Pricing Analytics for the Small and Medium Sized Company

Sophisticated Pricing is within Reach!

RPM 2013
By: Len Llaguno

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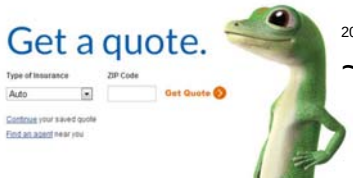


Source: geico.com

2011 Advertising Budget

~ $1 Billion

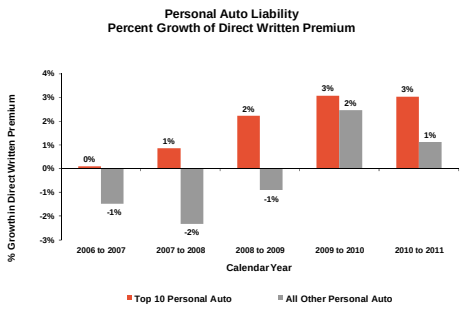
StateFarm™

Source: statefarm.com

Price Paid for UBI solution:

~ $24 Million

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



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Sophisticated pricing is within reach!

- Three things I want you to get from this presentation:
  - ***Small insurance companies can have sophisticated pricing analytics***
  - ***Key to sophisticated pricing is integration of your all pricing information***
  - ***Minimum requirements may not be as large as you expect***

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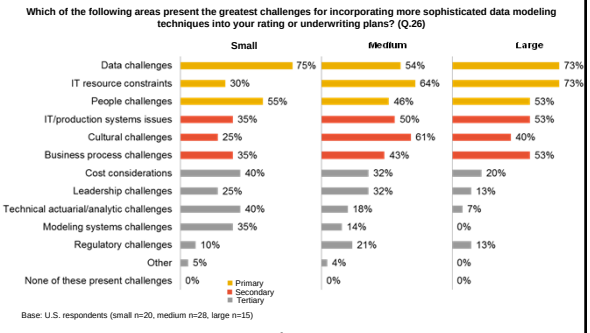
…but some challenges are unavoidable regardless of size



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Ratemaking vs. Pricing

- Actuarial Ratemaking
  - Actuarial Statement of Principals 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

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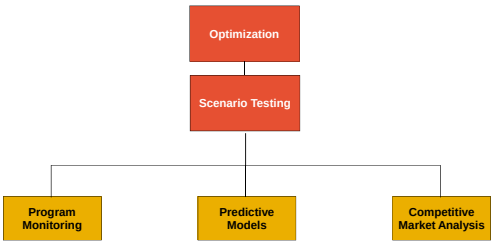
Key to sophisticated pricing is *integration* of all your pricing information



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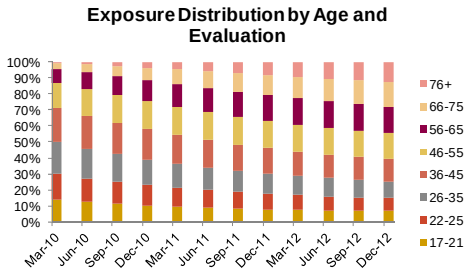
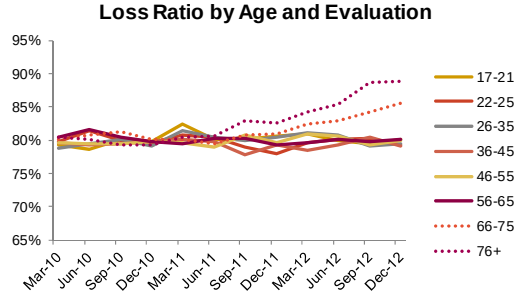
Program Monitoring

- 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

Example Outputs



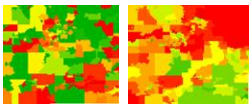
Example Outputs



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



Requirements

- Minimum data requirements
  - Historical in-force data
  - Claim data
  - Quote/renewal data
- Minimum IT requirements
  - Basic IT infrastructure
- Minimum analytical requirements
  - Personnel and software to manipulate, clean and process data into the required format and produce outputs

Challenges and Resources

- Challenges
  - Personnel may not have the skills to clean and manipulate data
- Resources
  - Database programing 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…

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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

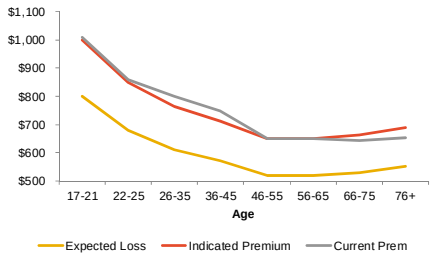
Insured	Age	Gender	Marital Status	Insurance Score	Expected Loss	Indicated Premium	Current Premium
John	19	Male	Single	650	$880	$1,100	$1,150
Mary	46	Female	Married	780	$440	$550	$547
Frank	70	Male	Widowed	560	$730	$913	$890

From Predictive Model

Expected Loss, loaded for:

- Expenses
- Contingencies
- Profit

Example Output



Requirements

- Minimum data requirements
  - Historical in-force data
  - Claims data
  - External data (e.g. credit, prior claims)
- Minimum IT requirements
  - Basic IT infrastructure
- Minimum analytical requirements
  - Personnel and software to manipulate, clean and process data into the required format
  - Modeling software
  - Personnel to build models

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 programing 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

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Competitive Market Analysis (CMA)

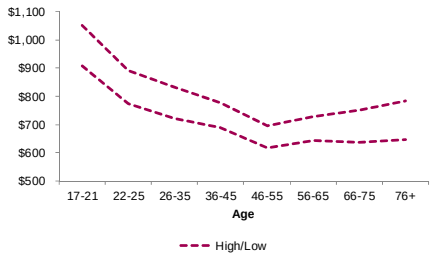
We will focus on the most sophisticated approach: calculation and analysis of "on-the-street" premiums using a comparative rating tool

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



Requirements

- Minimum data requirements
  - In-force data
- Minimum IT requirements
  - Basic IT infrastructure
- Minimum analytical requirements
  - Personnel and software to manipulate, clean and process data into the required format
  - Competitive Rating Software or personnel to program competitor rating plans
  - Personnel to execute CMA analysis

Challenges and Resources

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

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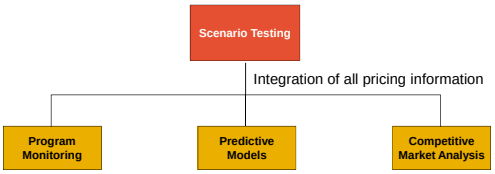
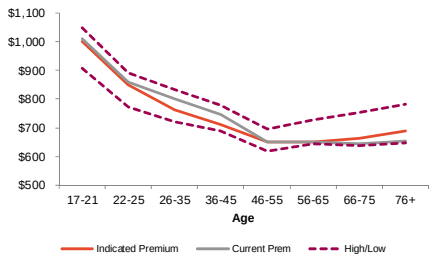
Scenario Testing



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

Example Outputs



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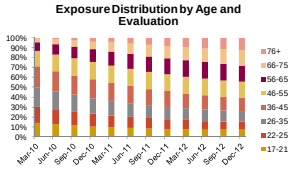

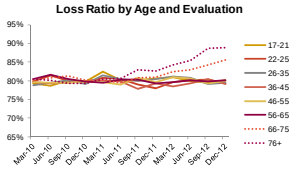

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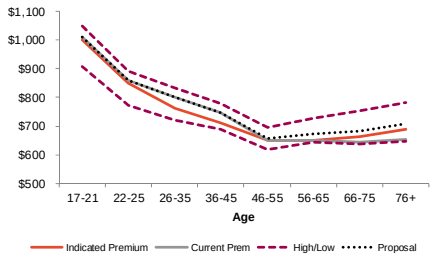

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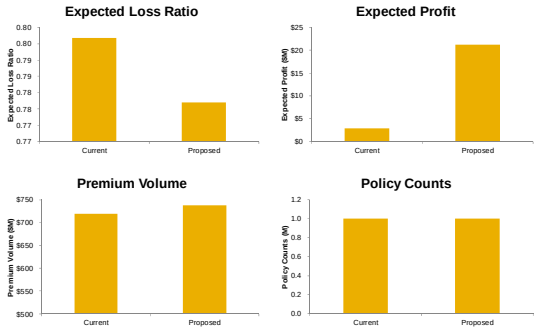

Incorporating retention into scenario testing

- 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

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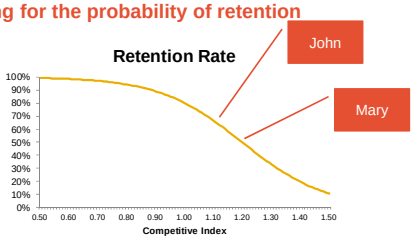
Accounting for the probability of retention



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%

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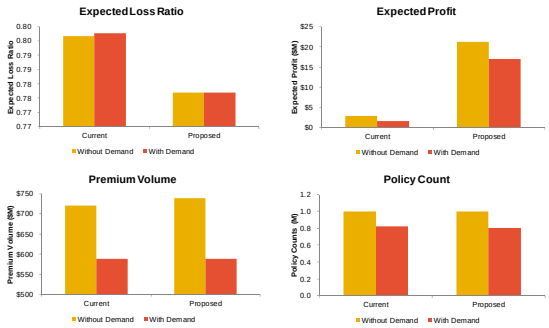
Example Outputs



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Requirements

- Completion of foundation analyses
  - Monitoring reports
  - Predictive models
  - CMA
- Assumptions regarding retention/conversion
- A platform to integrate all this pricing information

Challenges and Resources

- Challenges
  - Creating the infrastructure to integrate the foundation analyses; building from scratch can be difficult
  - *Scenario projections over multiple time horizons*
- Resources
  - Platforms to build from scratch
    - Excel/Access
    - SAS
    - SQL
  - Third party software

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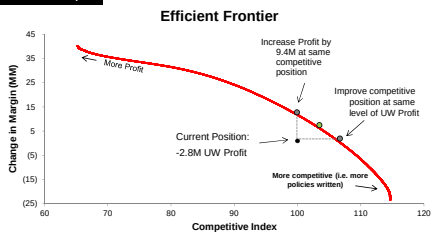
Optimization

- 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

The trail and error search can be automated

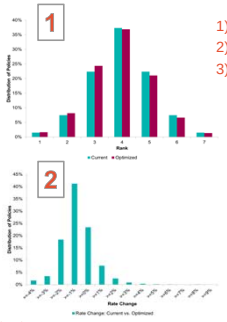
- Optimization can find the efficient frontier of most profitable rating plans for varying levels of competiveness

Illustrative Example

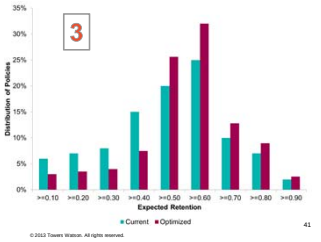


Enterprise objectives are optimized, while allowing you to maintain a desired competitiveness and minimizing rate dislocation

Illustrative Example



1) Overall competitive position virtually unchanged
2) Dislocation is constrained to acceptable levels
3) Profit is unchanged, retention is vastly improved



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