TOWERS PERRIN

Predictive Modeling – Next Steps in Pricing

Grasping a new concept: Price Optimization

Thomas Bayley, FCAS, MAAA

CAMAR Meeting, December 2008

The strategic imperative: why you should invest more in pricing

- Needed to win or needed to play?
- Invest substantially? In what?
- Is it worth?

Top Innovative Ideas Outside U.S. in Pricing, Product and Service in Homeowners insurance

The top innovative ideas used outside the US for Homeowners are in the areas of pricing, product and service

Criteria	Context/Innovation Opportunity	Country/Potential
Pricing	■ Number of square meters ■ Number of rooms as a rating base ■ No claim discount	UK/France/Spain ○ UK ○ UK/Spain ◑
Product	■ "Simple English" policy language (UK and Australia) ■ Accidental Damage for both home and contents (similar to HO-5 in the U.S.)	UK/Australia ● UK ●
Service	■ Claim payment in kind ■ Homeowners assistance ■ Legal assistance	UK/Spain ● Europe ● Europe ◑

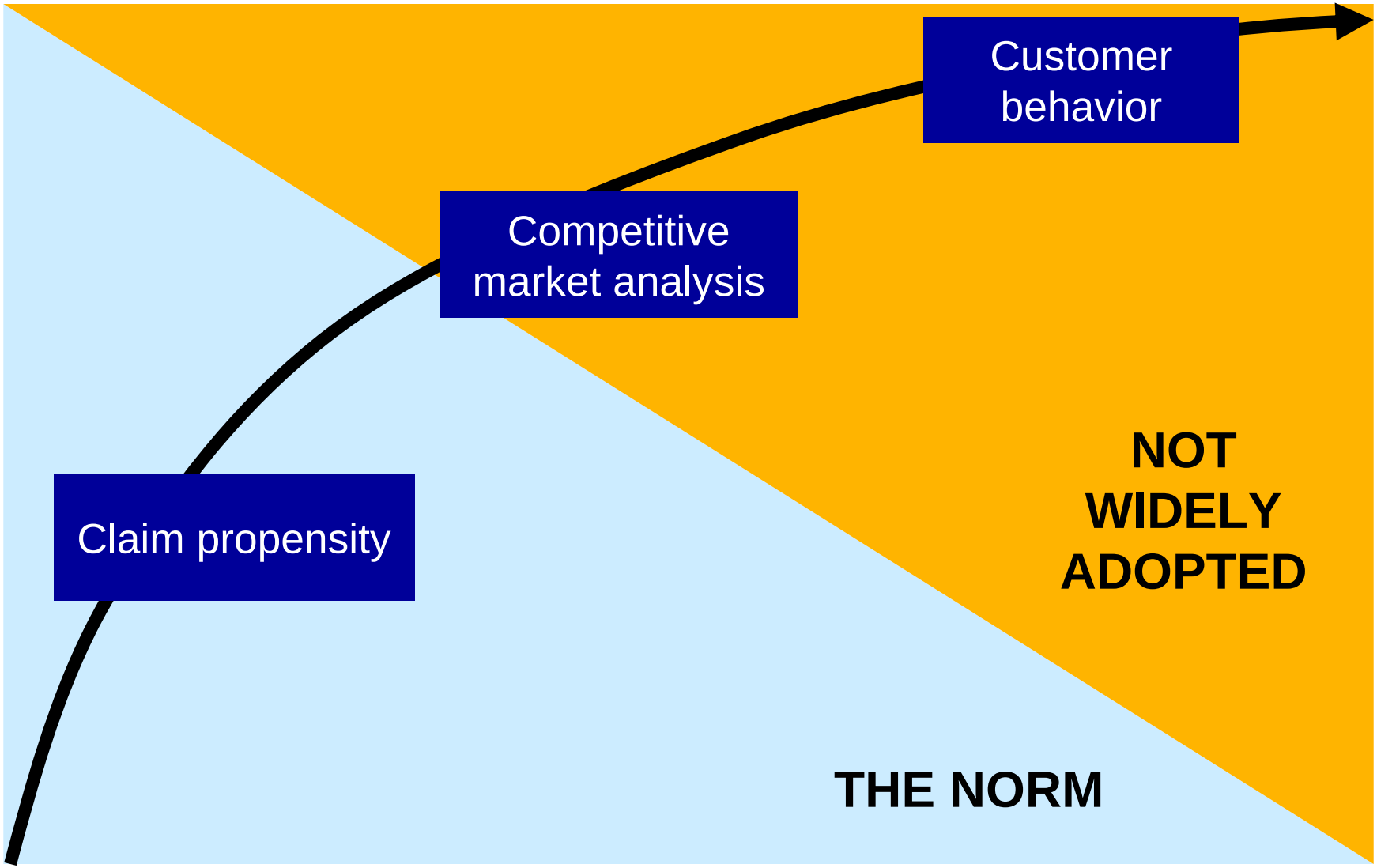
○ Low ◑ Moderate ● High

The top innovative ideas used outside the US for auto are

Criteria	Context/Innovation Opportunity	Country/Potential
Pricing	■ "Pay as you drive" program ■ Daily rate auto insurance ■ No claim discount	UK/Italy/Spain ○ Spain/France/Italy ○ Europe ◑
Product	■ "Simple English" policy language ■ Family policy (rating all drivers)	UK ● Europe ◑
Service	■ Claim payment in kind ■ Auto assistance ■ Legal assistance	Europe ● Europe ● Europe ●

○ Low ◑ Moderate ● High

The journey to price optimization



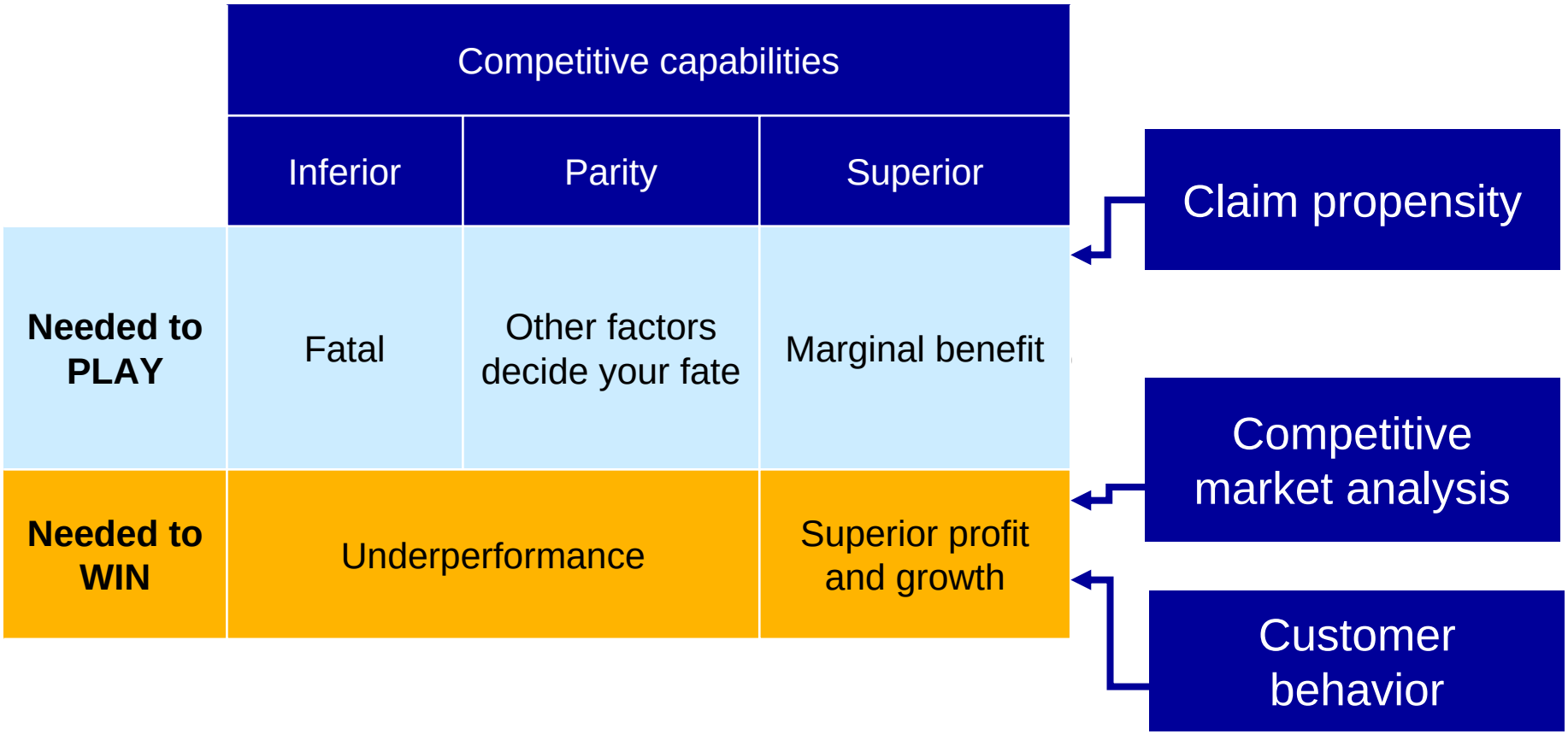
‘Needed to play’

	Competitive capabilities		
	Inferior	Parity	Superior
Needed to PLAY	Fatal	Other factors decide your fate	Marginal benefit

‘Needed to win’

	Competitive capabilities		
	Inferior	Parity	Superior
Needed to PLAY	Fatal	Other factors decide your fate	Marginal benefit
Needed to WIN	Underperformance		Superior profit and growth

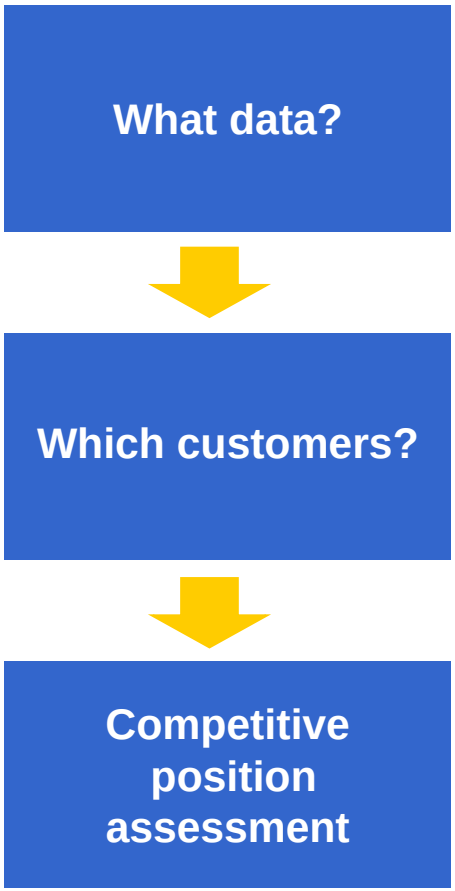
Considering the pricing techniques used (on average) in major European markets



Competitive Market Analysis in practice

- CMA means comparing a company's rates to the competition
- Involves the use of large portfolio of risks
- Enables assessment of competitive position:
  - Overall
  - By single rating factors
  - Against your competitors
  - Identify niches of opportunistic pricing
  - Changes over time
- CMA provides a comprehensive picture of your strategic positioning, opportunities and threats going forward

The process of assessing competitive positioning and market dynamics



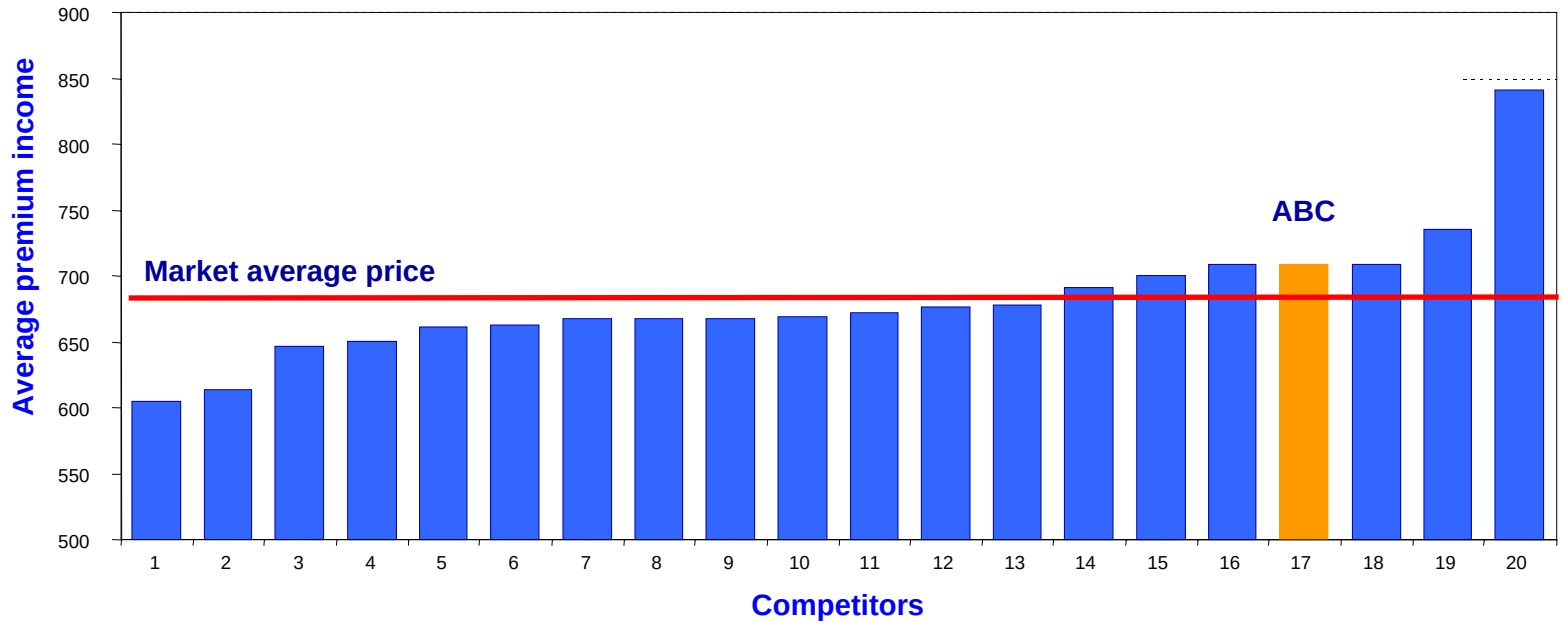
- Distribution / Competitors
- Product benchmarking
- Adjustments

- Reference portfolio
- Rates

- Assessment of competitors' rating structure
- Quantitative benchmarking

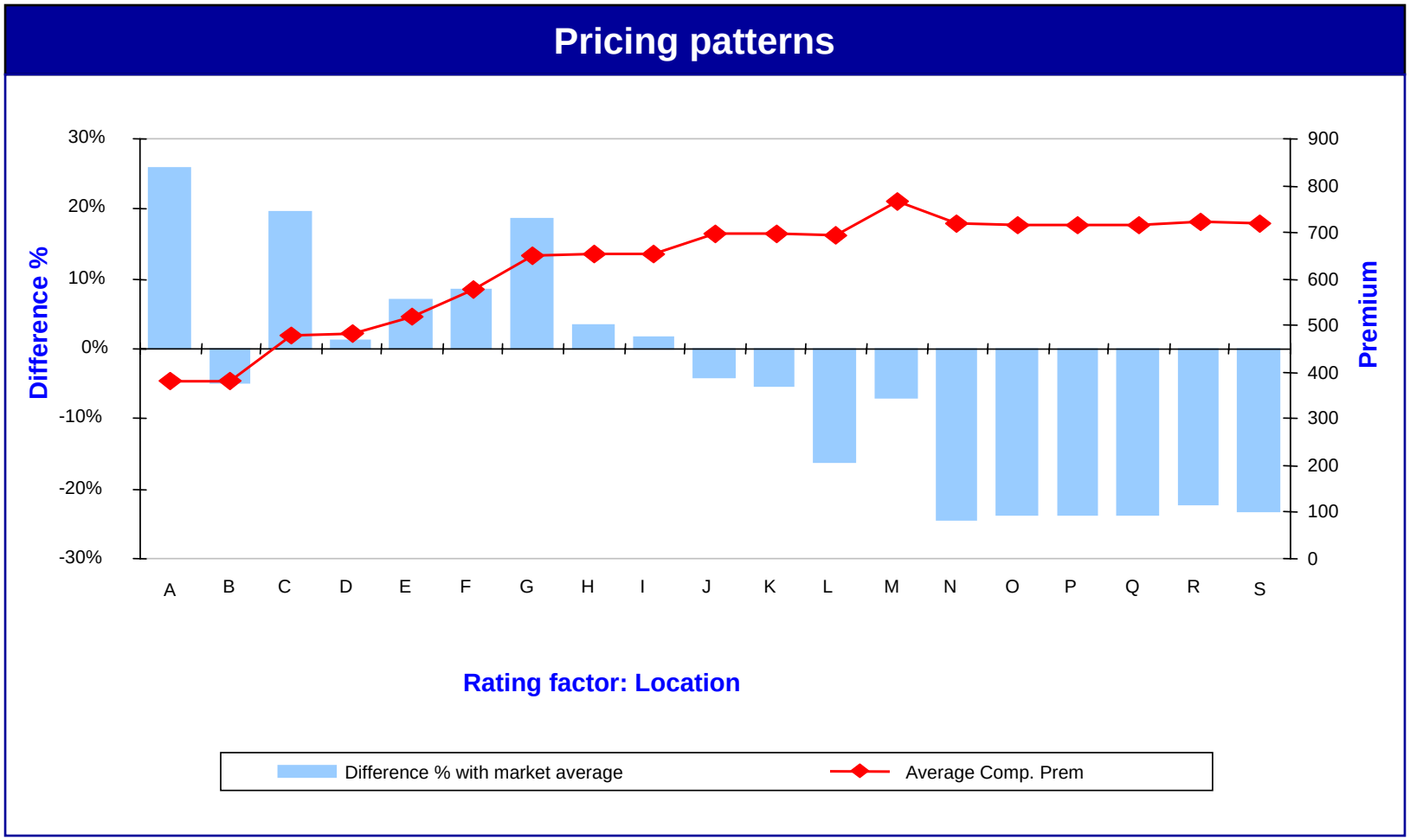
Begin with a view of your overall market positioning and identification of competitors ...

Overall market position : Location price



Illustrative: Bulding coverage

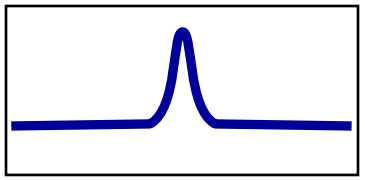
... then look for pricing patterns above or below the market



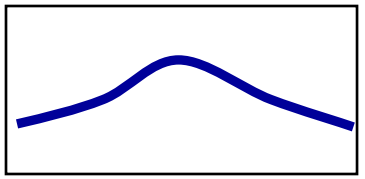
Review data one variable at a time, then examine each multi-dimensional rating cell for price level and market competitive intensity

Market Competitive Intensity Index → Measure of price dispersion in the market

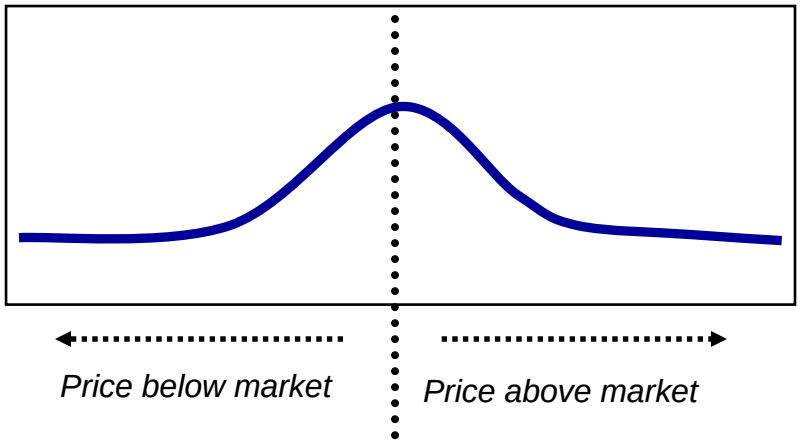
Low price dispersion / High competitive intensity



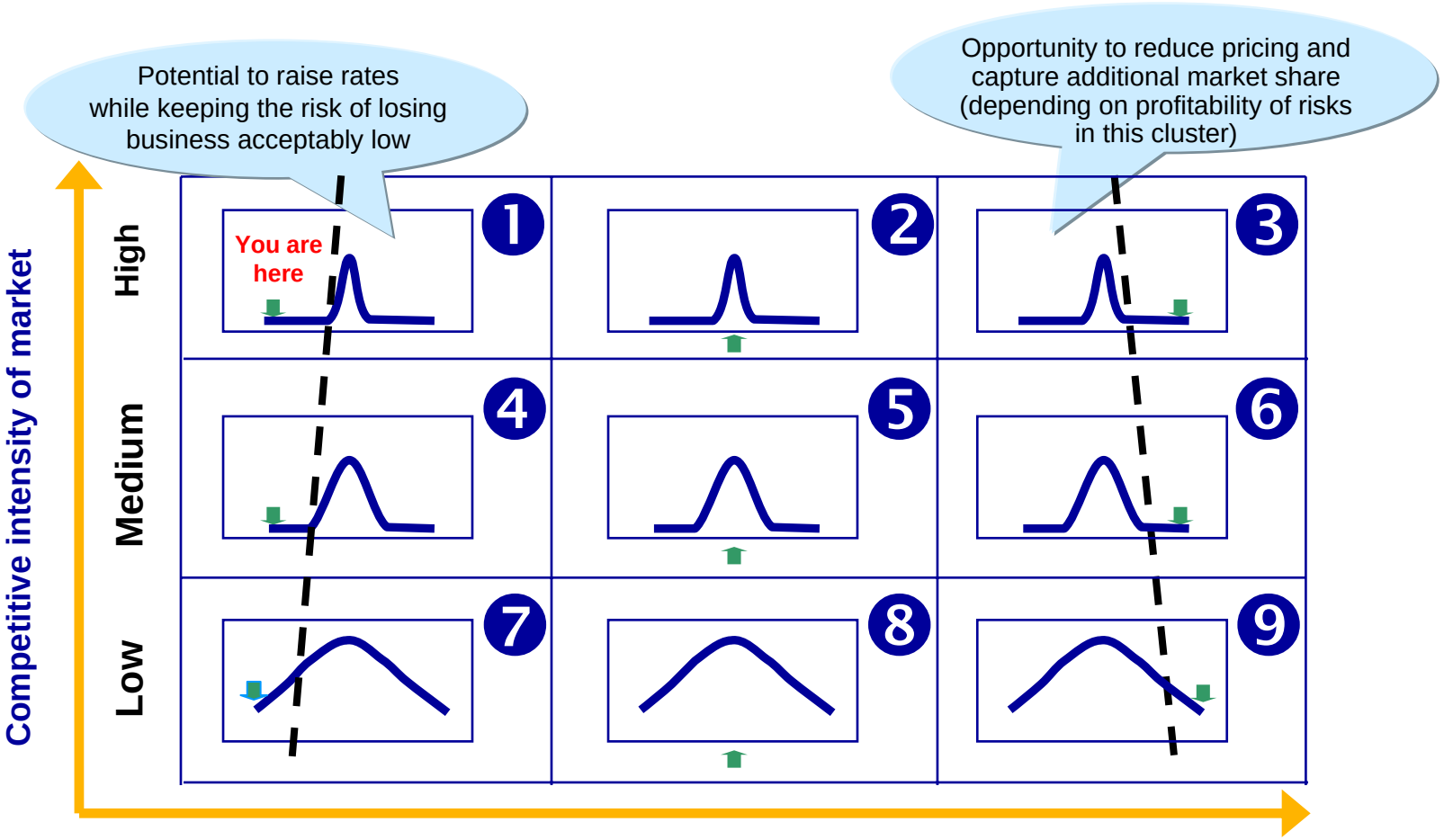
High price dispersion / Low competitive intensity



Price → Company's price compared to market



... and organize the result into 9 clusters, to identify rating cells where rating actions may be indicated

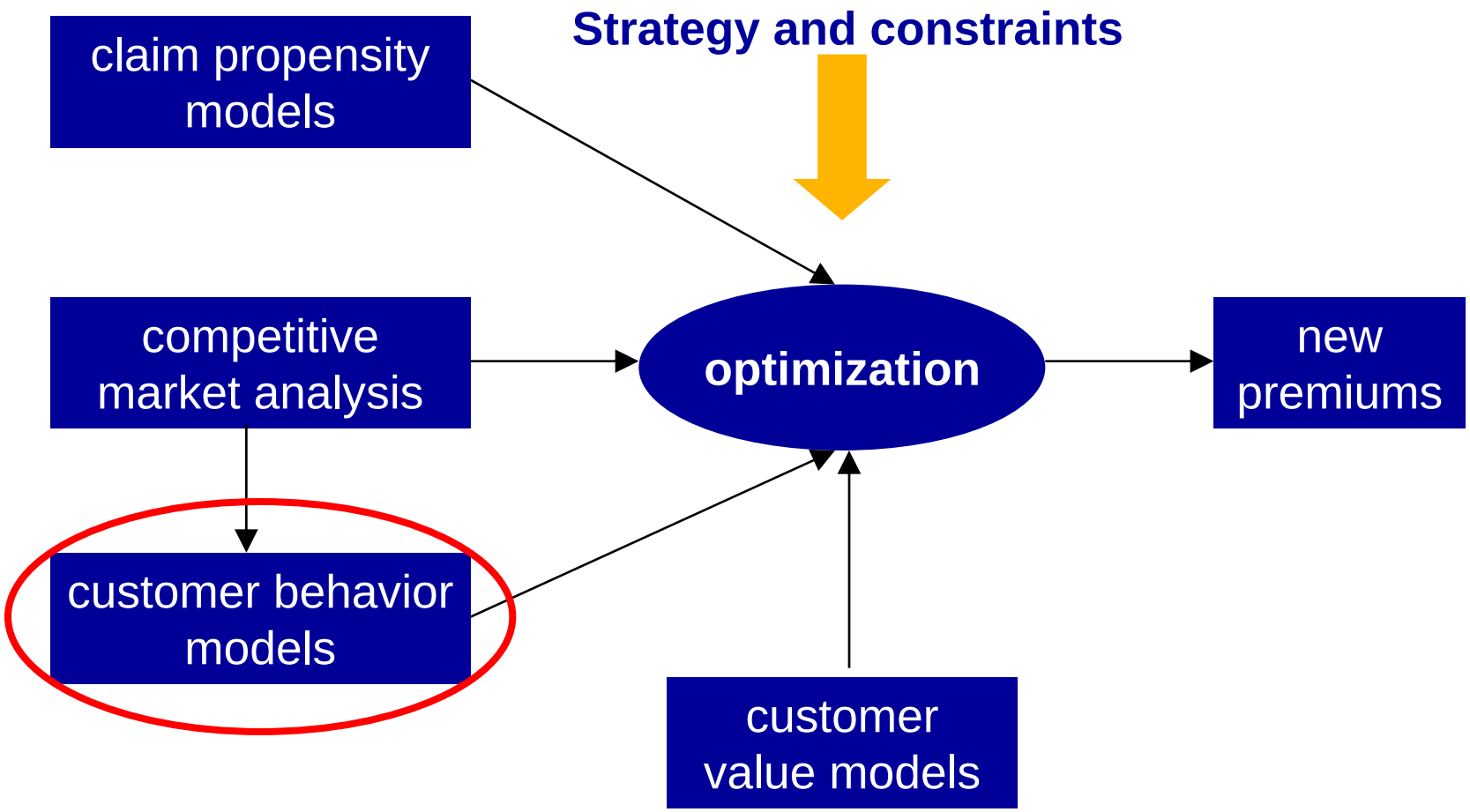


Dotted line represents optimal positioning in the cluster

What is price optimization?

The **process** of setting prices to maximize a pre-defined measure of **customer value** subject to a company's **strategic and business objectives**

Optimization process



Customer Behavior Models

Price elasticity

$$\frac{\text{\% change in volume}}{\text{\% change in price}}$$

customer
risk factors distribution channel other attributes
relationship
length depth nature
competition
brand marketing product
other
price movements external factors time of inquiry

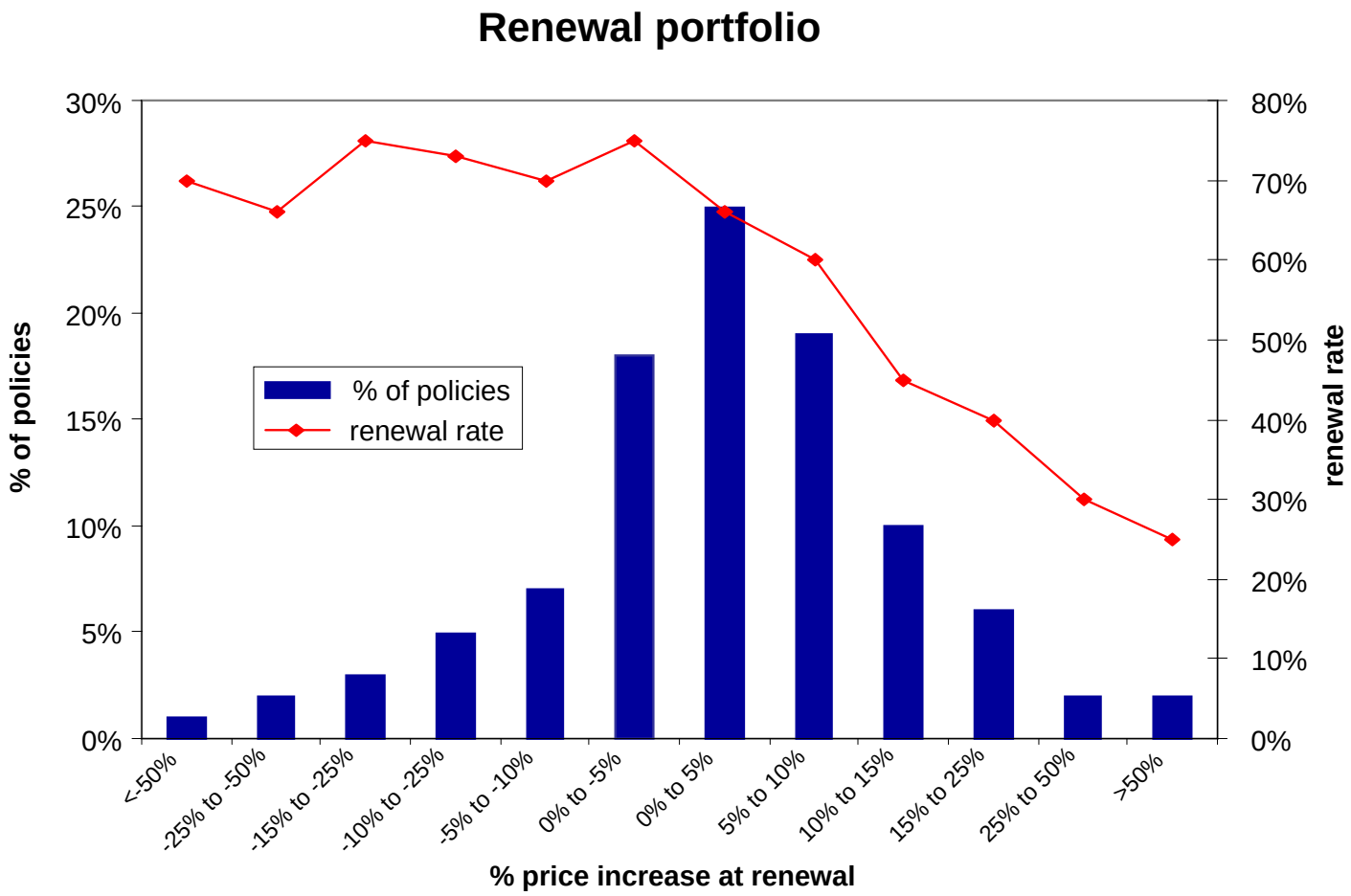
Measuring price elasticity

- Alternatives to price testing:
  - predictive modelling techniques based on historic information
  - what were the impacts on business volumes caused by …
    - — price changes
    - — competitive positioning
    - — marketing promotions
    - — price change at renewal

Measuring price elasticity

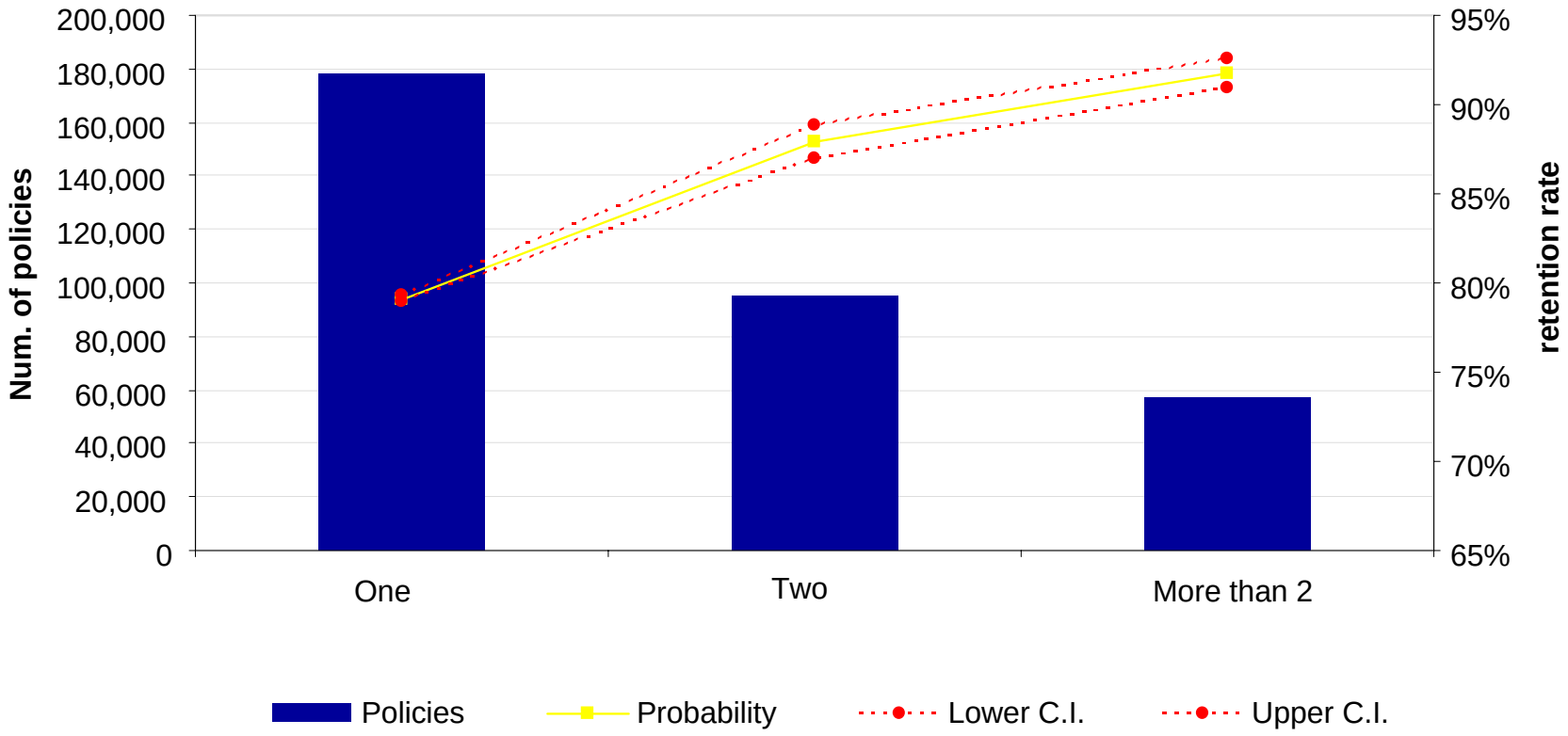
- Alternatives to price testing

Illustrative example



Customer price elasticity
Results – Number of products by customer

Illustrative example



As the number of products by customer increases, so does the probability of renewal

Customer price elasticity
Possible explanatory variables

Policy characteristics

- % Premium change
- Renewal month
- Discounts
- Coverage
- Actual premium
- Absolute change in premium
- Amount of difference with market
- Percent of difference with market
- Number years policy held
- Number years client in company
- No Claim discount
- …..

Risk characteristics (Continent)

- Type of house/flat/apartment
- Age of house/flat/apartment
- Usage
- Value
- …..

Risk characteristics (Policyholder)

- Years without claims
- Owner's age
- Owner's credit status
- Owner's occupation
- Additional occupants presence
- Additional occupant's age
- Pets
- …..

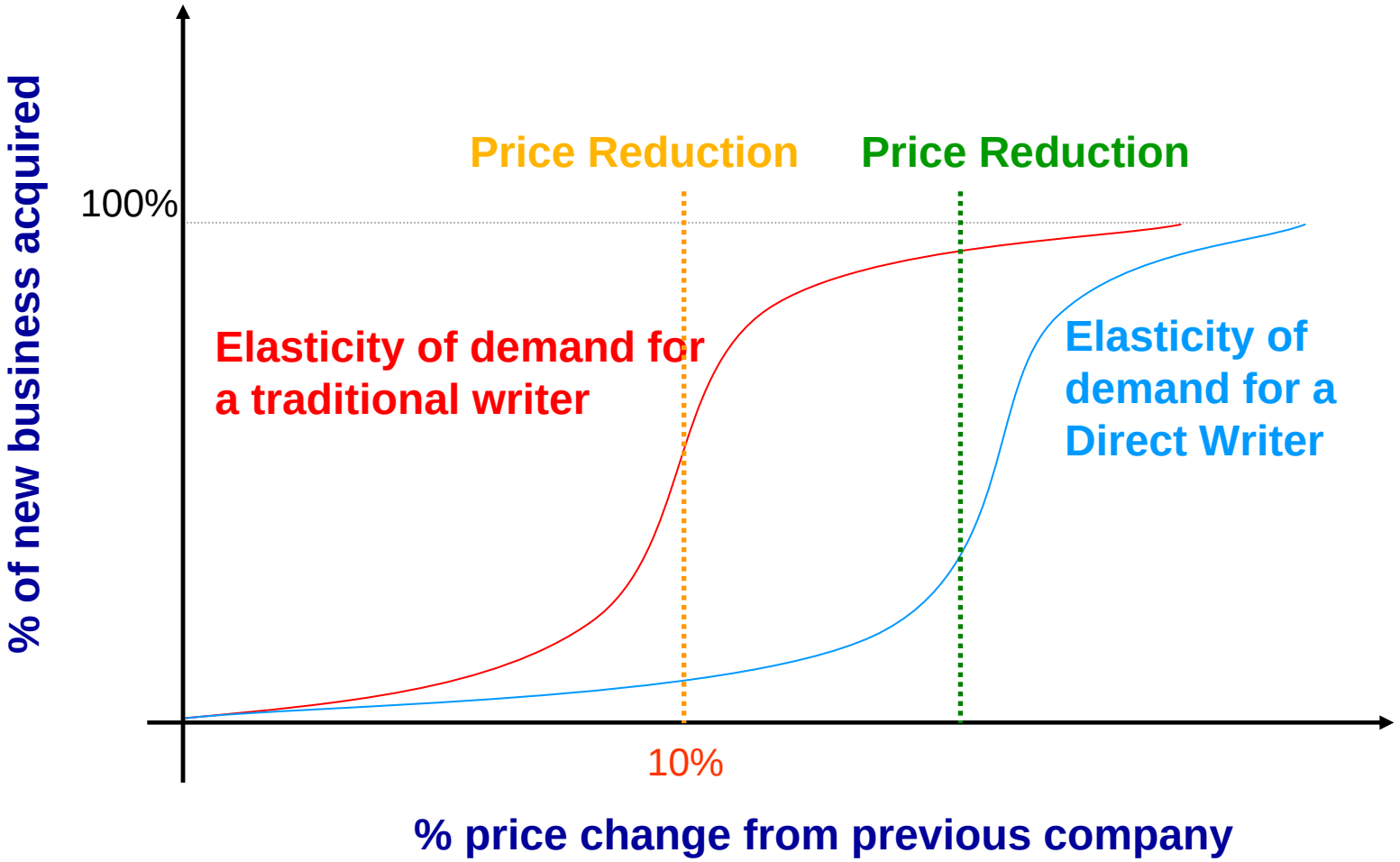
Others

- Homeowners assistance experience
- Payment type
- Payment term
- Distribution channel
- Cross sell
- Amount of agency-determined discounts
- Broker classification
- ……

Steps used to take into account the competitive market analysis (CMA) in the price elasticity calculation

- For each customer risk profile the average price offered by the market is estimated.
- The difference, ***"d"***, of the company's price from the average market price is identified for each customer risk profile.
- ***"d"*** is then introduced into the multivariate analysis to find out the extent to which the competitive position explains the price sensitivity of the corresponding customer profile.
- With this information, it's possible to determine the relative importance of the competitiveness factor and of each of the other variables in the price elasticity of the customer profile.

Customer Behavior Models
Elasticity of Demand



Optimization

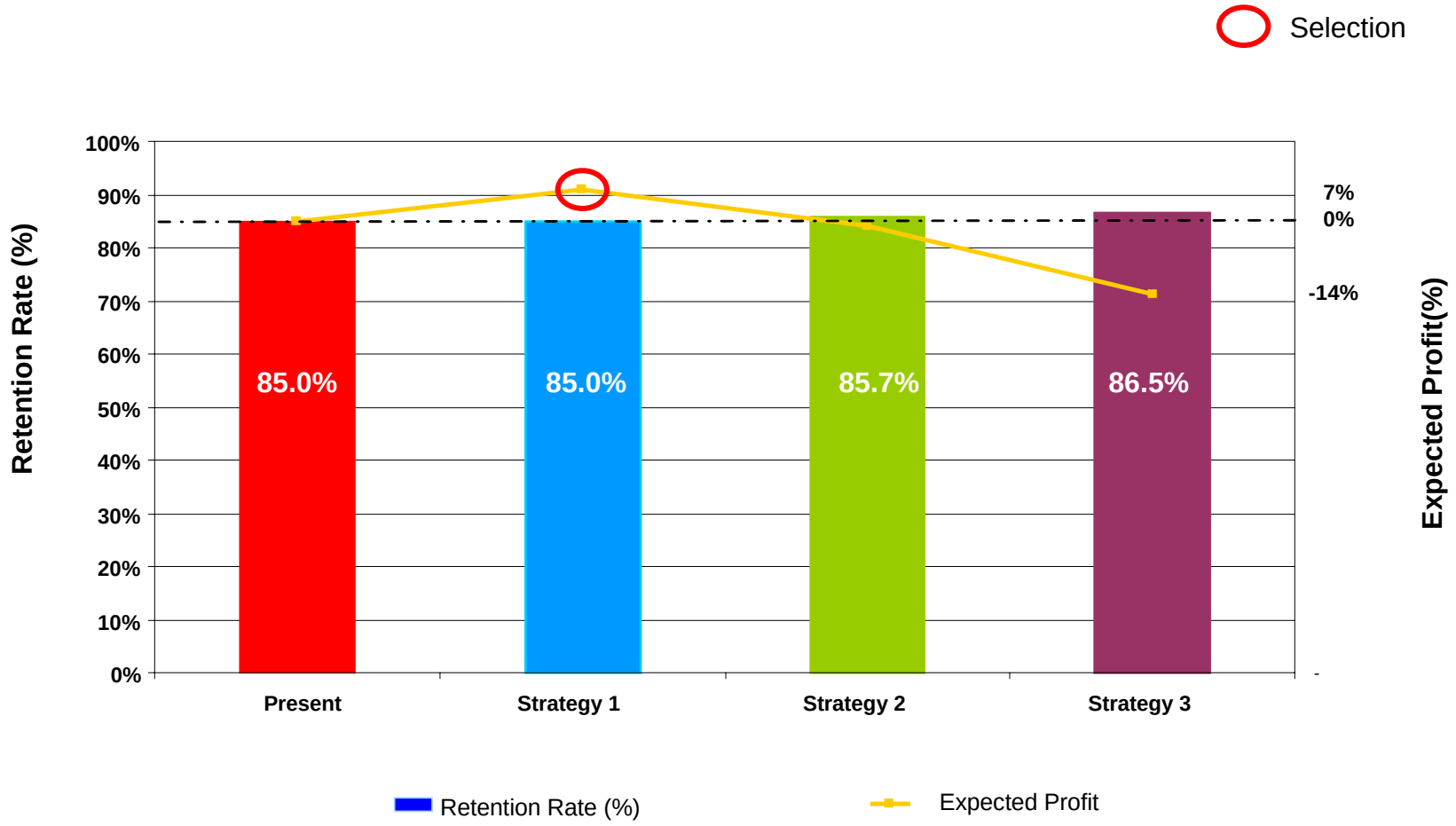
- This step involves combining the cost models (claims and expenses) and the customer price elasticity models derived in previous steps in order to determine the optimal profit loading by customer type
- The optimal price will be the one that satisfies the company's objectives and constraints maximizing profitability subject to a certain volume of business.

Constraints in the Optimization Process

- Constraints on the optimization process arise from both regulatory and management concerns.
- The regulatory process may impose rules limiting the loadings (including the profitability) applied to the cost premium.
- Jurisdictions differ on whether variation is allowed for individual customer prices or only at the class level.
- In some jurisdictions the final premium must be within a range of reasonable estimates of the loss premium, after loading for expenses and profits and contingencies.
- Any such regulations are reflected as constraints in the optimization process; the result is an optimized structure subject to the constraints
- In addition, company management often imposes restrictions (e.g., never allow increases of more than X% or decreases of more than Y%).

Alternative Strategies: Results

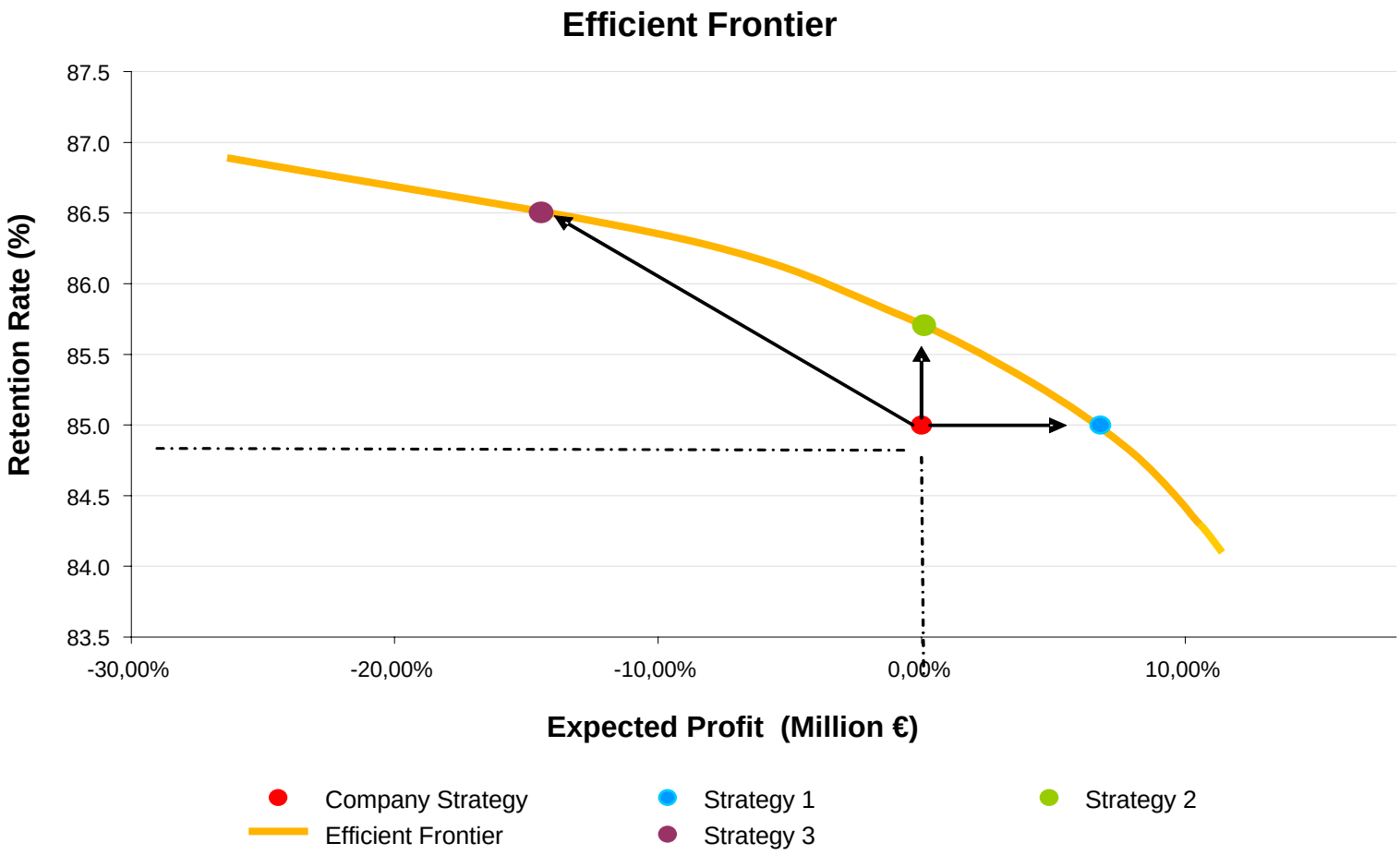
Illustrative example



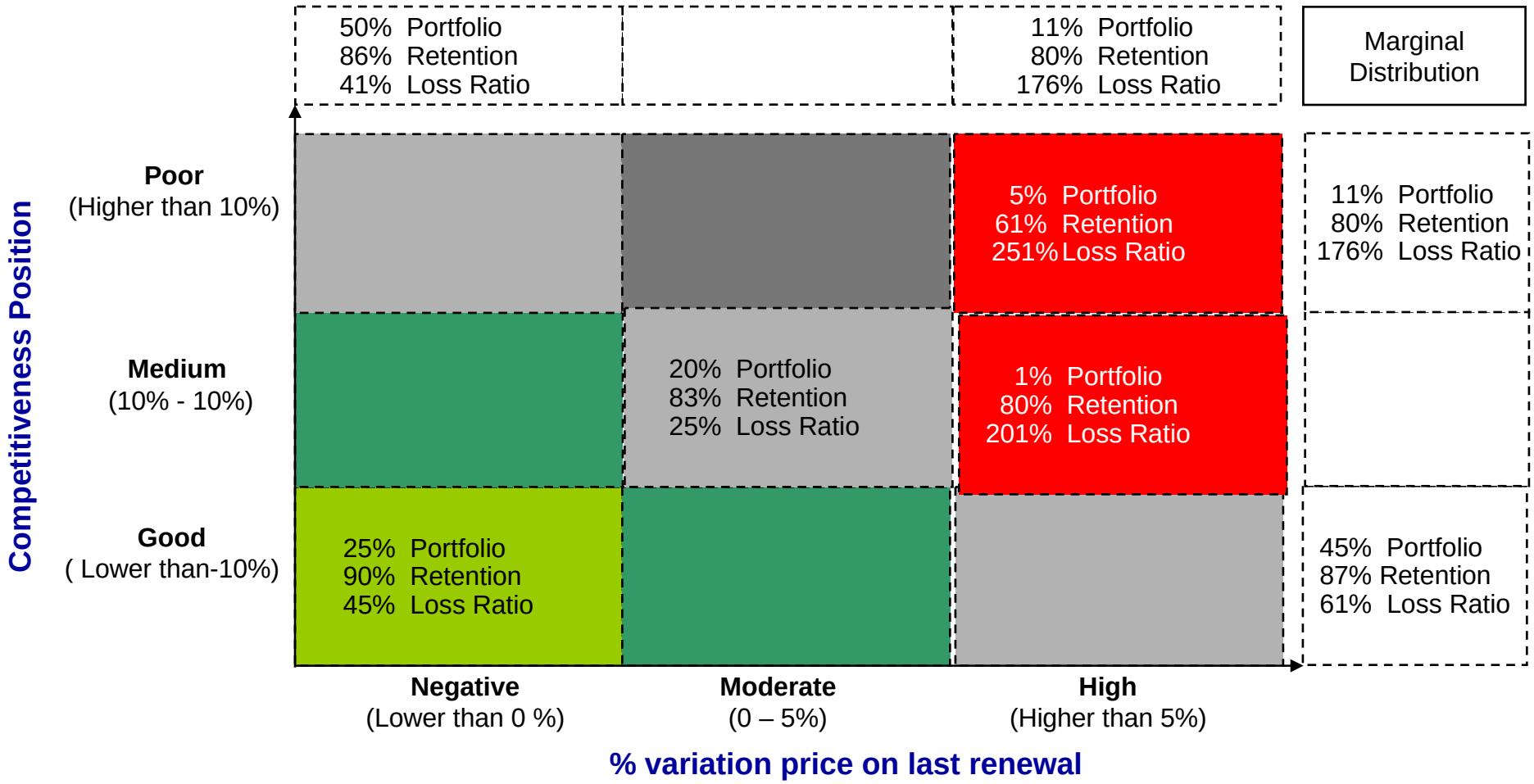
Note: Expected Profit without fixed expenses

Alternative Strategies: Efficient Frontier

Illustrative example

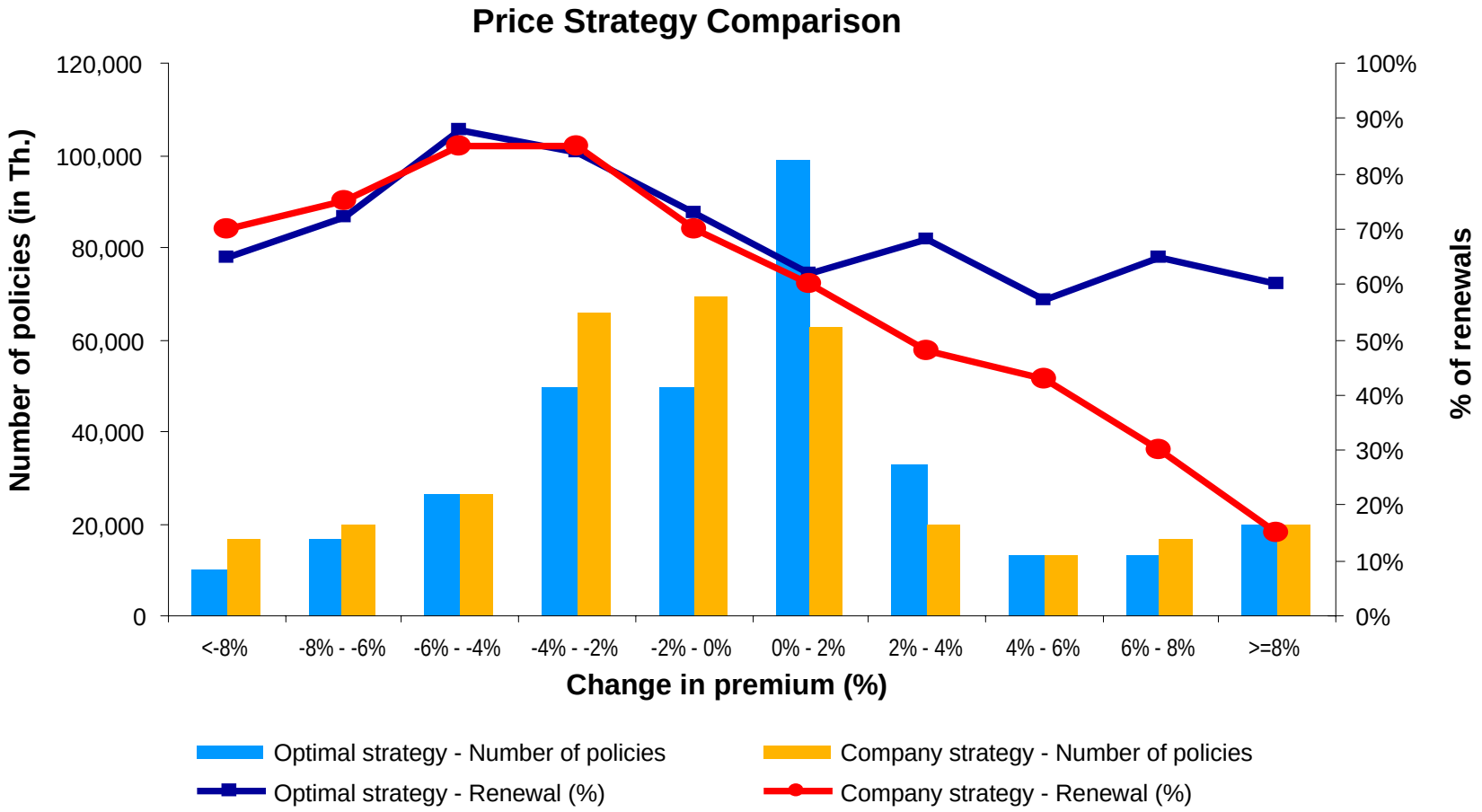


Price Variation vs. Competitiveness Position (illustrative)

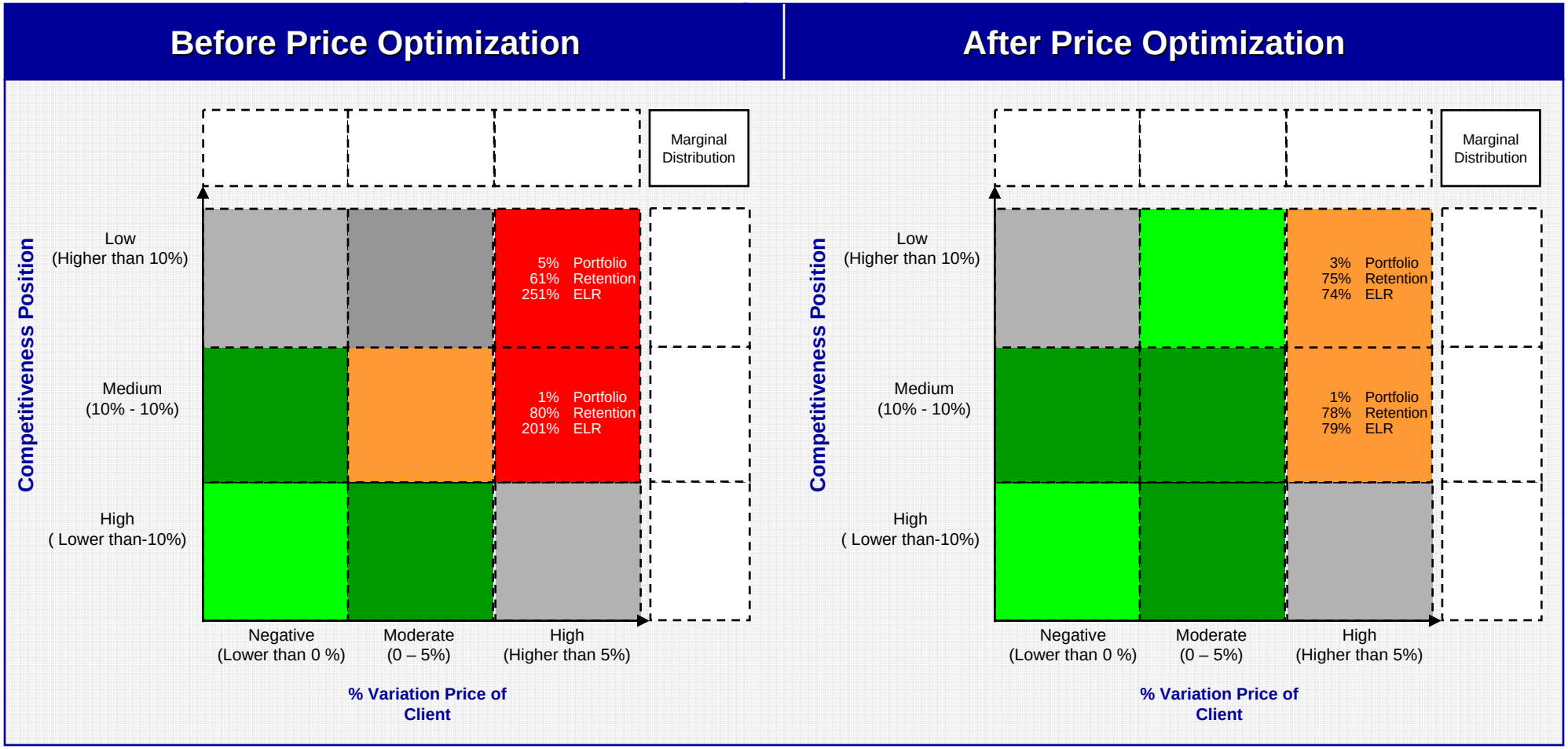


Optimization
Strategy 1: Maintain Retention/Increase Profits

- Comparison of company and optimized pricing schemes



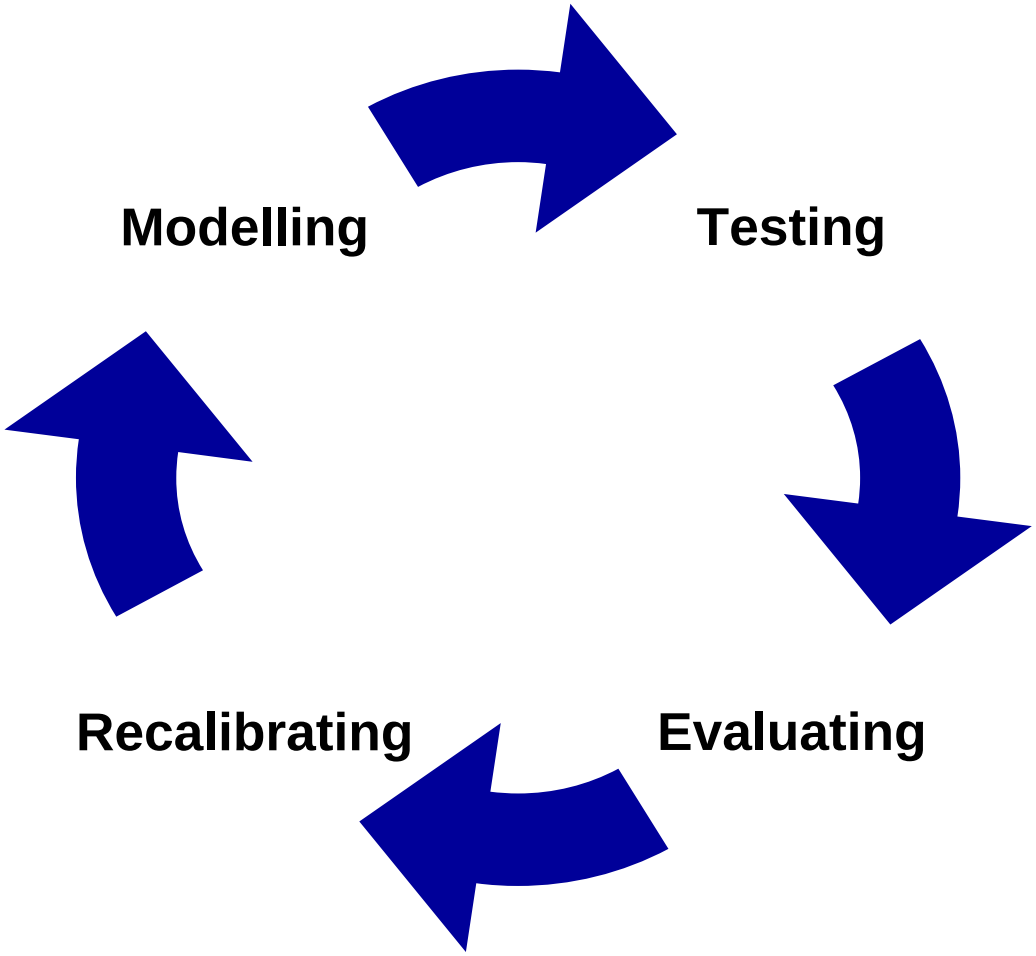
Optimization changes the mix of business



Implementation

- Optimized rates can be implemented in different ways:
  a. An algorithm that calculates the optimized price per individual customer based on their particular rating attributes. The algorithm can be built into the rating structure and operate in real-time
  b. A set of optimized premium rates that would fit into a tabular rating structure

Optimization – bringing it all together



Conclusions

- **Advanced statistical techniques** are now necessary for **managing your portfolio**
- It is possible to **grow market share** without **compromising profitability**
- **More and more companies** are **adopting the techniques** we describe
- **Implementation and managing the change are key to success**

TOWERS PERRIN

Thank you !

About Towers Perrin

Towers Perrin is a global professional services firm that helps organizations around the world optimize performance through effective people, risk and financial management. The firm provides innovative solutions to client issues in the areas of human resource consulting and administration services; management and actuarial consulting to the financial services industry; and reinsurance intermediary services.

The firm has served large organizations in both the private and public sectors for 70 years. Our clients include three quarters of the world's 500 largest companies and three quarters of the *Fortune* 1000 U.S. companies.

Our businesses include HR Services, Reinsurance and Tillinghast.

Tillinghast

The Tillinghast business of Towers Perrin provides global actuarial and management consulting to insurance and financial services companies and advises other organizations on risk financing and self-insurance. We help our clients with issues related to mergers, acquisitions and restructuring; financial and regulatory reporting; risk, capital and value management; and products, markets and distribution.

Thomas Bayley, FCAS, MAAA
thomas.bayley@towersperrin.com
Telephone: 1 215 246 7376