

## Sophisticated Price Optimization Methods

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Session PM-7

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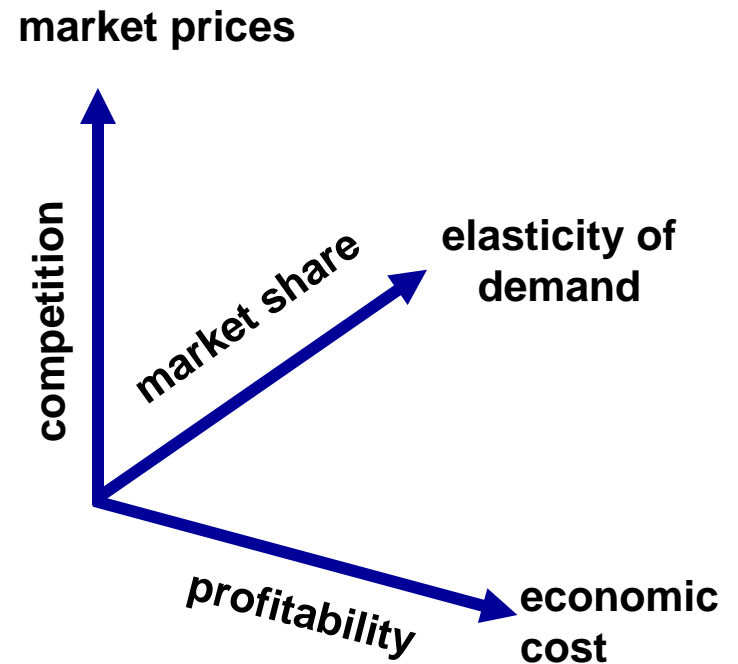


## Contents

- **Introduction to optimized pricing**
- Case study
- Conclusion

# The next frontier in pricing management

- To set **optimized prices** we need.....
  - **Cost models** which predict the net claims and other costs for different types of customers
  - **Competitive Market Analysis** which provides a thorough understanding of the market place in which a company is operating
  - **Customer price elasticity models** which reflect market competition and customer behaviour so as to predict the volume of new business and renewal acceptances at various prices for different types of customers
  - **Optimization techniques** which integrate these models to predict the profit/volume impact of price changes, and to identify the best price changes for a given financial objective and constraints



## Why Price Optimization?

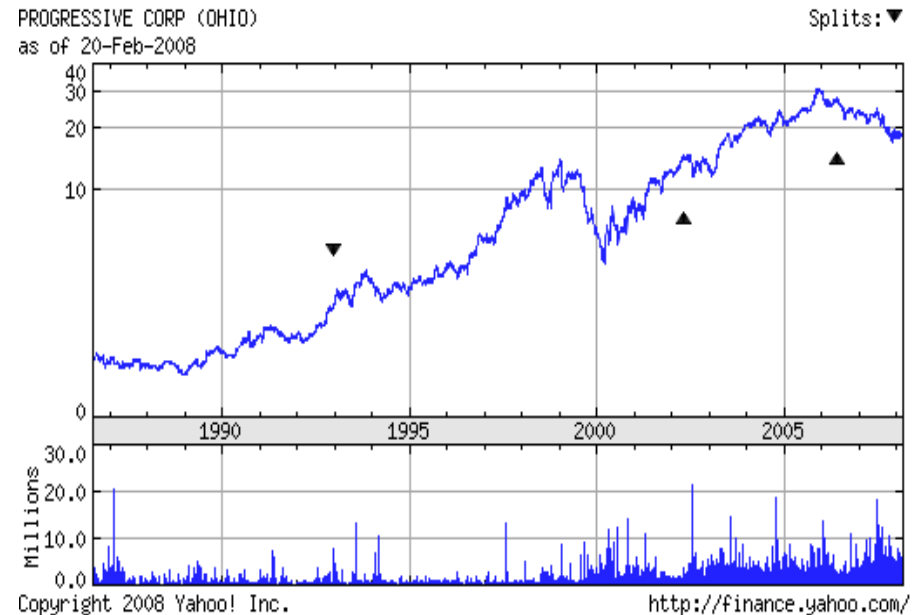
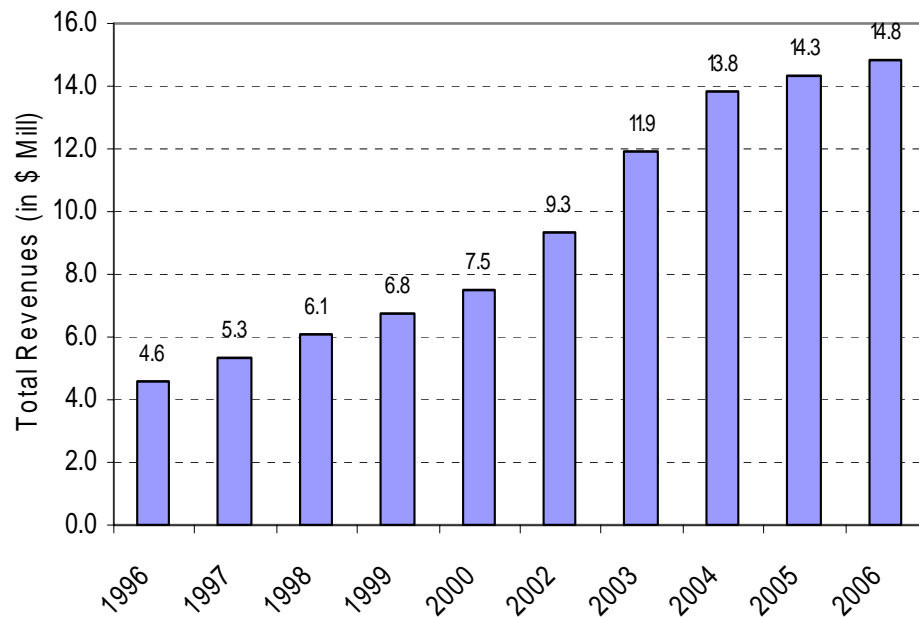
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- The personal lines insurance industry is highly competitive and maintaining underwriting profits will continue to prove a challenge for the industry
- Opportunities for improving profitability through efficiency and cost reduction are becoming more difficult
- Pricing management presents the best opportunity for a company to improve its profitability – optimizing prices is the next step

# Progressive: growing volume while maintaining profitability through price segmentation

- Predictive modeling gained more attention in the US around 2000 due to Progressive success:
  - In 10 years moved from 43<sup>rd</sup> to 3<sup>rd</sup> largest Motor insurer in the US
  - Share price quadrupled

Progressive Corp

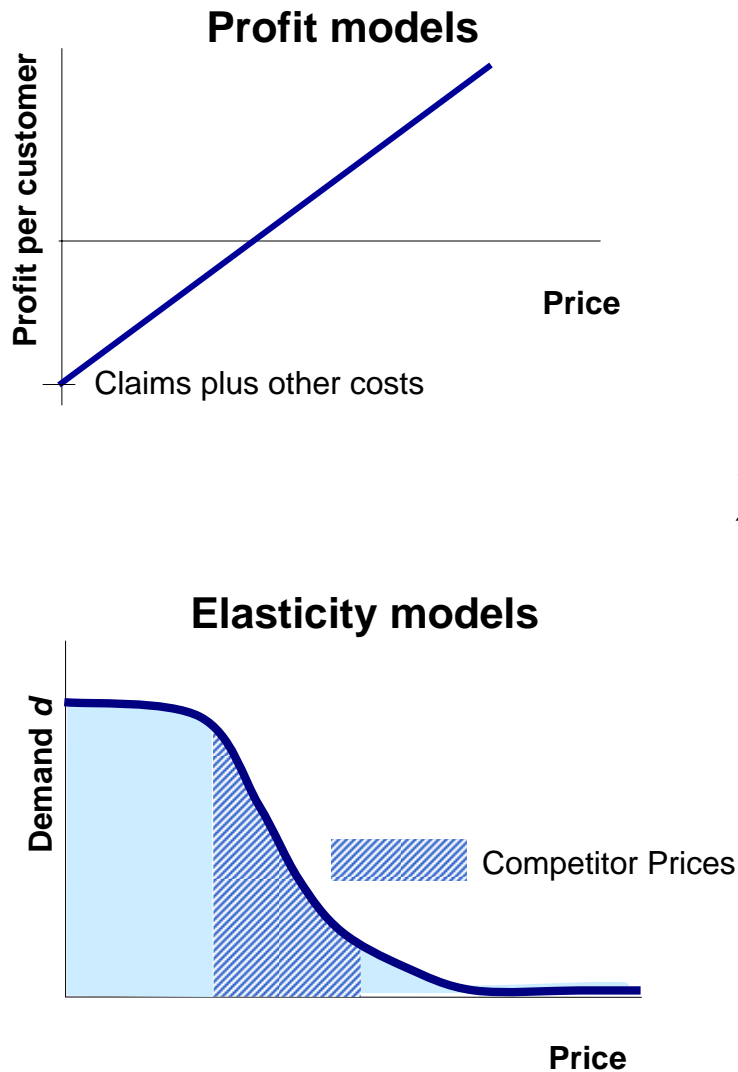




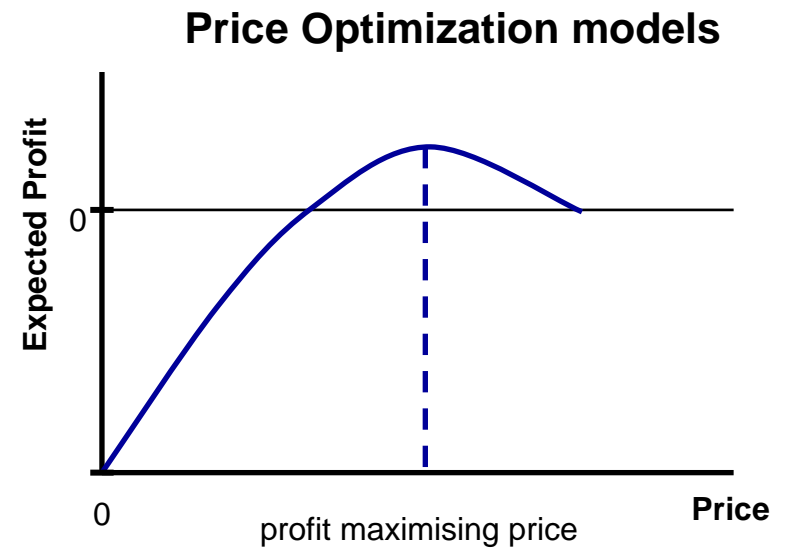
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# The Price Optimization equation



X



By integrating price elasticity models and profit (cost) models, **by customer segment and distribution channel**, we aim to set prices that optimize the trade-off between the contribution per policy and the volume of business expected to meet a given financial objective and business constraints



# Optimization Project focused on better management of the renewal portfolio

## Context

- The company was providing quotes for renewal considering only profitability, past claims experience and previous premium.
- The market entered a price war.

## Objectives

- Improve the renewal process.
- Forecast the impact of different strategies on profitability and premium volume.
- Maximize retention and expected profit.

## Solutions Provided

- Claims cost per policy.
- Competitive market analysis for the specific profile of the portfolio.
- Elasticity of demand study.
- Forecast tool to estimate renewal rate for a given pricing strategy.
- Provide directions for discounts granted to agents.
- Optimized prices subject to the objectives and restrictions of the company.
- Evaluate different pricing strategies.

## Steps

- An analysis of claims (GLM model) and expenses was previously performed.
- The steps were the following:
  1. Agree to objectives and constraints
  2. Gap analysis
  3. Competitive Market Analysis
  4. Renewal analysis
  5. Measure and model customer price elasticity
  6. Optimization
  7. Implementation

Case study is based on a European company - rate regulations are different in the US



## Agree to objectives and constraints

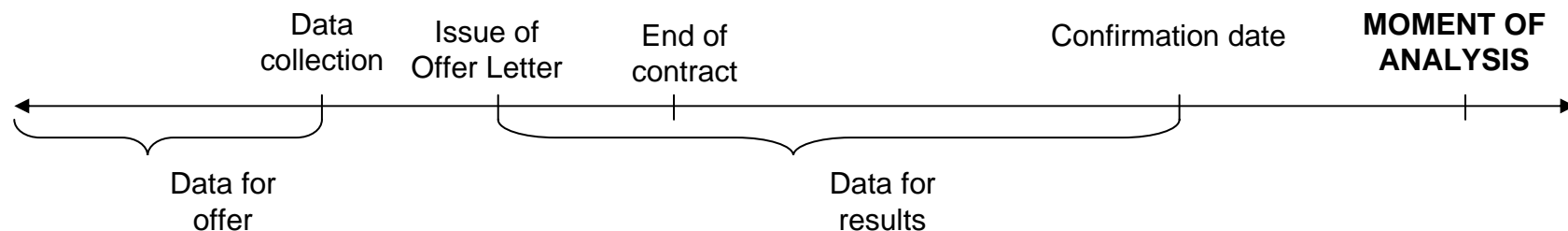
### Step 1

- Initial project workshop to further understand the company's strategy and financial objectives for the Price Optimization process.
- Establish:
  - Maximization/minimization function: Maximize Expected Profits
  - Time horizon (One year)
  - Business constraints:
    - Global (Target retention rate: 85.0%)
    - Individual (Base on individual policy profiles):
      - Number of claims in the previous years (0, 1, 2, >2)
      - Non claims discount (<55%; => 55%)
      - Tenure (< 4 years; >= 4 years)
      - Historical loss ratio (<55%; >= 55%)

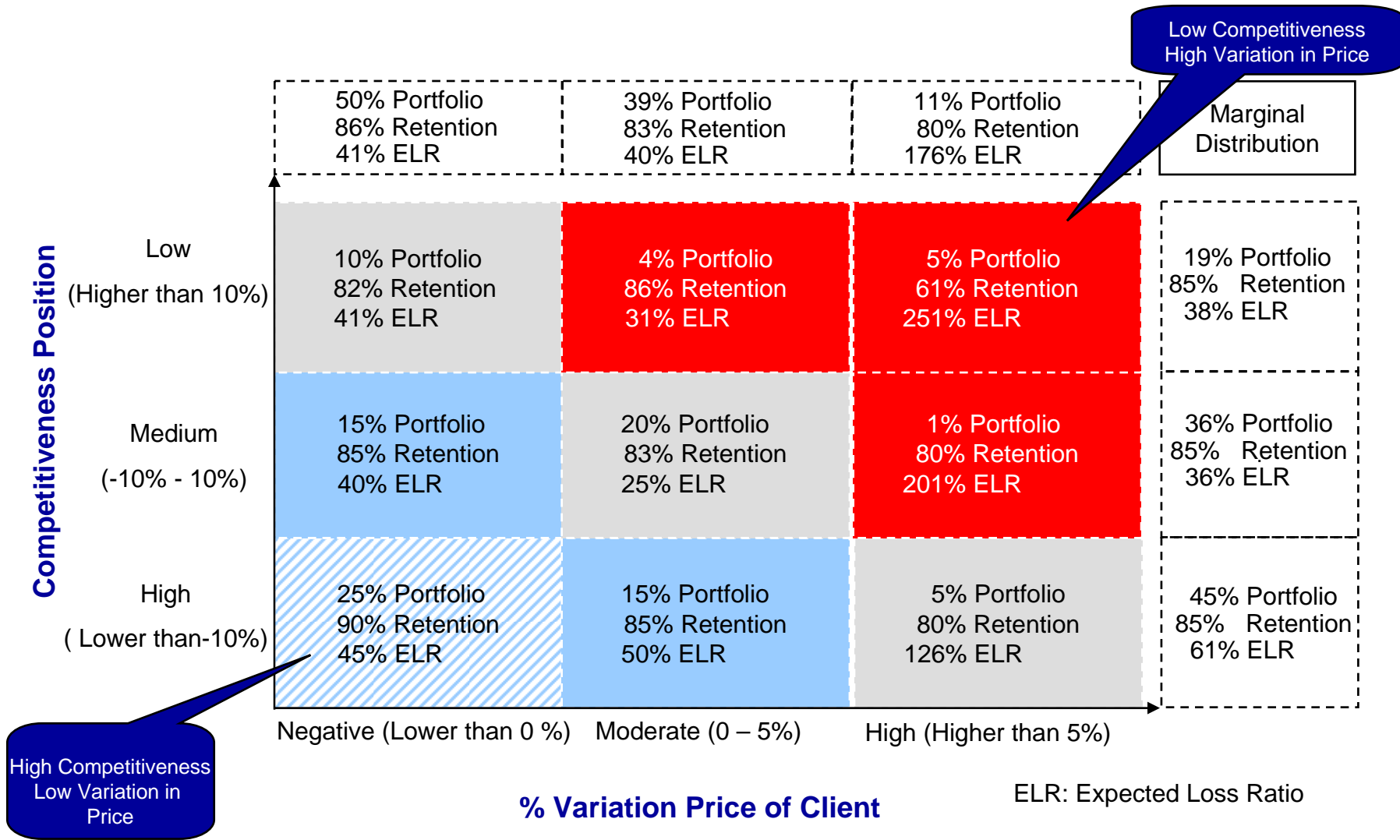
- Understand how much of the information and analysis is already available through previous work
- Use existing company pure pricing models based on expected cost of claims as an input to the Optimization process. This is a fundamental part of the process and one which will have a significant impact on profitability
- Understand the current rating structure and what enhancements and additional flexibility might be required to meet the objectives

- CMA is a fundamental part of an insurance company's pricing management processes and a key input into the process of Price Optimization:
  - Understand the positioning of the company's rates in the market at any point in time
  - Help identify segments where the company's prices are relatively cheap/expensive relative to the market
  - Understand the intensity of competition in each segment
  - Understand the scope for price changes and what impact such changes would have on market positioning
  - Key input into later steps

- **What is it?**
  - The renewal rate is defined as a customer (who has been offered renewal) staying with the company 12 weeks after expiring date
- **How is it used?**
  - Assess how variable the renewal rate is across the portfolio and identify segments of the business that have higher/lower than average rates
  - Combine with the CMA to assess how good a predictor the competitiveness measure is of retention - by customer segment and over time
  - Provide initial insight into customer elasticity e.g. what happened to retention rates when previous price changes were implemented?
  - Assess how retention rate varies as a function of price change at renewal
- Data used for the statistical estimation of customer renewal demand:
  - All car policies renewed between May 2007 and July 2007.



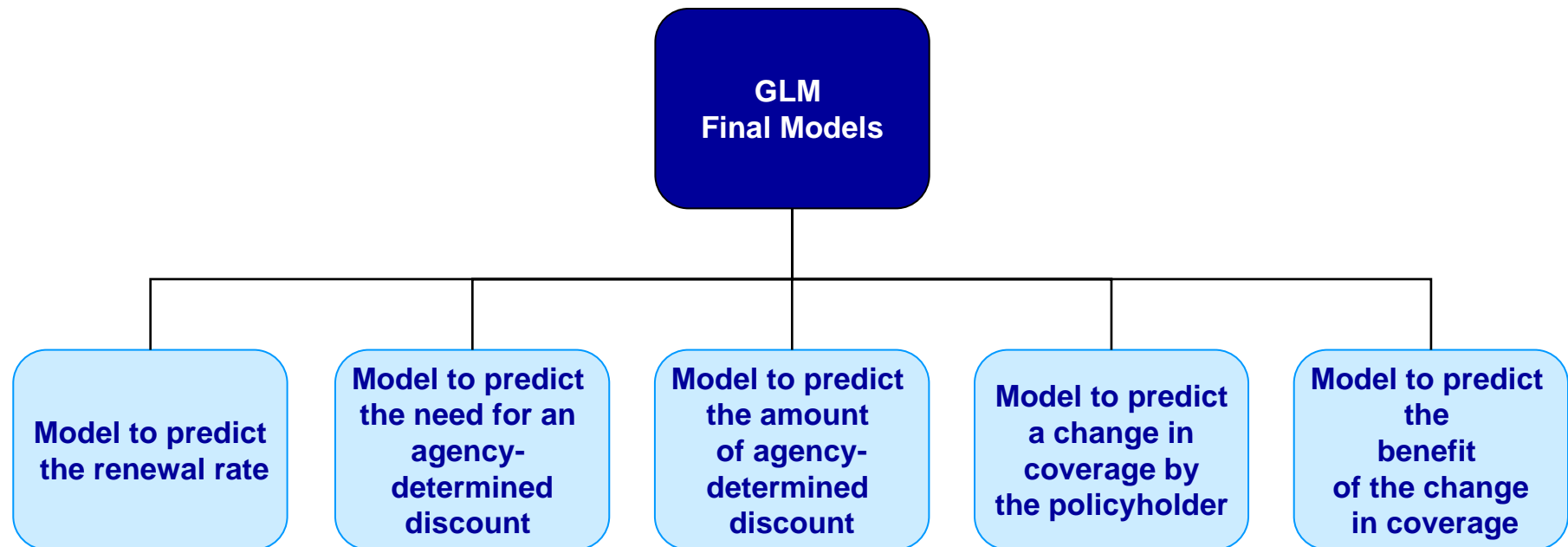
# Price Variation vs. Competitiveness position Step 4



# Customer price elasticity

## Summary of models

### Step 5



Note: in Europe, agencies are given discretionary “budgets” to offer discounts to insureds – sometimes referred to as “commercial discounts”

# Customer price elasticity

## Possible explanatory variables

### Step 5

#### 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
- Bonus/malus TPL
- .....

#### Risk characteristics (Vehicle)

- Type of vehicle
- Age of vehicle
- Usage
- Value
- .....

#### Risk characteristics (Driver)

- Years without claims
- Driver's age
- Driver's gender
- Driver's license age
- Driver's occupation
- Additional driver presence
- Additional driver's age
- Additional driver's licence age
- .....

#### Others

- Payment type
- Payment term
- Distribution channel
- Cross sell
- Amount of agency-determined discounts
- Broker classification
- .....



# Customer price elasticity

## Base profile

Illustrative example

### Step 5

Variables	Base Profile	Relativities Range	Explaining Capacity
Cross sell	ONLY MOTOR	0.40 - 1.00	31.0%
Premium offered	400-600 €	0.35 - 2.15	20.8%
Product	THIRD PARTY + WINDSCREEN	0.50 - 1.20	9.3%
% change premium	0% - 2%	0.40 - 1.60	8.4%
Payment type	BANK ACCOUNT	1.00 - 1.80	6.8%
Competitiveness	< -5% MARKET	1.00 - 1.75	6.3%
Distribution channels	BROKER	0.80 - 2.10	4.1%
Province	Zone 2	0.70 - 1.30	3.4%
Num. years policy held	3-4	0.75 - 1.15	2.4%
Commercial classification of broker	2	0.80 - 1.35	2.3%
Years without claims	5	0.80 - 1.25	2.2%
Sex – Age	H40-54	0.70 - 1.25	1.3%
Age of driver license	>20	1.00 - 1.50	0.9%
Type of Vehicle	Automobiles	0.85 - 1.45	0.4%

Intercept 0.15

Xb=Lineal Predictor 0.15

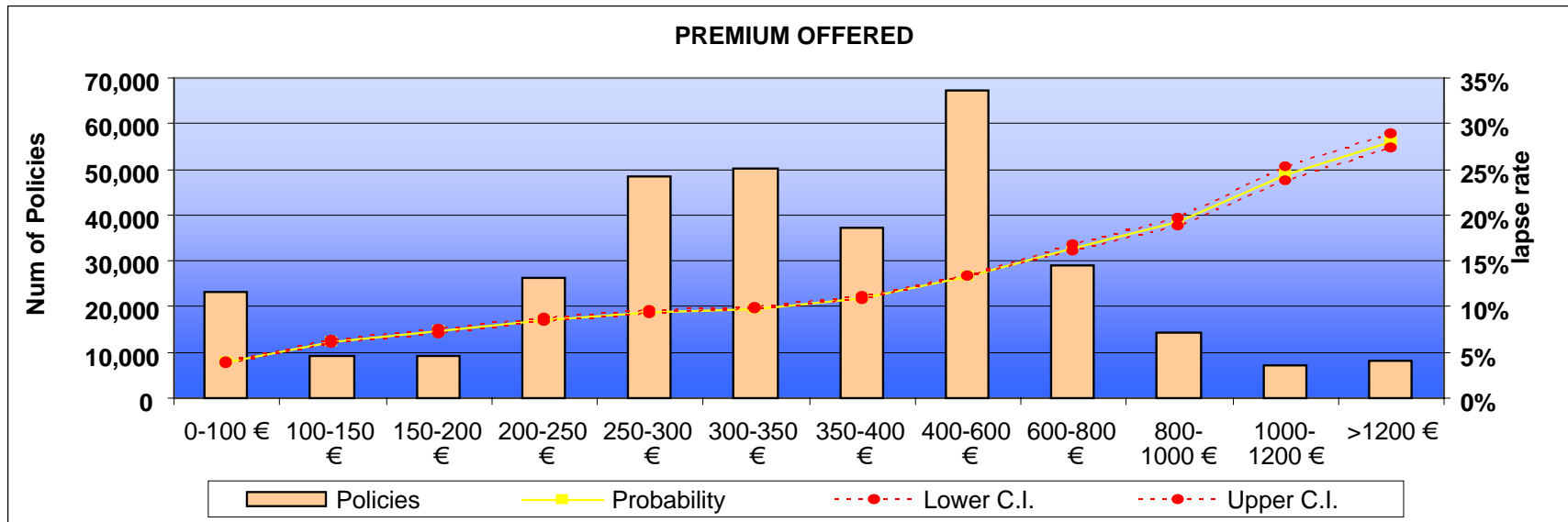
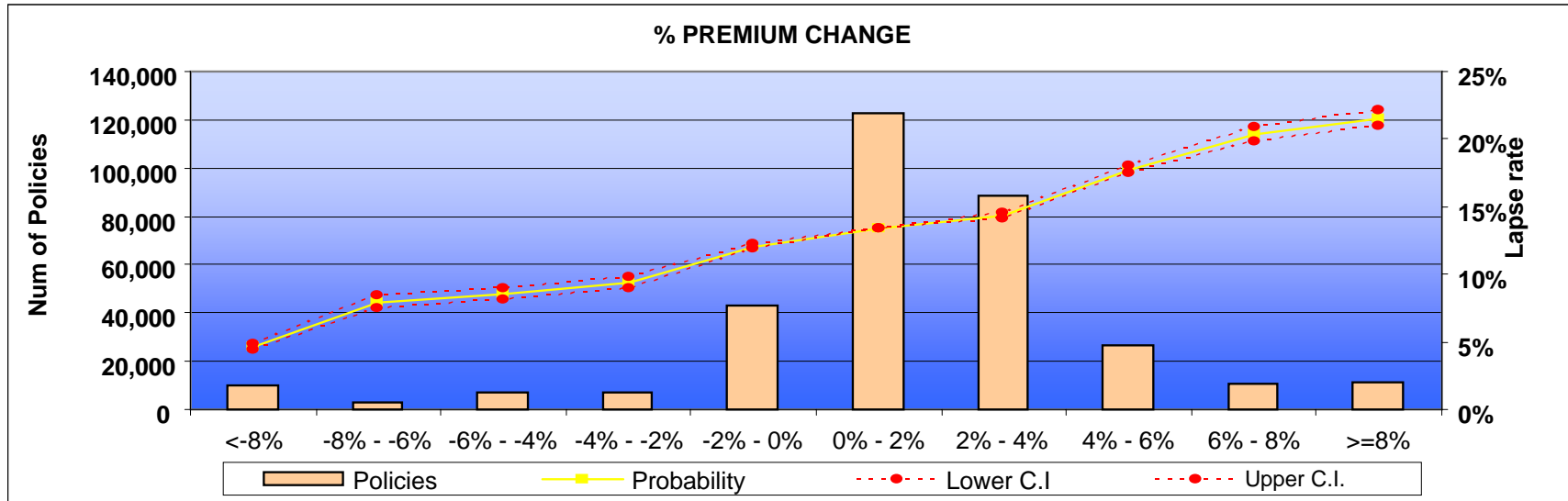
Lapse probability=  
 $Xb/(1+(Xb))$  13.4%

Renewal probability=  
 $1-Xb/(1+(Xb))$  86.6%

# Customer price elasticity Results - Elasticity curve

Illustrative example

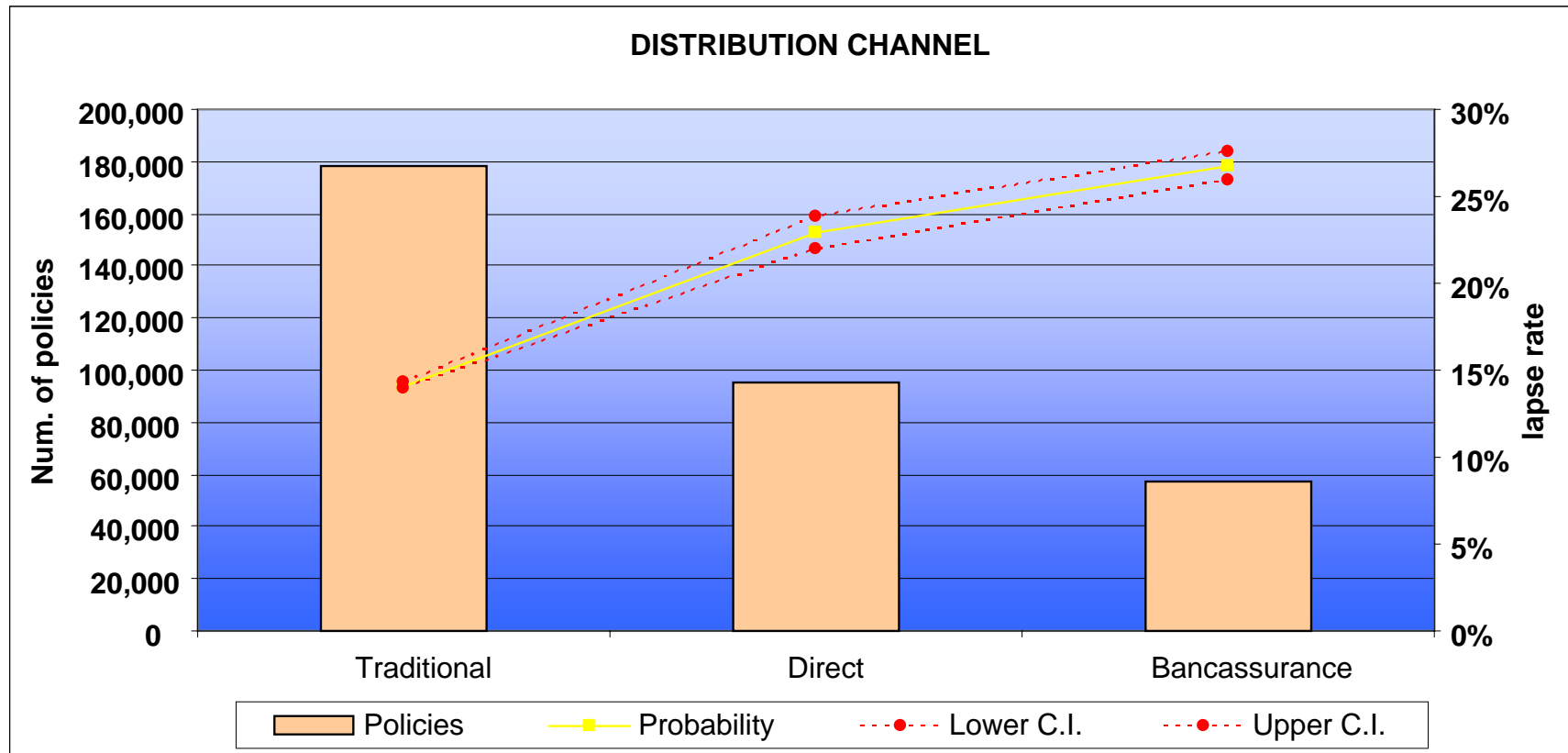
## Step 5



# Customer price elasticity Results - Distribution Channel

Illustrative example

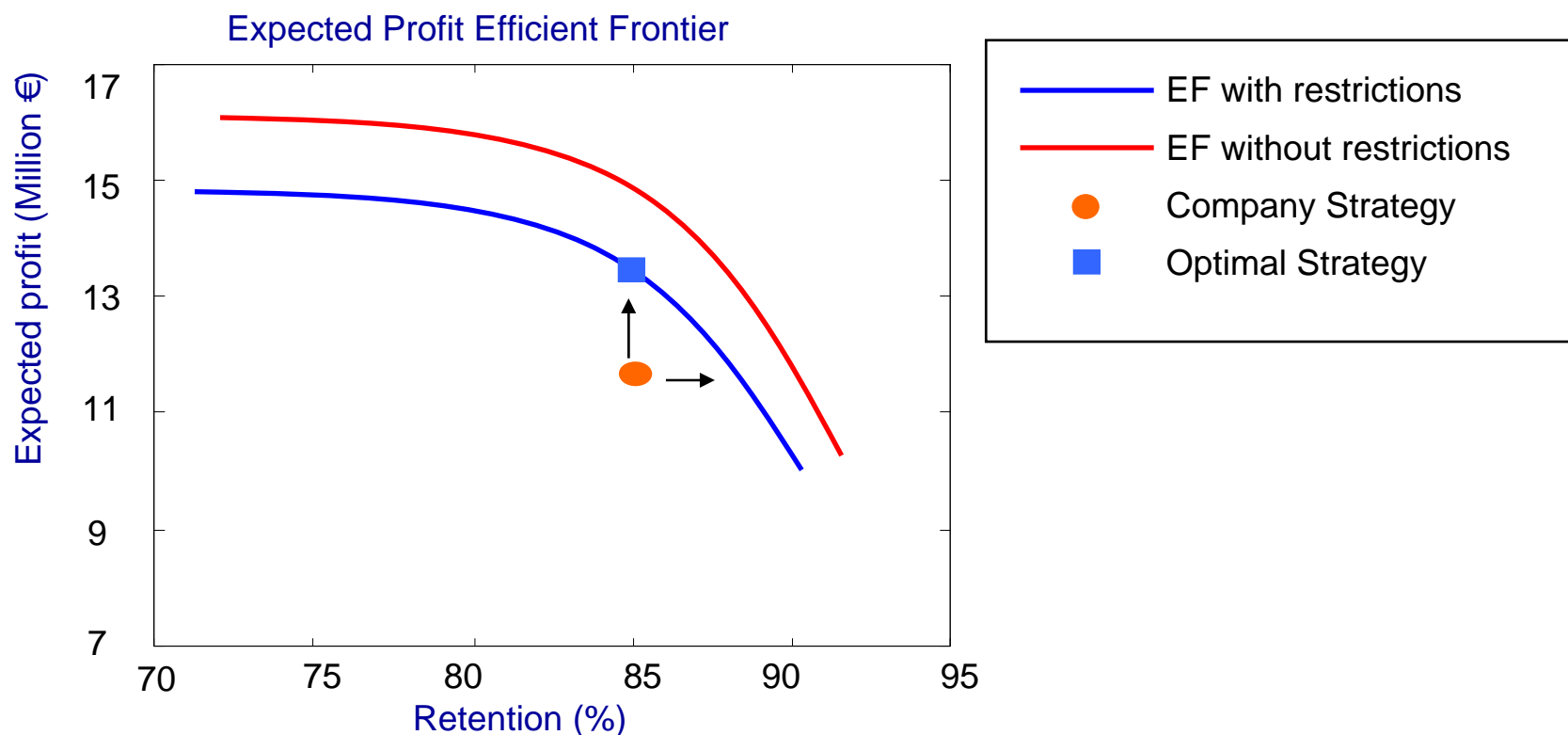
## Step 5



## Optimization

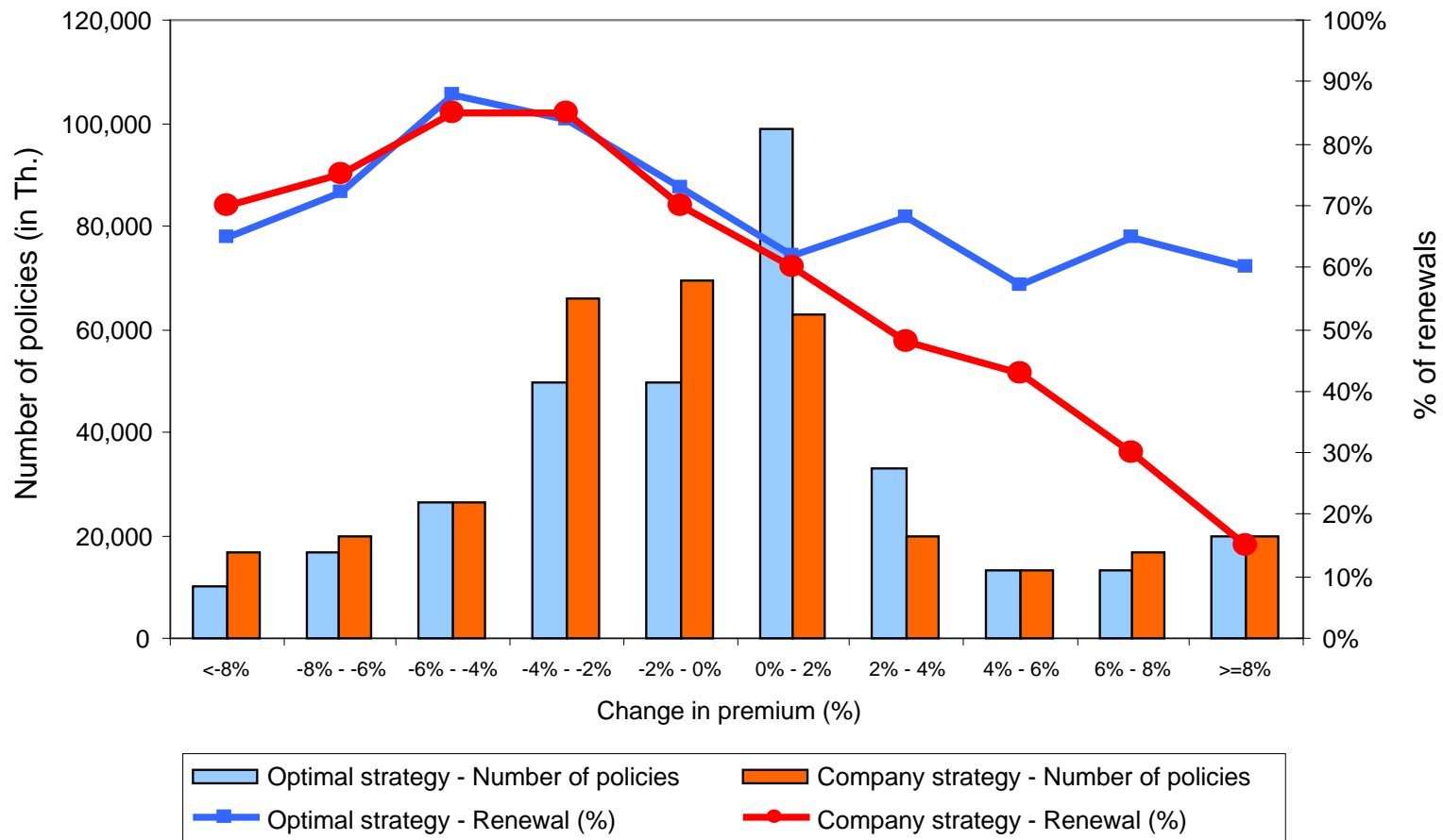
### Step 6

- 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 maximising profitability subject to a certain volume of business



- Comparison of company and optimized pricing schemes

### Price Strategy Comparison

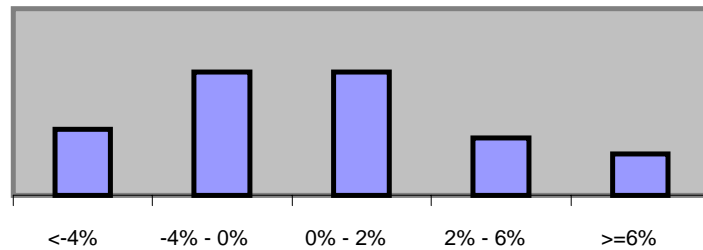


# Optimization

## Step 6

Distribution of premium changes

Optimal



1.2%

Average  
Premium  
Change

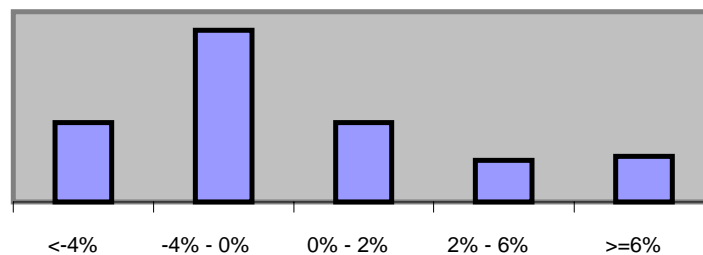
Retention  
Rate

85%

Expected  
Profit (million)

13.8

Company



0.5%

85%

11.2

- Optimized rates can be implemented in different ways:
  - a) An algorithm that calculates the optimised 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
- Given the IT investment, lead time, and other operational considerations that need to be made for option (a), our current recommended approach for the company is (b)





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## Price Optimization: The next challenge

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The insurance industry is highly competitive and maintaining underwriting profits will continue to prove a challenge for everyone, whereas improving profitability through efficiency and cost reduction are more difficult, pricing management presents the best opportunity for a company to improve its profitability and OPTIMIZING PRICES is the next step.

## Conclusions

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- **Advanced statistical techniques** will be necessary for **managing a portfolio**:
  - Selecting profitable customers, leaving unprofitable ones to competition
  - Implementing gradually to reduce market disruption
  - Maintaining benefits over time
  - Providing a solid basis to monitor the portfolio
- It is possible to **grow market share** without **compromising profitability**
- **Stay ahead of competition!**



**TOWERS  
PERRIN**

