

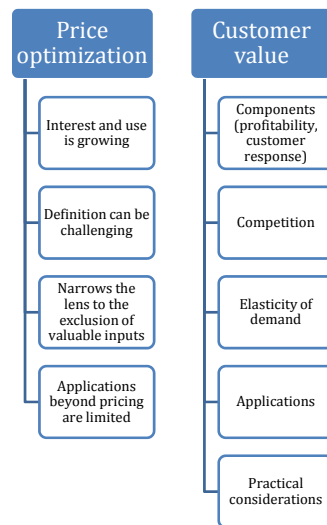


Measuring Customer Value: A Different Perspective on Price Optimization

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CAS In Focus Seminar
Roosevelt C. Mosley, Jr., FCAS, MAAA
Pinnacle Actuarial Resources, Inc.

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Measuring Customer Value



What is Price Optimization?

Google Definitions

- Integration of demand side pricing into an overall pricing strategy
- Offering each customer the right price to achieve pricing and profit goals
- The process of setting prices to maximize a pre-defined measure of customer value subject to a company's strategic and business objectives

Definition



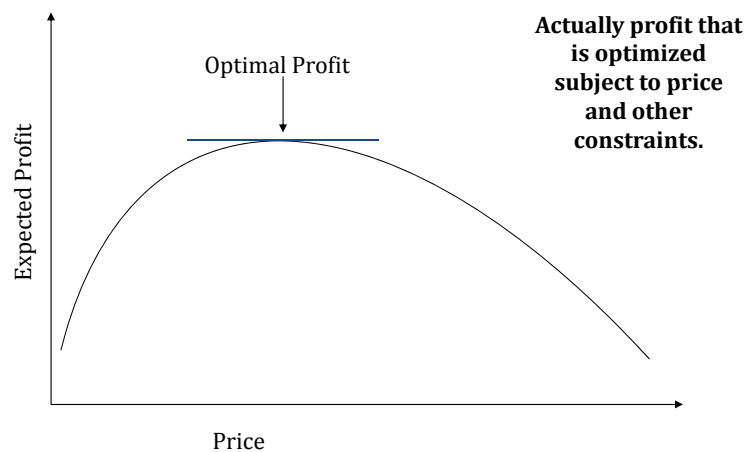
- **Optimize**
 1. to make as effective, perfect, or useful as possible
 2. to make the best of
- **Optimization**: a mathematical technique for finding a maximum or minimum value of a function of several variables subject to a set of constraints, as linear programming or systems analysis

Source: www.dictionary.com

Expanded Definition

- **XXXX optimization:** mathematical technique for finding the best XXXX (most effective, perfect, most useful, maximum, minimum) subject to a set of constraints
- XXXX =
 - Price
 - Marketing strategy
 - Claim settlement process
 - Claim fraud identification
 - Underwriting process
 - Price change

Expected Profit Curve



Constraints

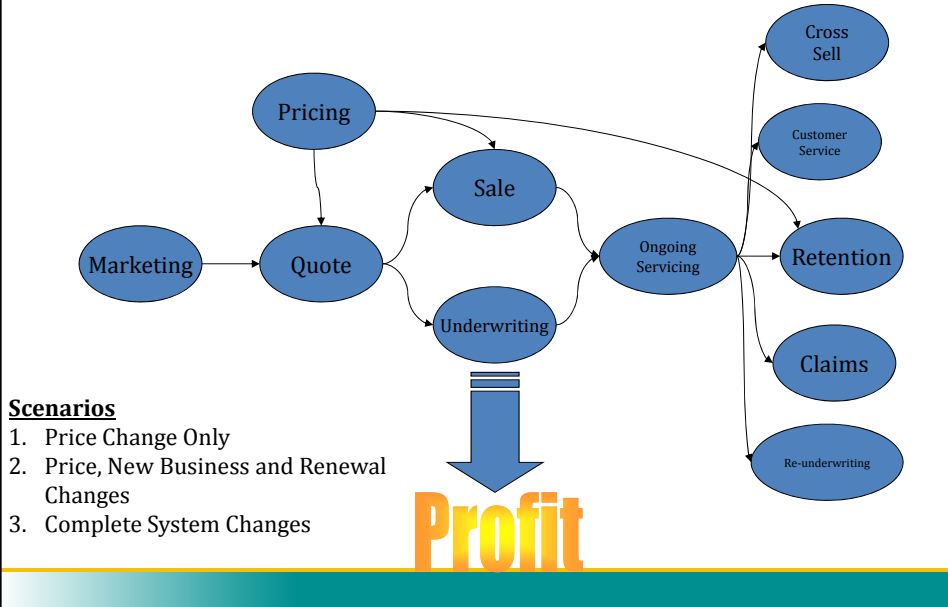
- **Profitability:** corporate goals
- **Growth**
 - Success of marketing efforts
 - New business hit ratios
- **Loyalty:** retention ratios
- **Competitive:** competitor price AND operational considerations
- **Future:** lifetime value implications
- **Actuarial:** not excessive, not inadequate, not unfairly discriminatory
- **Regulatory:** must operate within parameters of the law

Not just pricing issues!

Limits of Price Optimization

- Focus is necessarily on price
- What am I really optimizing?
- Practical implications of price optimization are unclear
- Application to other areas of a company is a challenge
- What happens when the optimal price is significantly different than the price I can charge?

Expanding the Focus



Defining Customer Value

Instead of focusing solely on price,
expand the lens to including pricing as
well as broader company considerations

What is a Valuable Customer?

- Low claim frequency risks
- Niche customer
- Customer segment where rates are adequate
- Customer segment a company is / is not successful writing
- Measures: historical or short term, aggregate

Issues With Current Customer Value Definitions

- Can be subjective
- Short term view
 - Ignores longer term potential value
 - Complicates long term changes
- Can hinder implementation of more advanced insurance techniques
 - Pricing advances
 - Optimization

Customer Value Definition

Expected Value of Existing Business

$$EVEB = \frac{P_1 \times (1 - C_1)}{(1 + r)} + \frac{R_1 \times P_2 \times (1 - C_2)}{(1 + r)^2} + \frac{R_2 \times P_3 \times (1 - C_3)}{(1 + r)^3}$$

P_i = profit at time i = Premium - E(Loss) - Expense

C_i = Probability of cancellation during period i

R_i = Probability of renewal at the end of period i

r = discount rate

Potential Customer Value Definition

Value of Quoted Business: $VQB = VEB \times P(Co)$

$P(Co)$ = probability of converting quoted business

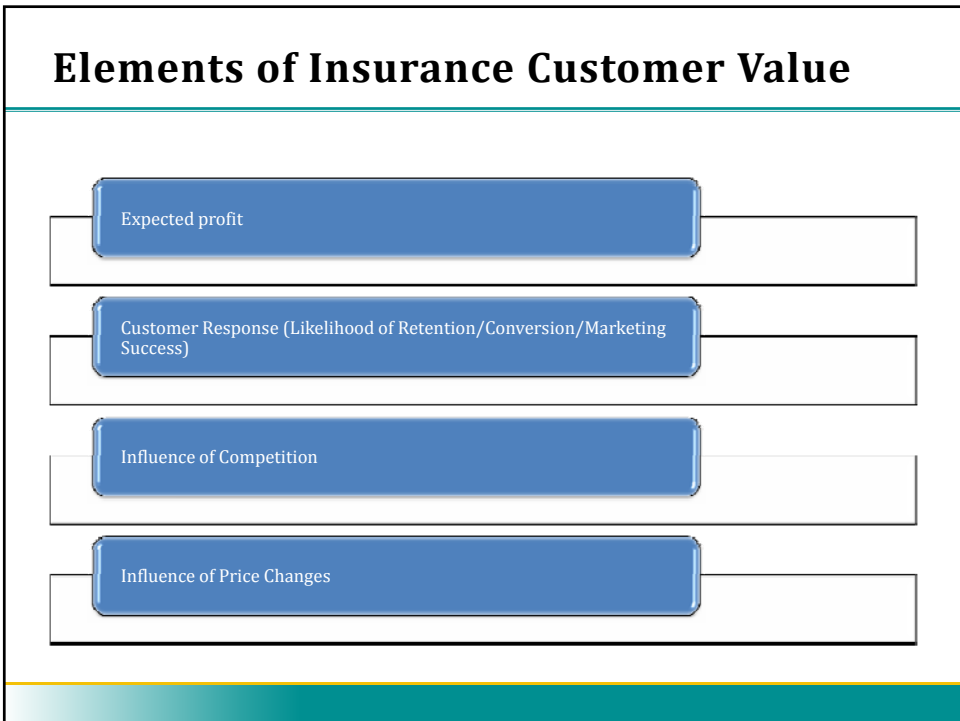
Value of Targeted Business

$$VTB = \frac{P(Q) \times VQB}{(1 + r)^{tl}}$$

$P(Q)$ = probability of targeted business receiving a quote

tl = time lag between being targeted and receiving a quote

Elements of Insurance Customer Value



Expected Profit

$$E(\text{Profit}) = \text{Premium} - E(\text{Cost})$$

- Premium - set by the company
- E(Cost)
 - For setting premiums
 - Modeled loss costs by techniques accepted by industry and regulators
 - Variables used limited by regulatory/public acceptance, operational considerations
 - For purposes of determining E(Profit)
 - More advanced techniques can be used
 - List of potential variables is “unlimited”



Modeling Expected Cost – Expanded Considerations

Use All Available Information

- Rating
- Underwriting
- Marketing
- Agency
- Billing
- External (demographic, etc.)
- Endorsement activity
- Payment history
- Portfolio information

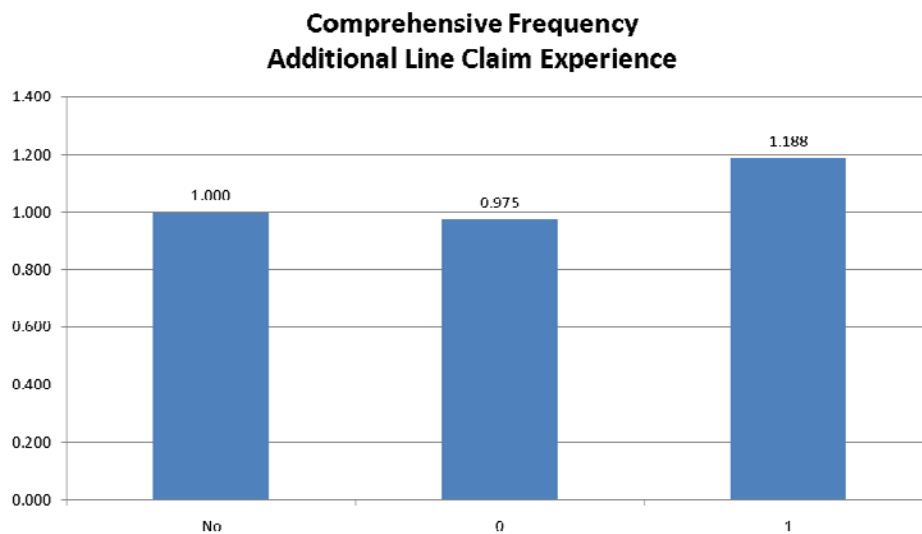
Use Additional/Advanced Techniques

- Decision trees
- Neural networks
- Clustering
- Principal components
- Association analysis

Examples of Additional Significant Cost Variables -Auto Analysis

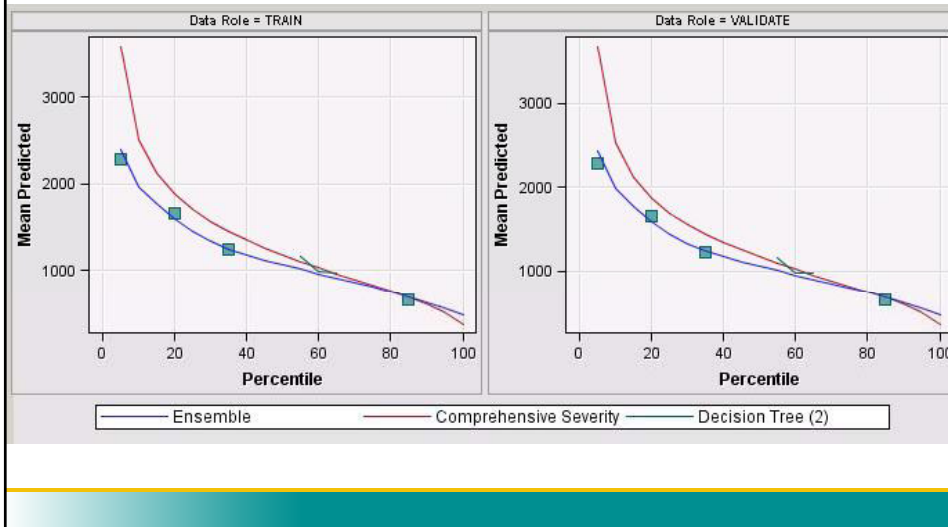
- Presence of additional lines (home, commercial, health)
- Additional line loss experience
- Scheduled property
- Amount of insurance
- Age of home
- Prior property claims
- Home occupancy type
- Umbrella indicator

Auto Indicated Claim Frequency



Comprehensive Severity Model Comparisons

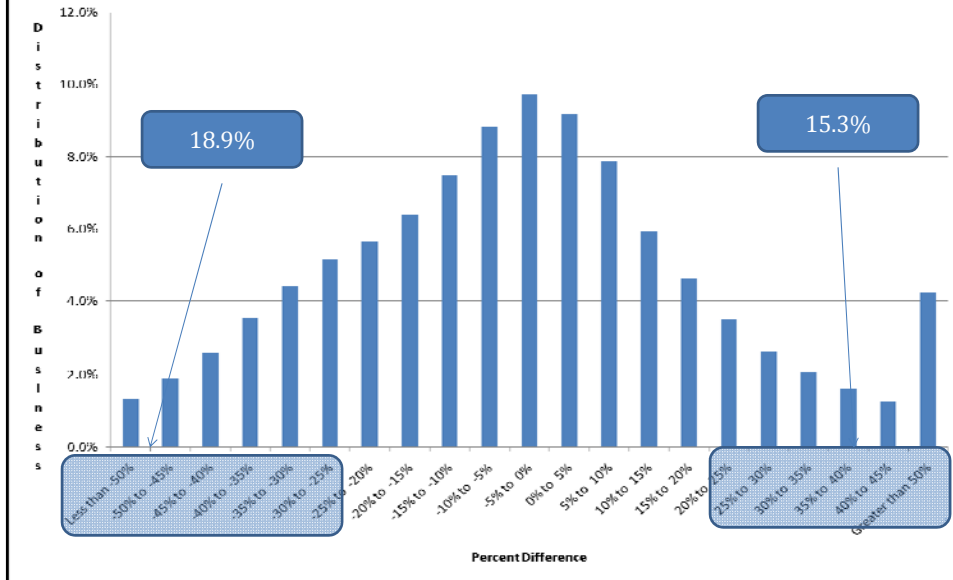
Linearity creates issues at the extremes



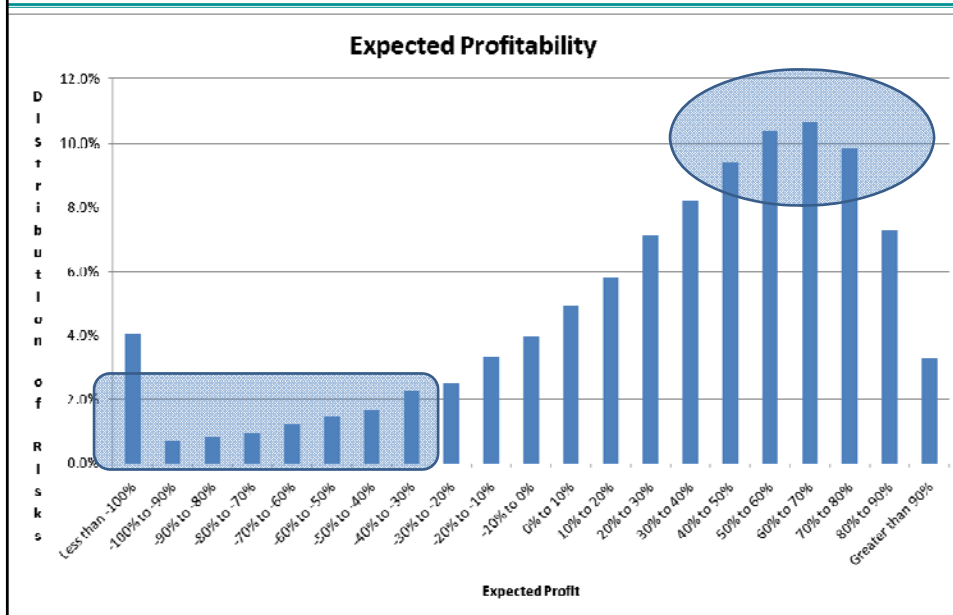
Expenses

- Some are difficult to vary by risk
 - Subtract fixed dollar amount – can change relative profitability but maintains order
 - Subtract fixed percentage of premium or expected loss – maintains relative probability
- Expenses that could vary by risk
 - General claim expenses
 - Marketing expenses
 - Customer service expenses

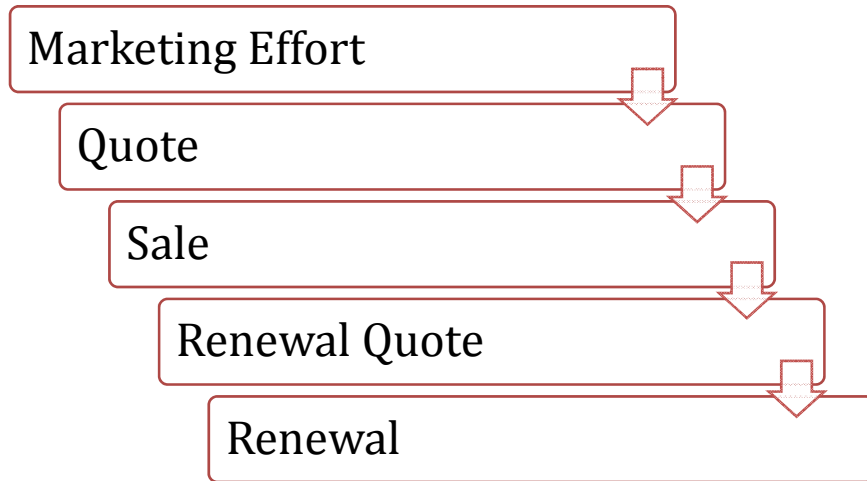
Difference Between "Full Model" and "Rating Plan Model"



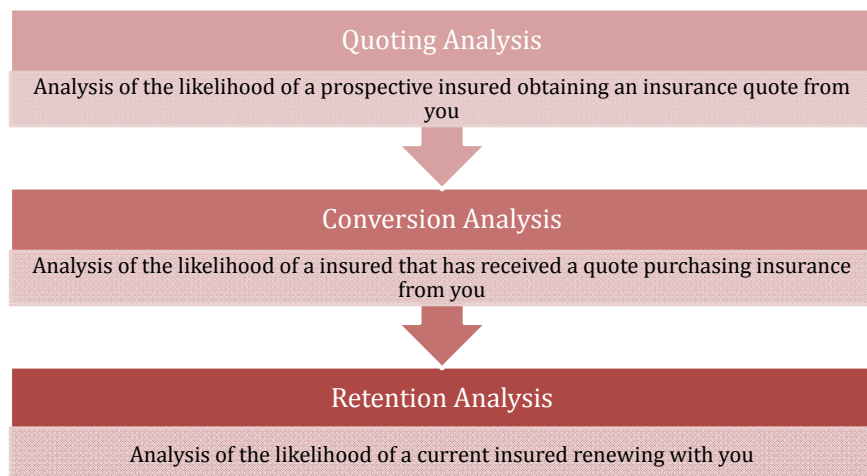
Distribution of Expected Profit



Customer Response Process



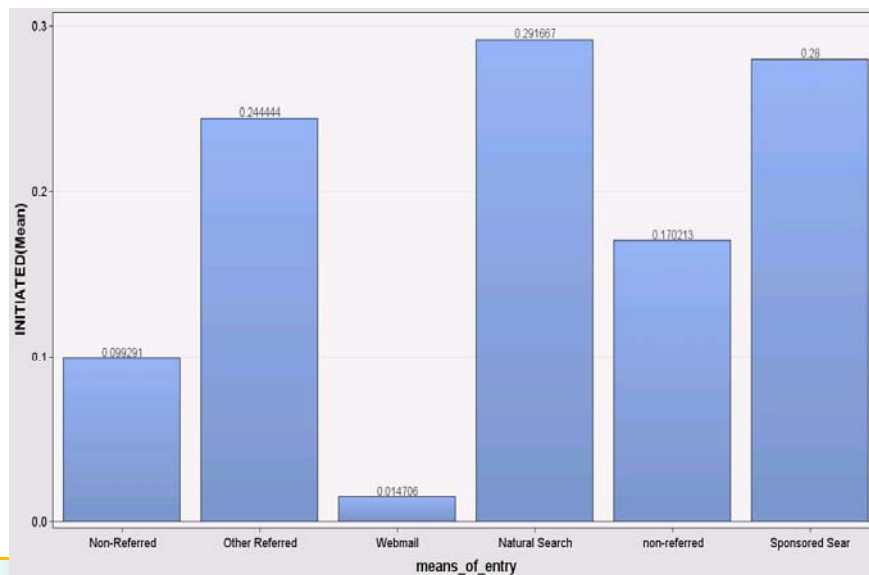
Customer Response Models



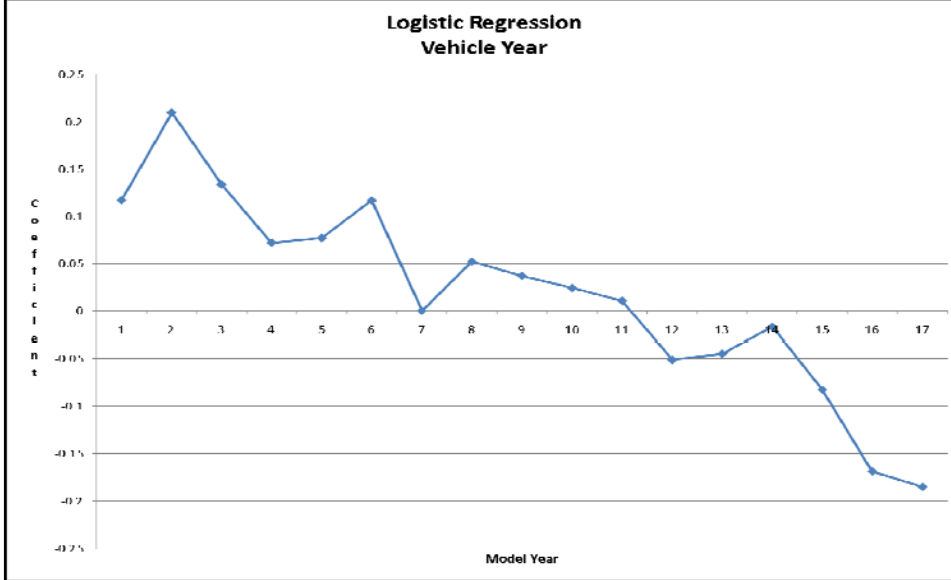
Quoting Analysis

- Analyze characteristics of shoppers and quoters
- Characteristics
 - Internal company information
 - External demographic information
 - Credit profiles
 - Marketing profiles
- Identify insureds to target
- Can be done at different levels (individual target, geographic area, risk segment target)

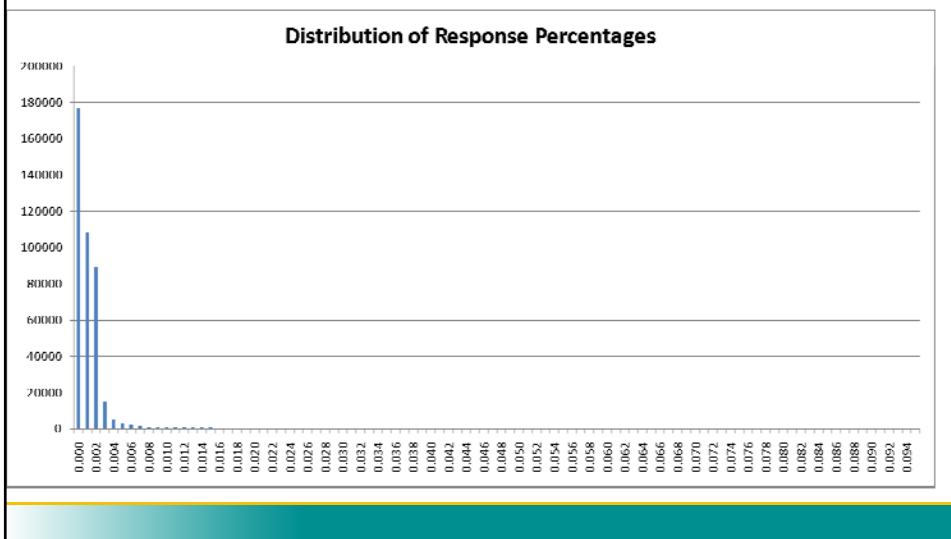
One Way Summary - Means of Entry



Quoting Analysis Example - Vehicle Year



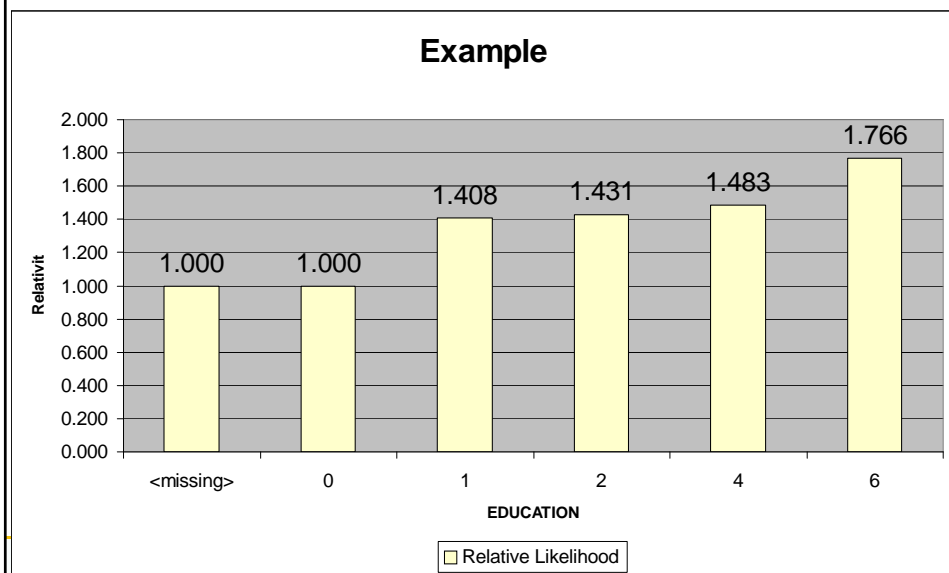
Response Percentage



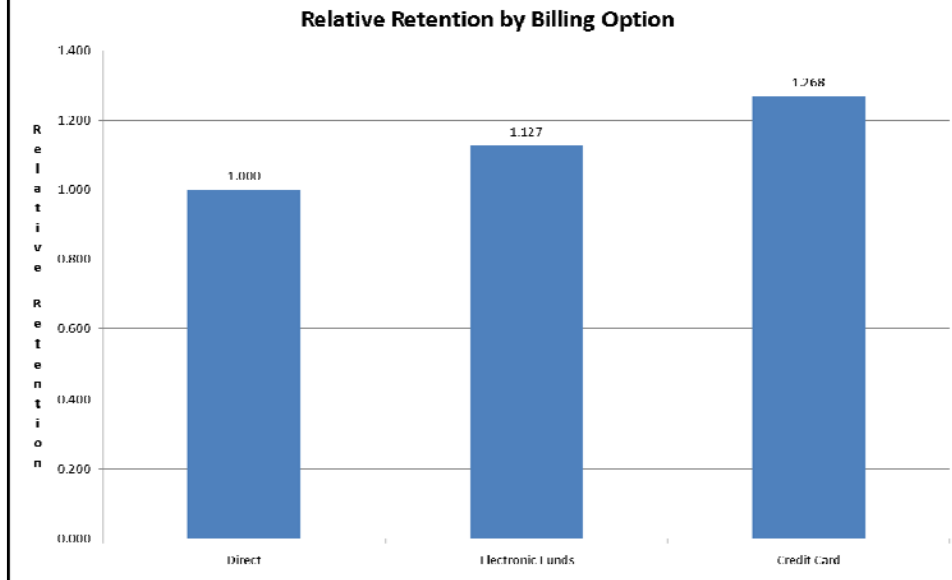
Retention/Conversion Characteristics

- Traditional Rating Factors
 - Class
 - Territory
 - Limit
 - Insurance Score
 - Claims history
 - Violation history
- Account Characteristics
 - Number of Years Insured
 - Number of Policies
 - Account Size
 - Renewal Pricing Change / New Business Price Difference
- Agent/Distribution Channel Issues
 - Satisfaction with Agent/Service
 - Distance to Agent
 - Independent vs. Captive vs. Direct
- Market Conditions
 - Competitive Position
 - Inflation
 - U/W Cycle
 - Brand Value (company & competitors)

Conversion Analysis Example



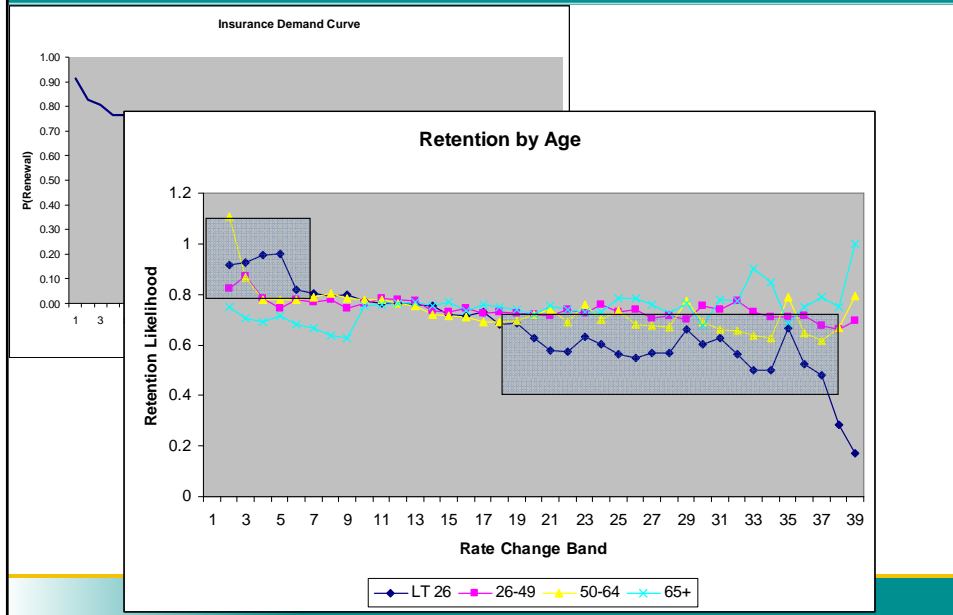
Retention Analysis



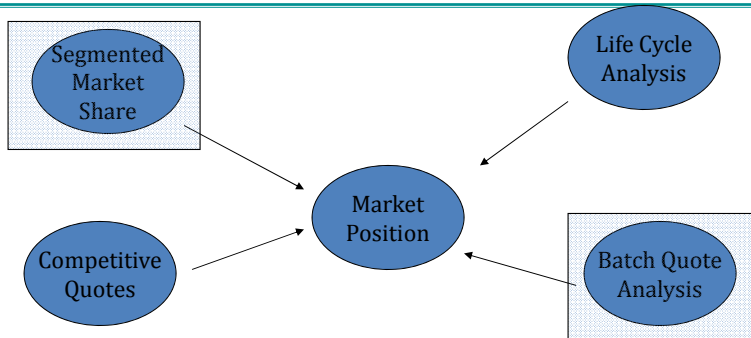
Influences on Customer Value

- Price changes
 - Impacts expected profit
 - Also impacts expected customer conversion and retention
 - Interaction of these elements can produce unanticipated changes in customer value
- Competitive position
 - Influences ability to write/retain risks
 - Ultimately impacts premiums charged
 - Depends on more than just price
 - Changes over time and varies by type of risk

Insurance Demand

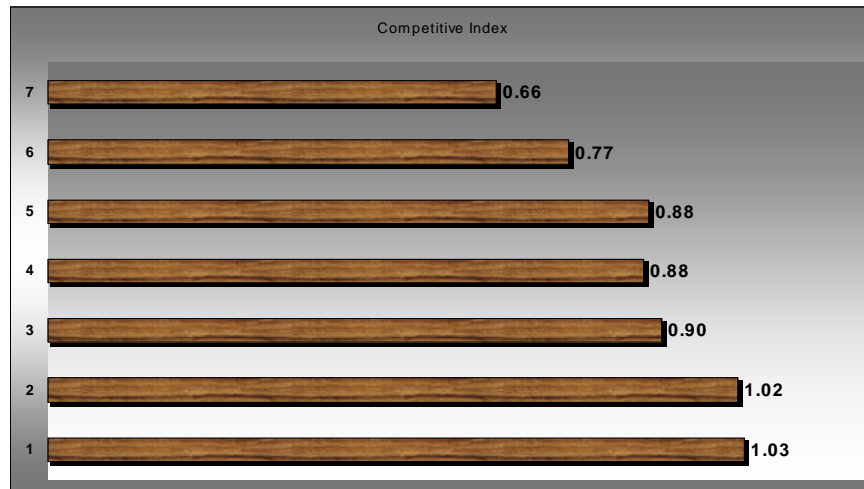


Competitive Influence on Price Impacts



- Based on market realities
- Still retains analysis of price
- Also includes market reality of what is being written/retained
- Allows insurer to then investigate cause of competitive issues

Measure of Influence of Competition

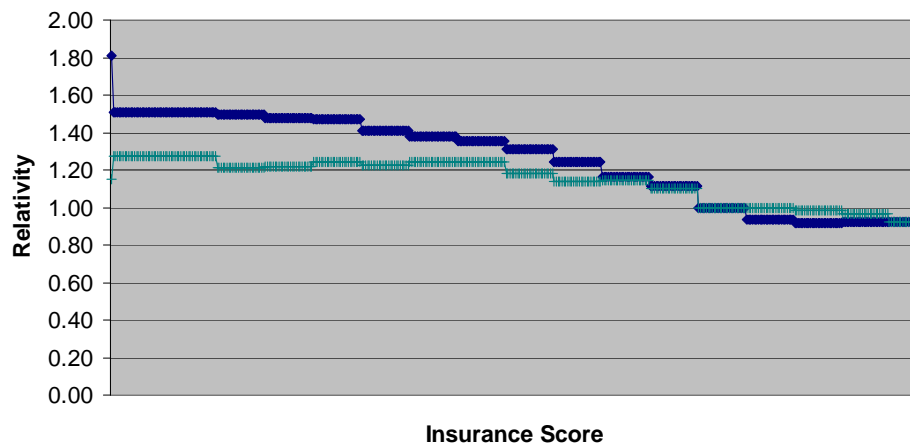


Analysis of Batch Competitive Quotes

- Due to competitive analysis difficulties, batch quoting is not an exact science
- Assumptions
 - Because of insurance scoring and other proprietary elements, absolute rate level is difficult to determine
 - More likely to get relative rates between risks correct
- Use batch quotes to determine “effective” competitor relativities – what is the estimated rate difference between your rate and rate of other companies for risk characteristics
- Use batch quotes to get a range of competitor prices

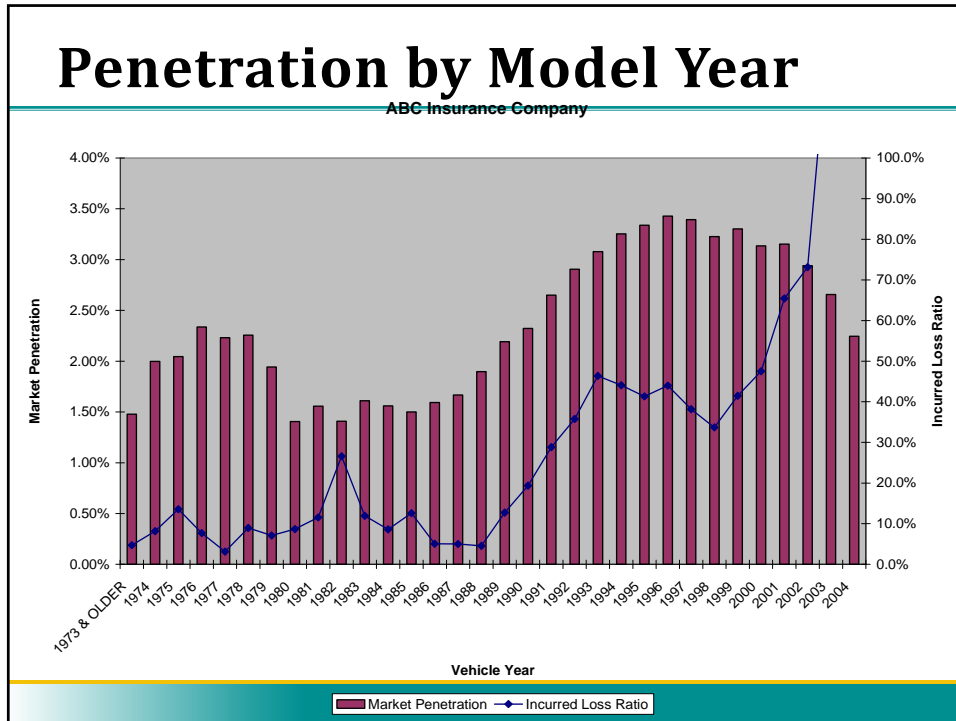
Credit Scores Conversion

Example



Detailed Market Share Segments

1. Detailed vehicle/property market penetration by:
 - Geography (ZIP, census block)
 - Vehicle characteristics (model year, make/model, vehicle segment)
 - Home characteristics (year built, AOI, construction)
 - Driver characteristics (age, marital status, gender, occupation)
2. Penetration levels based on demographic characteristics
3. Penetration levels by company risk characteristics
4. Models of projected market penetration based on historical penetration data



Putting It All Together

Value of Existing Business

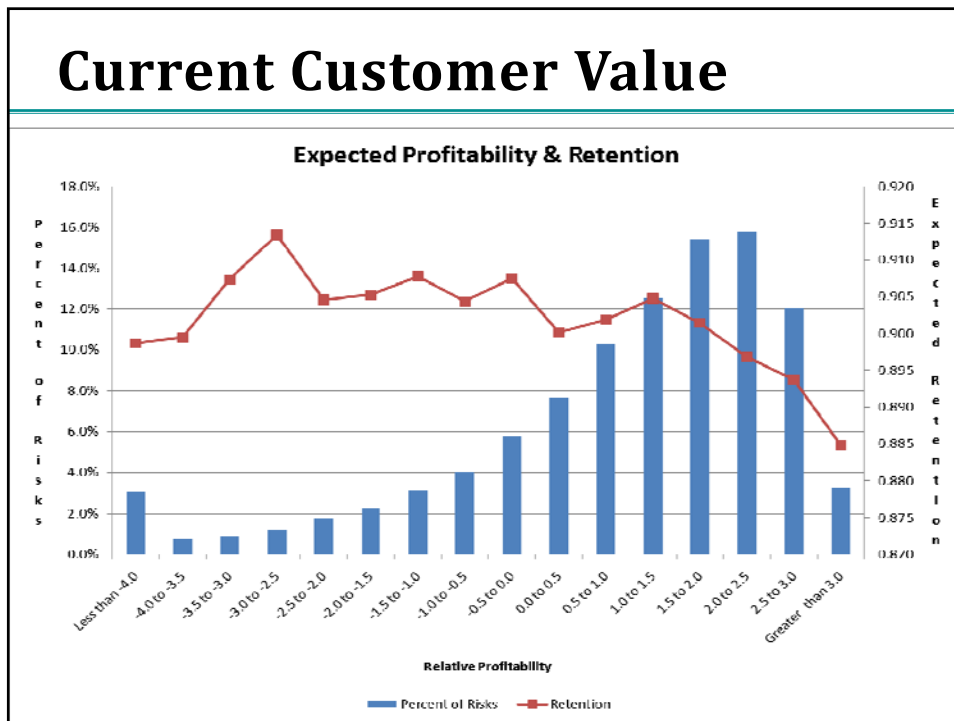
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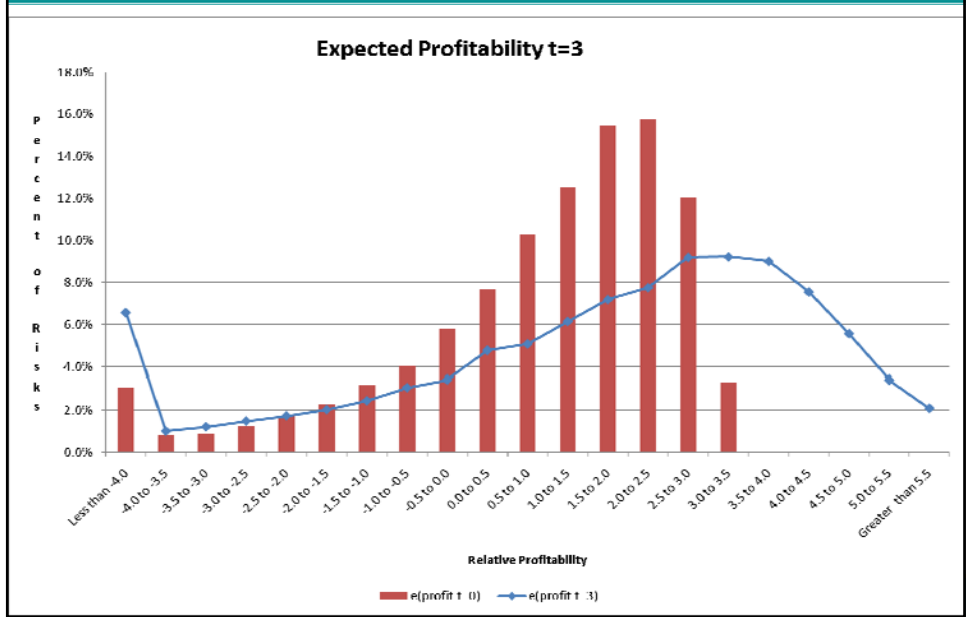
Modeling Expected Cost - Considerations

- Modeling multiple years
 - Life changes (household demographics)
 - Aging of insureds
 - Vehicle changes
 - Uncertainty and time value of money

Current Customer Value



Customer Value at t = 3



Applications of Customer Value

Customer Value Formulas

Expected Value of Existing Business

$$EVEB = \frac{P_1 \times (1 - C_1)}{(1 + r)} + \frac{R_1 \times P_2 \times (1 - C_2)}{(1 + r)^2} + \frac{R_2 \times P_3 \times (1 - C_3)}{(1 + r)^3}$$

Value of Quoted Business: $VQB = VEB \times P(Co)$

Value of Targeted Business

$$VTB = \frac{P(Q) \times VQB}{(1 + r)^{tl}}$$

Driving Customer Value



Premiums: actuarial



Claim cost: claims, underwriting



Cancelation rate: actuarial, customer service, agency, claims



Renewal rate: actuarial, customer service, agency, claims



Conversion rate: actuarial, customer service, agency, IT



Response rate: marketing

Application of Customer Value Measures

- Underwriting
 - Historically focused efforts on “bad” risks: high frequency, prior violations and accidents
 - Use customer value to Improve underwriting workflow, shift focus to less profitable risks
- Actuarial
 - Price optimization focused on solely changing price to improve profitability
 - Customer value considers price as part of bigger picture to help drive customer value
- Marketing
 - Historical focus on hit ratio, how many customers are responding
 - Use customer value to develop target market profile
 - How do I better attract low response segments
- Product management – how do all elements interact, common theme that flows through the entire program

Practical Considerations

- Data/Modeling
- Regulatory
- Corporate Culture

Data/Modeling Considerations

- Pricing Changes
- Account vs. Line/Subline Modeling
- New Business – premium & quote information
- Competitive information
- Quoting analysis

Regulatory Considerations

- Pricing approach
 - E(Loss) + Expense Load vs.
 - Premium that optimizes profit
- Market conduct
 - When you determine more profitable business, what do you do with it?
 - Underwriting?
 - Marketing?
 - Pricing?
- Actuarial standards and codes

Corporate Culture

- Focus is generally on the short term
 - Business value focuses on the longer term
 - Must carefully balance
- Culture in many companies is that volume must be preserved at all costs
 - Business value introduces profitability at the individual insured level
 - Finds the optimal point that maximizes profit based on the combination of price and volume