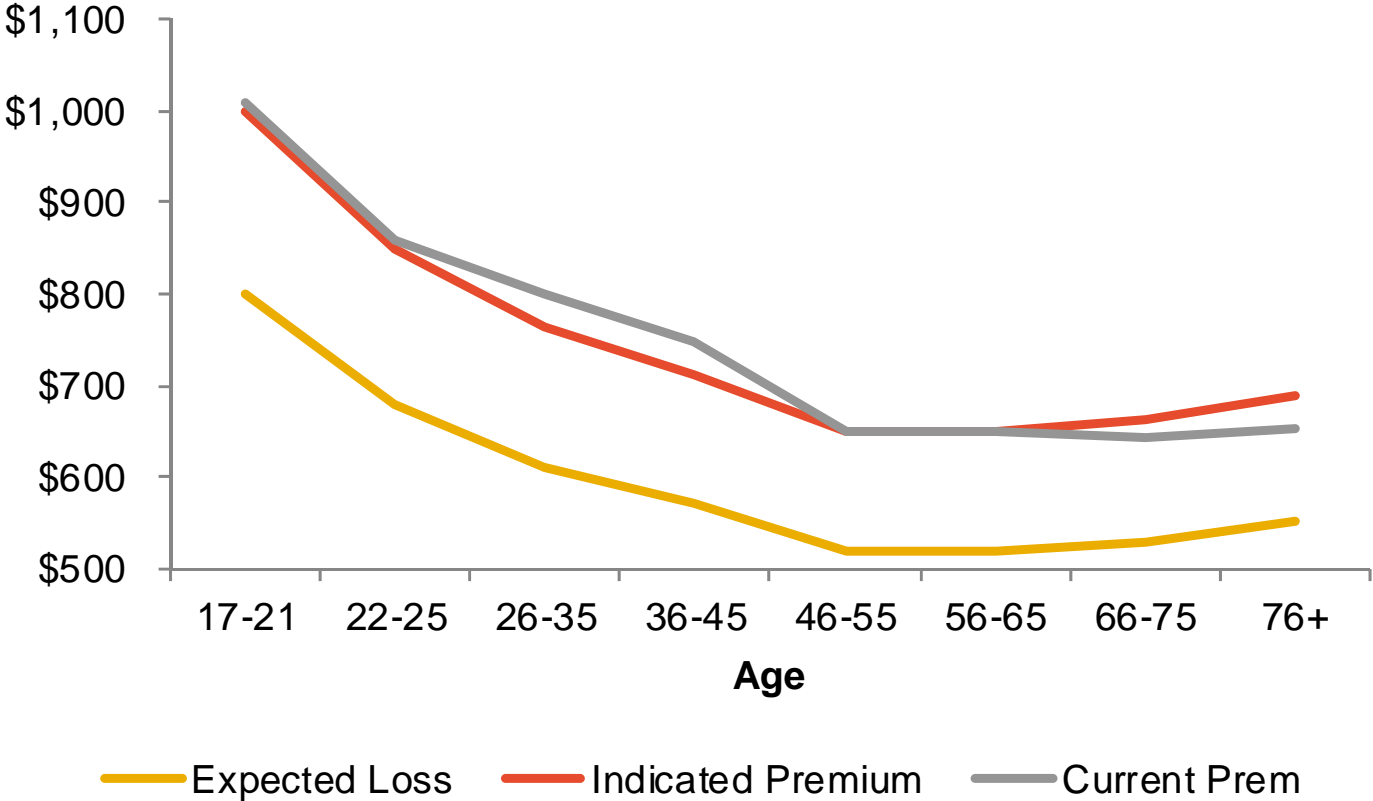
Insured	Age	Gender	Marital Status	Insurance Score	Expected Loss	Indicated Premium	Current Premium
John	19	Male	Single	650	\$880	\$1,100	\$1,150
Mary	46	Female	Married	780	\$440	\$550	\$547
Frank	70	Male	Widowed	560	\$730	\$913	\$890

From Predictive Model

Expected Loss, loaded for:

- Expenses
- Contingencies
- Profit

Example Output



Challenges and Resources

- Challenges
 - Personnel may not have the skills to clean and manipulate data
 - Personnel may not have the skills to build models
- Resources
 - Database programming courses
 - Modeling resources
 - Practitioner's Guide to Generalized Linear Models:
<http://www.casact.org/library/studynotes/anderson9.pdf>
 - RPM sessions
 - Consulting support
 - Database software
 - Excel/Access, SAS, R, SQL
 - Modeling software
 - SAS, R, vendor software



Competitive Market Analysis

Competitive Market Analysis (CMA)



We will focus on the most sophisticated approach: calculation and analysis of “on-the-street” premiums using a comparative rating tool

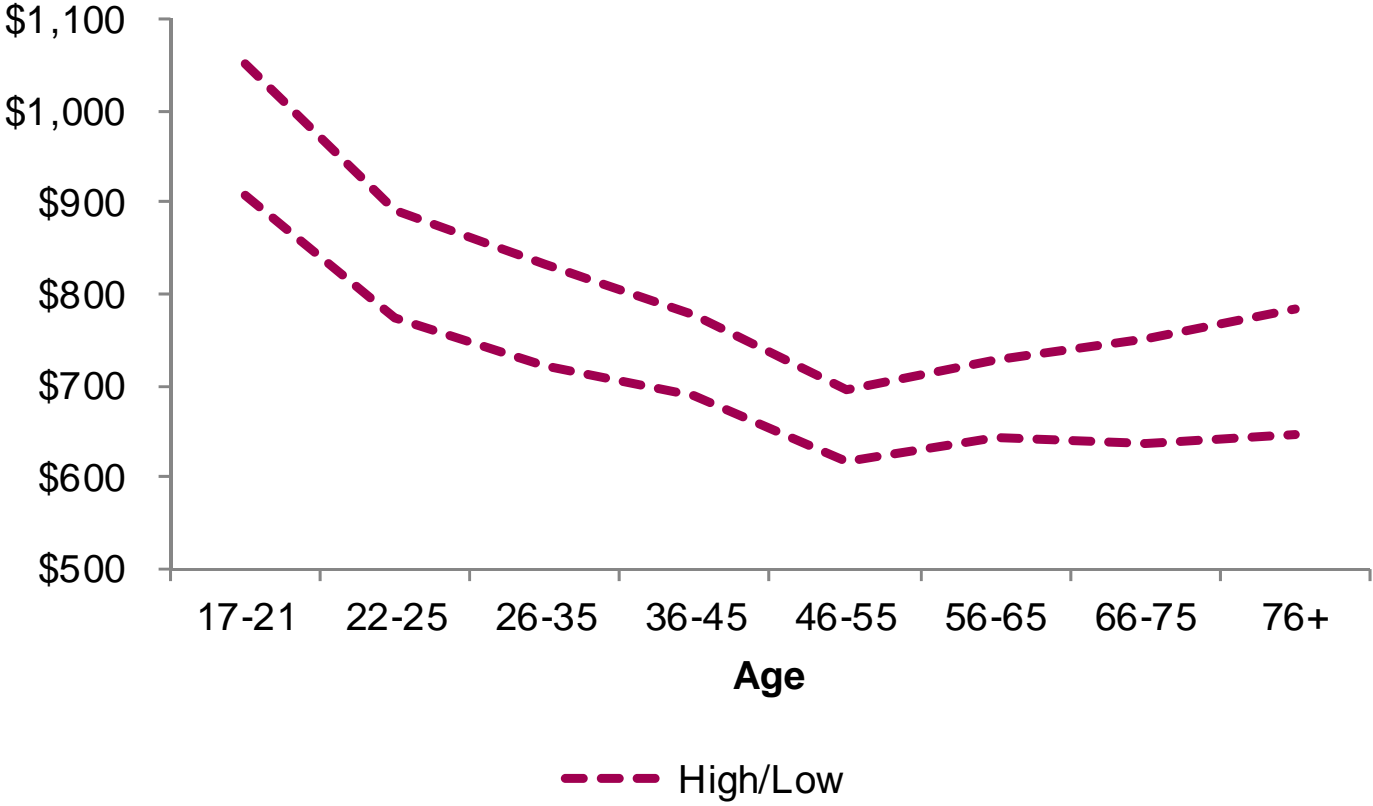
Example Outputs

Insured	Age	Gender	Marital Status	Insurance Score	Competitor A Premium	Competitor B Premium	Competitor C Premium	Competitor D Premium
John	19	Male	Single	650	\$1,093	\$1,265	\$1,035	\$1,288
Mary	46	Female	Married	780	\$520	\$602	\$558	\$536
Frank	70	Male	Widowed	560	\$846	\$979	\$997	\$801



Rerating of each insured using competitor rating plans

Example Outputs



Challenges and Resources

- Challenges:
 - Company selection
 - Credit tier assignment
 - Missing variables
 - Product alignment
 - Validating results
- Resources:
 - Third party rating software
 - RPM sessions

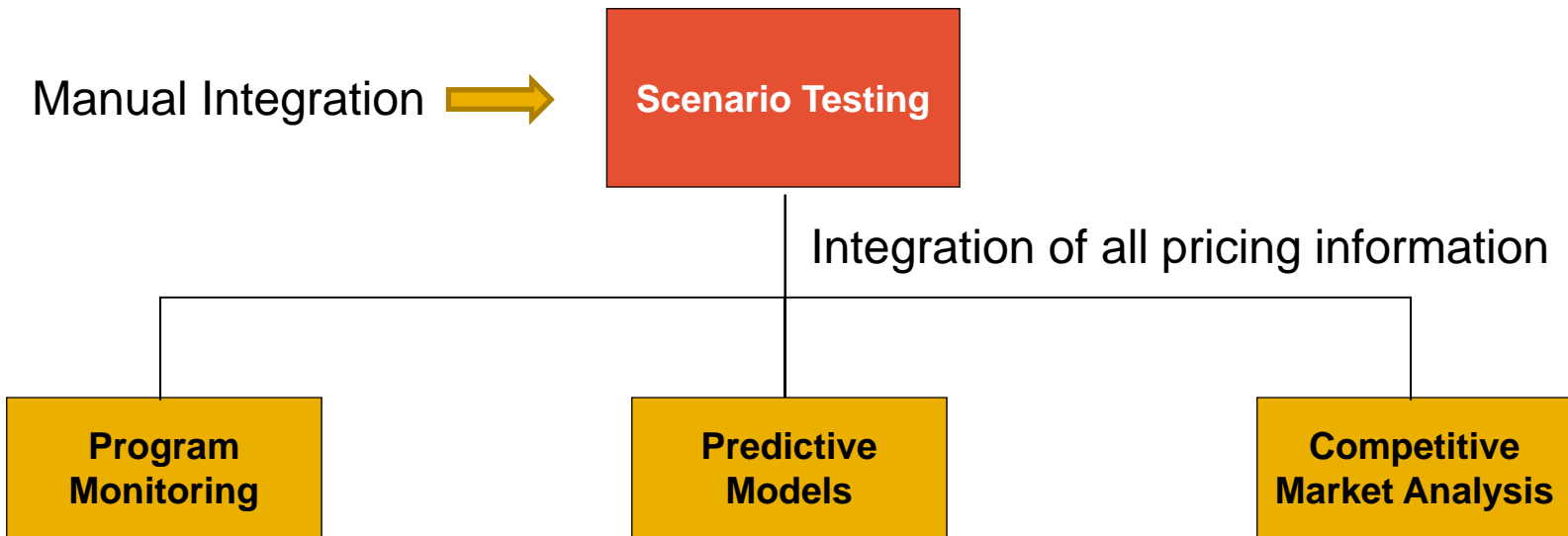


Scenario Testing

It's unavoidable that small companies are at a disadvantage

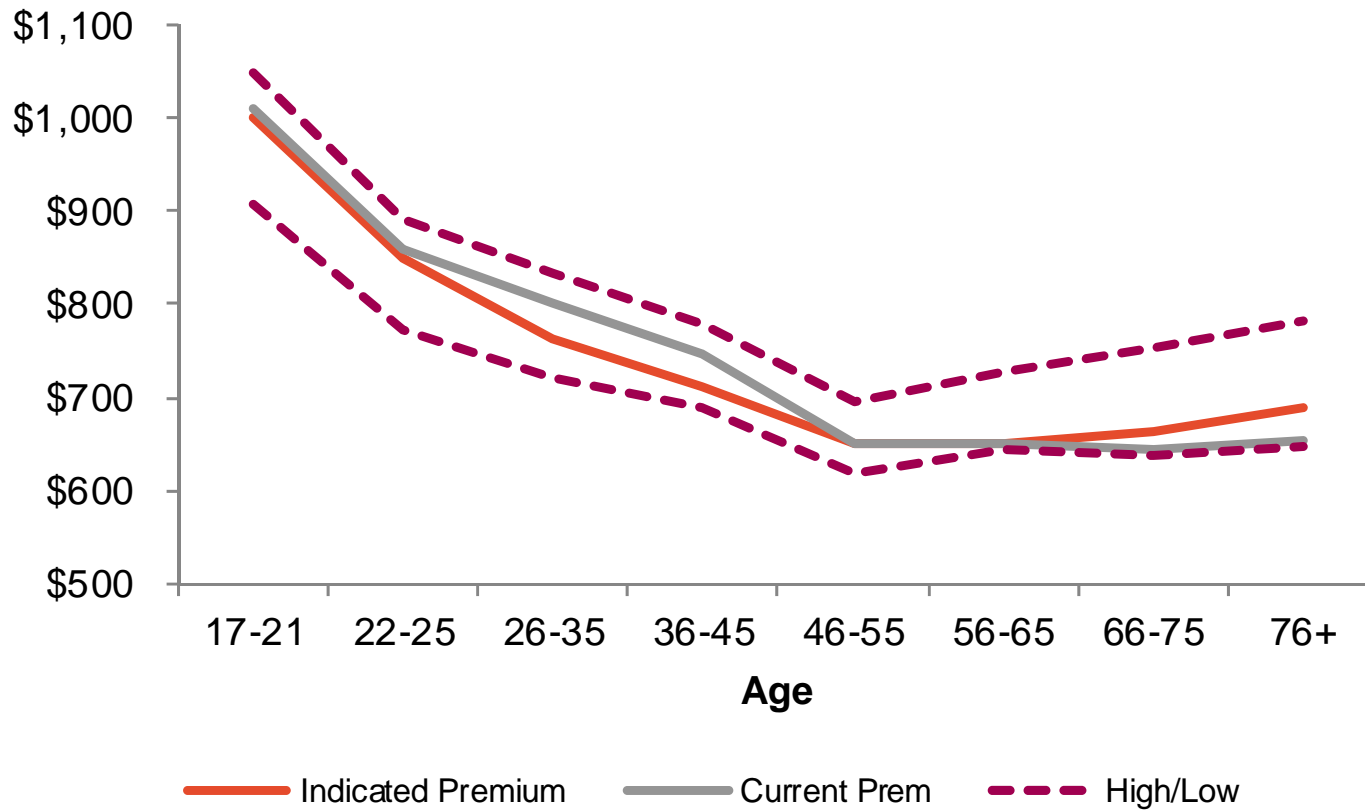
- Important to re-iterate that small companies have unavoidable disadvantages with the foundational capabilities
 - Predictive models will never be as good as larger companies because you are limited by data volume
 - CMA is limited compared to larger companies because you do not have the resources to thoroughly vet underlying assumptions
- The challenge is maximizing the value of the pricing analyses that you do have available
 - The key is to integrate your monitoring reports, predictive models and CMA

Scenario Testing



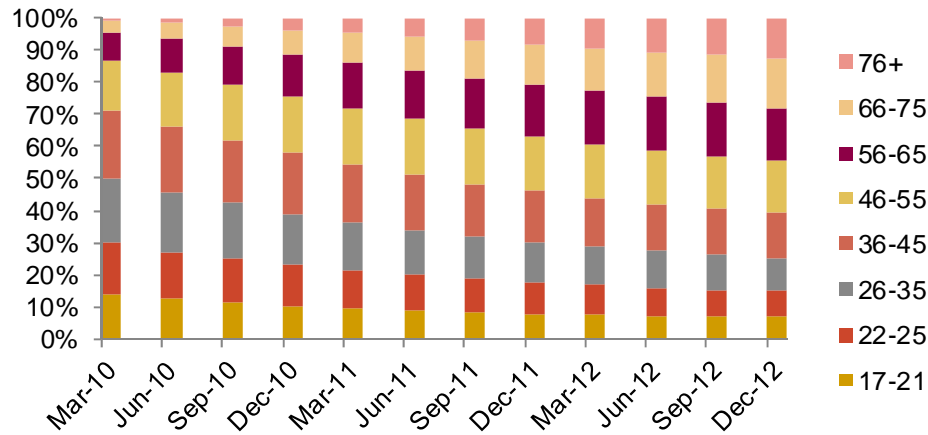
- Integration of these analyses allows for:
 - Identifying potential pricing opportunities
 - Testing implications of pricing strategies

Example Outputs

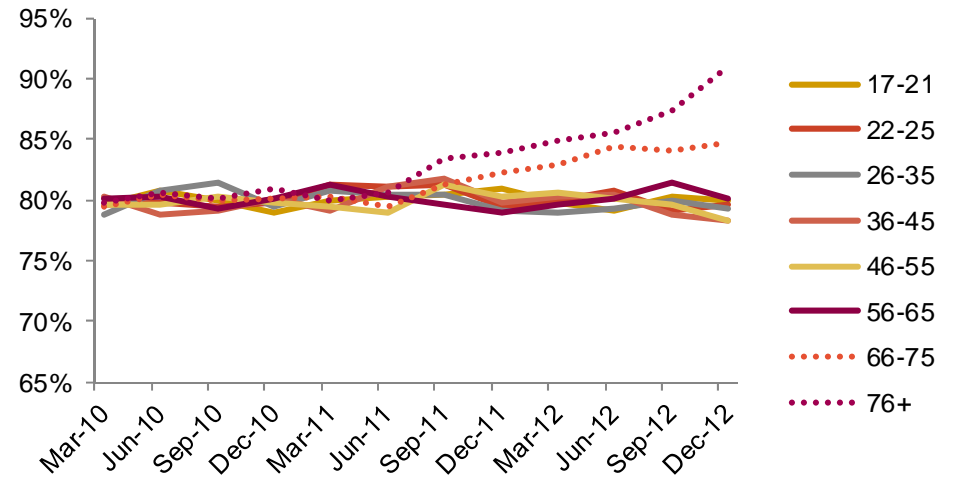


Example Outputs

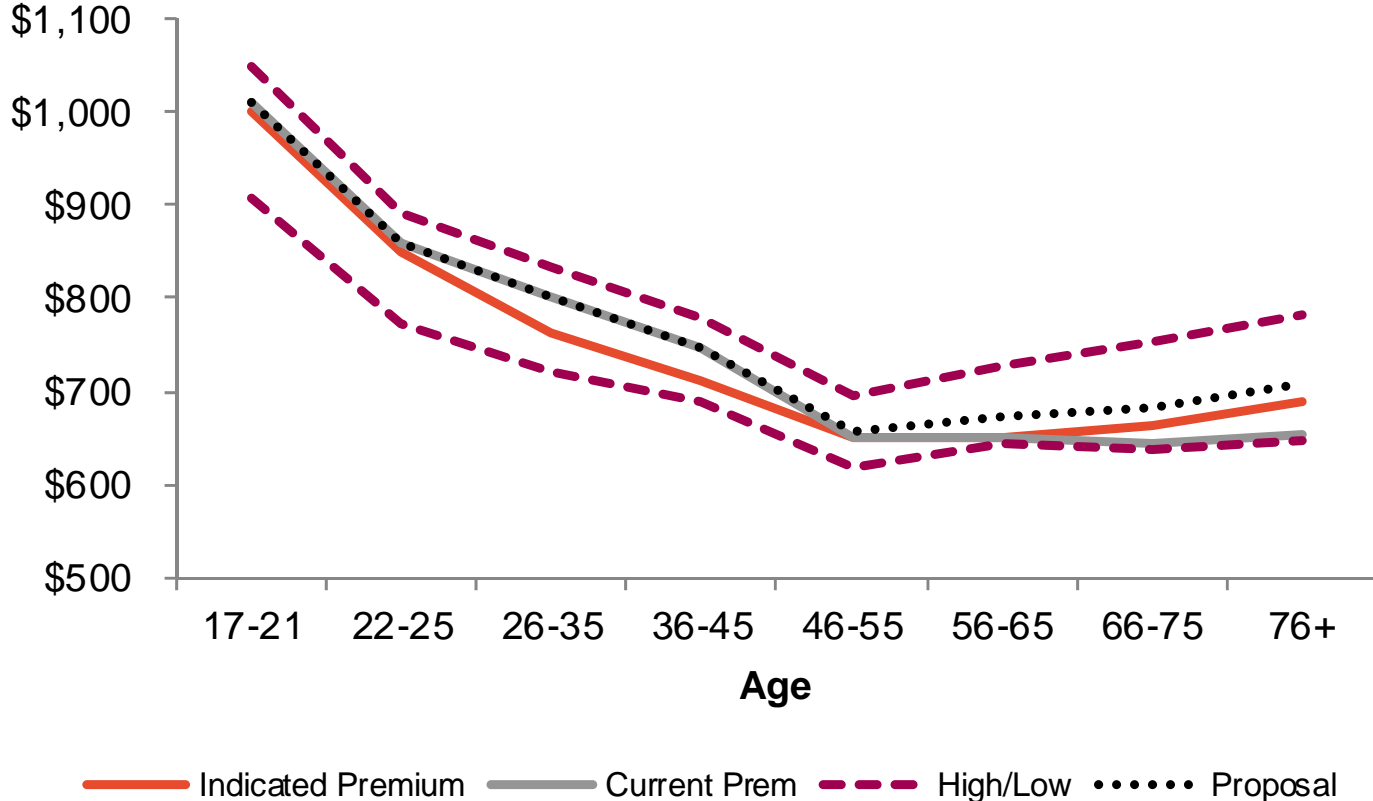
Exposure Distribution by Age and Evaluation



Loss Ratio by Age and Accident Quarter

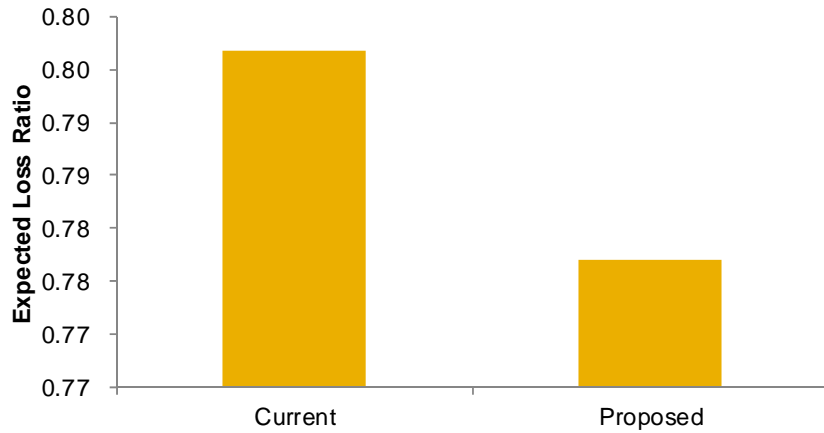


Example Outputs

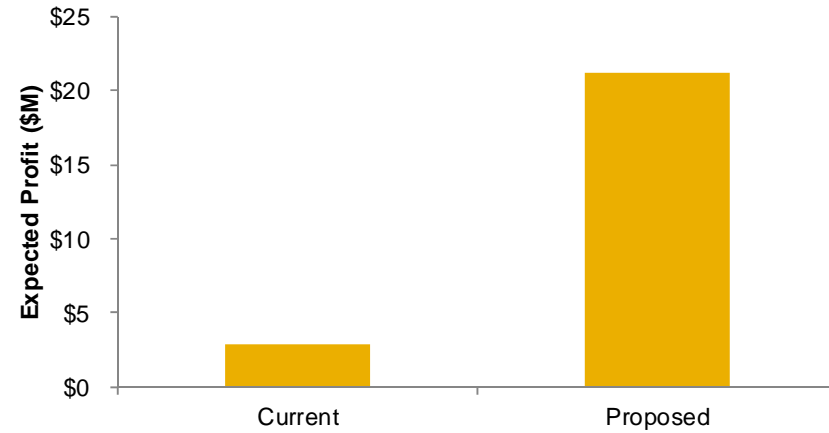


Example Outputs

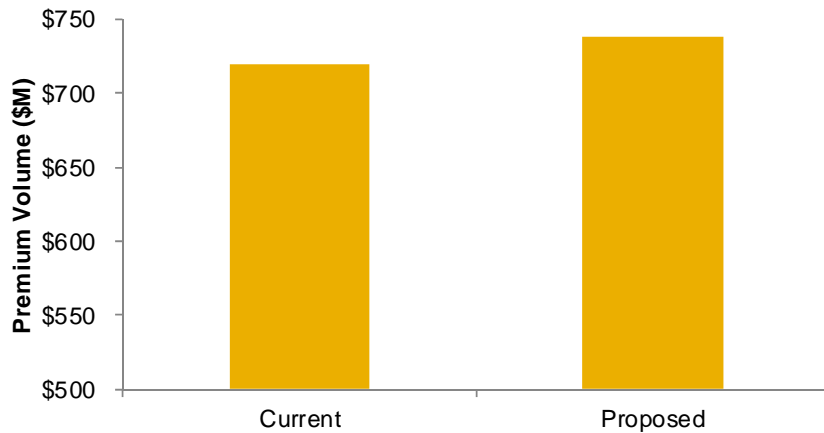
Expected Loss Ratio



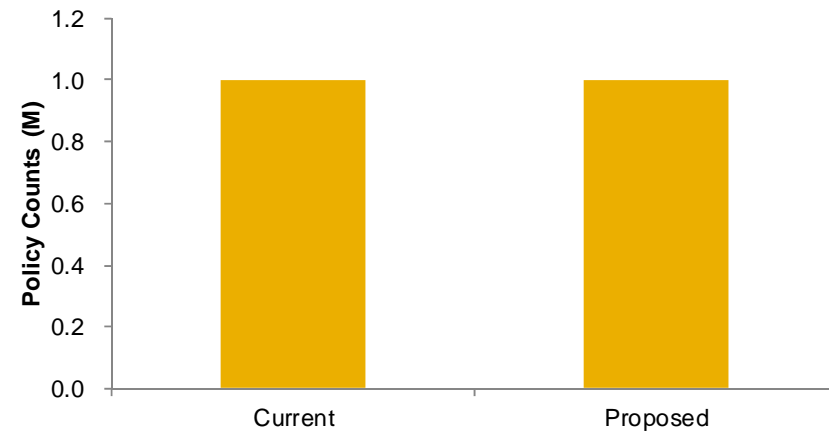
Expected Profit



Premium Volume



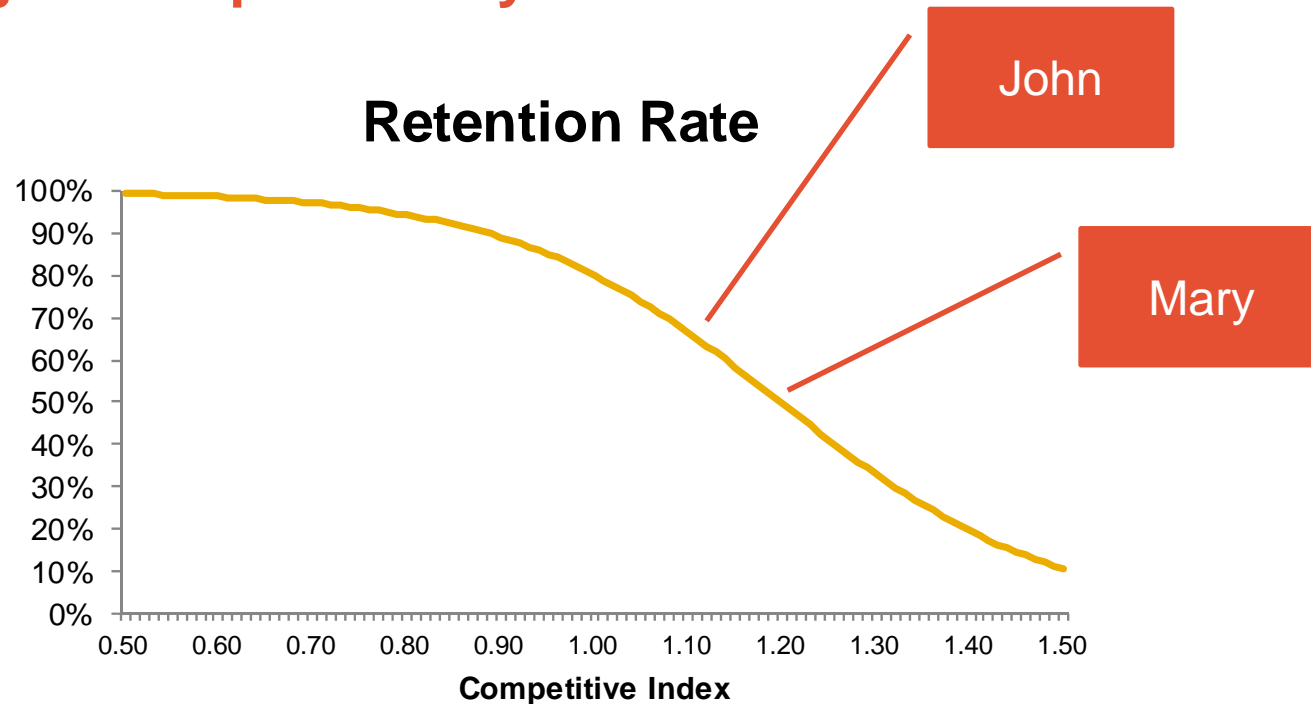
Policy Counts



Incorporating retention into scenario testing

- The most sophisticated companies build retention models to estimate each individual insureds probability of retention for a given rate change
 - Majority of small and medium sized companies do not have the data or capability to build these models
- Simple assumptions can be used in place of these models
 - Demand is a function of competitive position
 - Cheaper relative to competitors, then higher probability of retention
 - Take into account individual insured characteristics, so each insured has a different retention

Accounting for the probability of retention



John – 19, Male, Single:

Proposed Premium = \$1,100

Market Average Premium = \$1,000

Competitive Index = 1.1

Probability of Retention = 67%

Mary – 46, Female, Married:

Proposed Premium = \$600

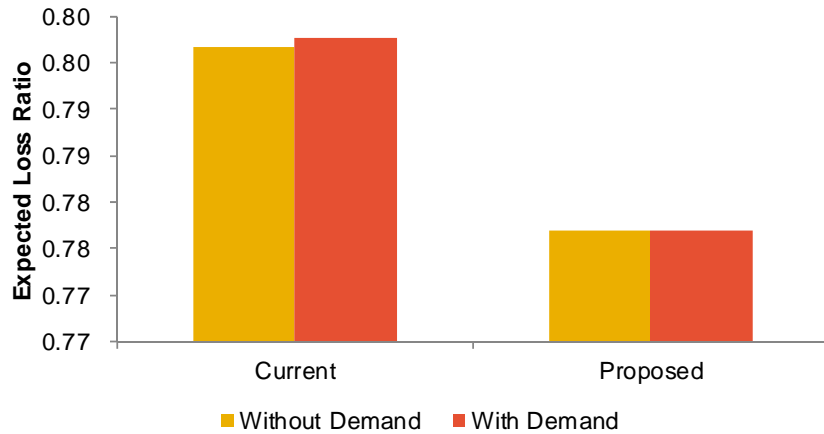
Market Average Premium = \$500

Competitive Index = 1.2

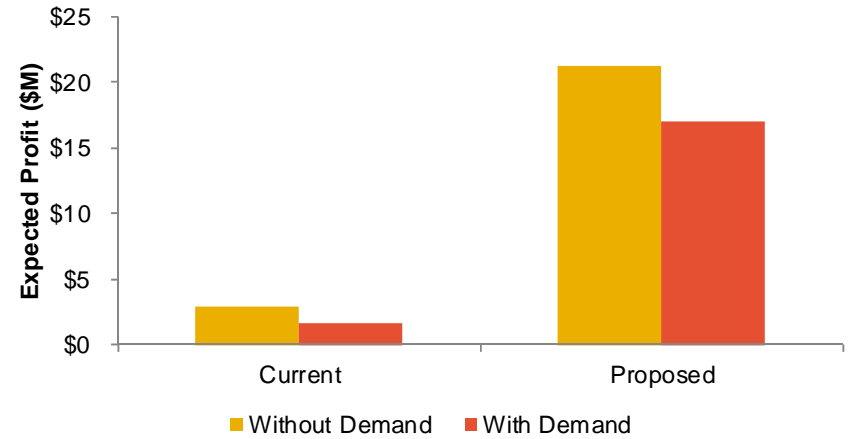
Probability of Retention = 50%

Example Outputs

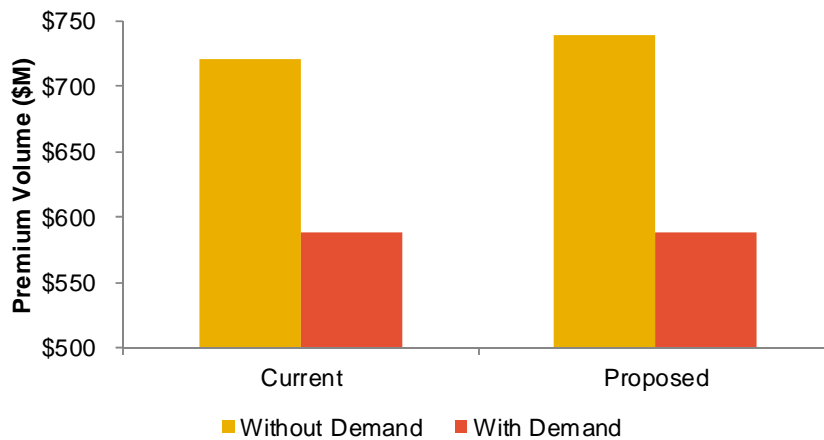
Expected Loss Ratio



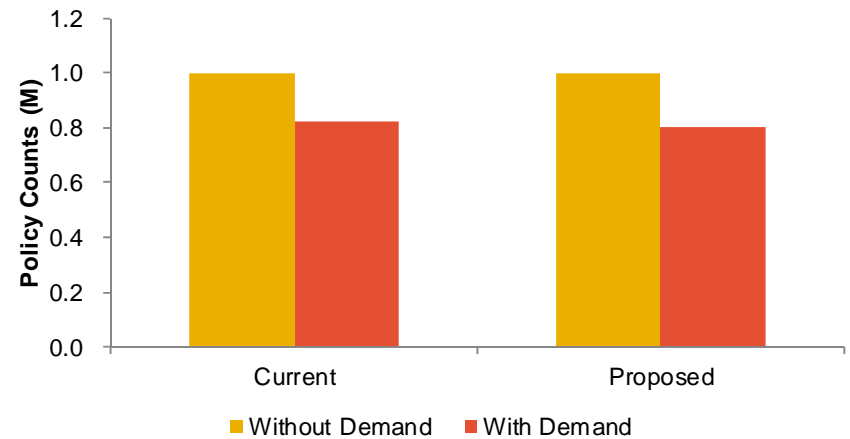
Expected Profit



Premium Volume



Policy Count



Challenges and Resources

- Challenges

- Creating the infrastructure to integrate the foundation analyses; building from scratch can be difficult
- *Scenario projections over multiple time horizons (including testing for logical changes to policy premiums)*

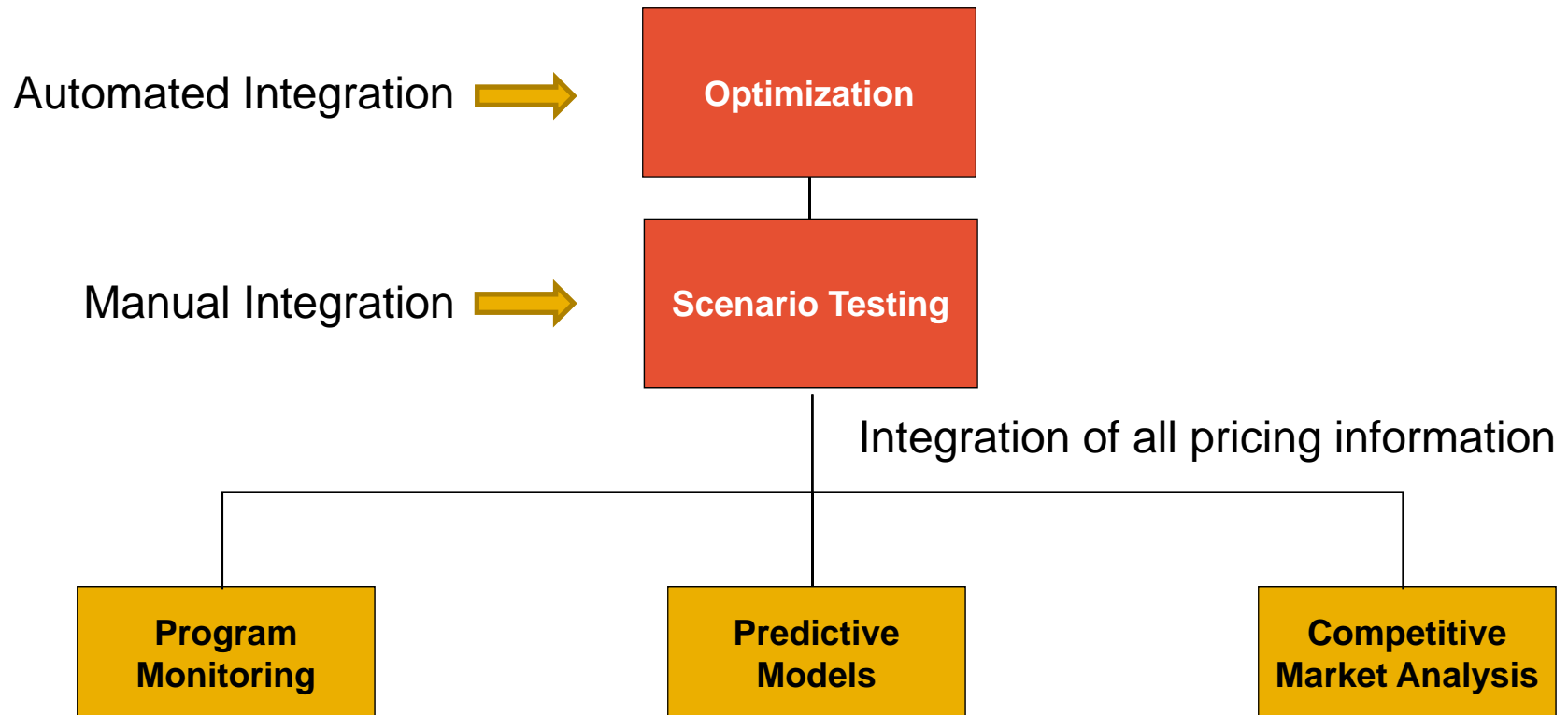
- Resources

- Platforms to build from scratch
 - Excel/Access
 - SAS
 - SQL
- Third party software



Optimization

Optimization



- Searching for the right pricing action across all rating variables can be tedious
 - There are literally billions of possible scenarios to test
 - Most product managers use trial and error to choose their final pricing decisions

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