



**TOWERS  
PERRIN**

TILLINGHAST

# The last thing a fish notices is the water in which it swims: Competitive Market Analysis, an example for motor

---

## **2007 ASTIN**

22 June 2007, Orlando

Alessandro Santoni

Bob Sanche

Eduard Folch

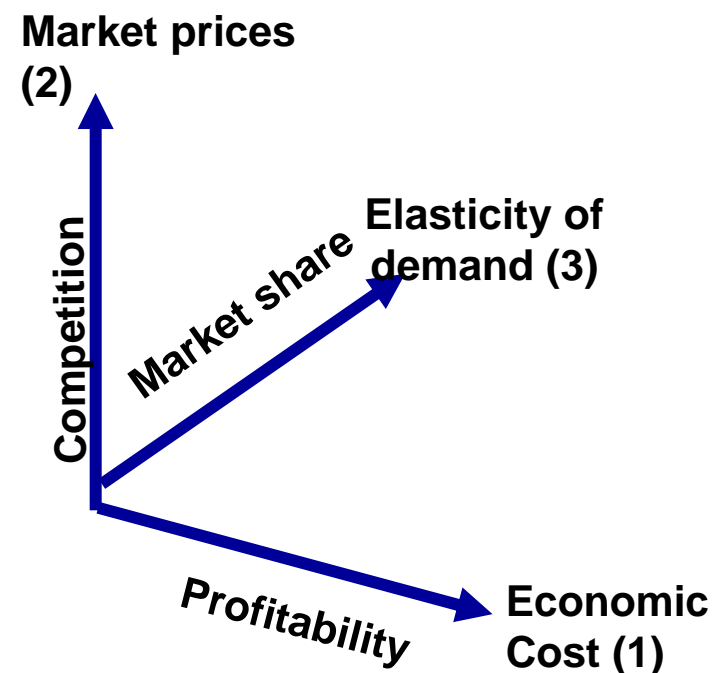
# Agenda

---

- Introduction
  - Why CMA?
  - The CMA process
- One way Analysis
- Tree based methods
- Multiway Analysis
- Conclusion

# Major European players are successfully using innovative pricing tools to understand market dynamics and develop pricing strategies

- Insurers have traditionally used a technical pricing approach (costing) in personal lines, US rating plans generally allows less cross subsidies and target niches more granularly than European Insurers
- Costing and cross-subsidies remain critical
- **But costing is only the first step** in the pricing process
  - Competitive positioning
  - Market dynamics
  - Constraints given by regulators and distribution channels
  - Customer behaviour and lifetime events
- **Several insurance companies have exploited these dynamics to enhance profitability and grow market share - we call this Price Optimization Management**



## Why CMA?: It is not sufficient to know the "correct price"; optimal strategies also require knowing the market price

- Given the increasing complexity of rating algorithms, assessing competitive position by comparing a few insurance quotes is not enough and may be misleading.
- **This presentation outlines a structured, analytical approach to assess an insurer's competitive position**
- And how these analyses can be implemented in a pricing process
- CMA provides answers to the following questions:
  - What is my average overall premium compared to my competitors?
  - Which are the market segments with the highest/lowest competitive intensity and what is my positioning for customers falling into these segments?
  - Who are my direct competitors in these segments?
  - In which segments are insurance companies fighting most to gain market share?
  - In which segments am I particularly expensive or inexpensive?
  - **And finally: How to transform this information into rating actions!**

# The process of assessing competitive positioning and market dynamics

**What data?**



**Which customers?**



**Competitive position assessment**

- Define the reference market:
  - Number and nature of competitors (traditional, direct players, other distribution channels)
  - What product to include in the analysis
  - Adjustments?
  
- Define the portfolio of customers: Target portfolio, portfolio in force, market portfolio
- Define the tariff: New business/ Renewals
  
- **Assessment of competitors' tariff structure**
  - Output: Identification of Best Practices, innovative variables, "Market" cross subsidies
- **Quantitative benchmarking:**
  - Output: Market segments where my price is in line, above or below my competitors, overall and analysis by rating factors (one way/multiway)
- **Product Benchmarking:**
  - **Output:** Identification of Best Practices, threats/opportunities analysis of terms and conditions

# What is Competitive Market Analysis in practice?

---

- CMA analysis is particularly effective under the following conditions:
- The product is treated as a commodity, with no guarantees or quality-of-service differences to differentiate competitor products.
- Premium rating structures are publicly available, and the actual premium charged by agents/brokers does not differ substantially from the rating book. (Discounts granted by agents can be as much as 30% for certain coverages.) It is possible to estimate agent discounts (through mystery shopping, for example) but the degree of accuracy is somewhat impaired.
- Competitor rating plans are based on known rating factors applied multiplicatively without caps or floors, and there aren't variables such as number of customers who have requested quotes, time of day, or quotes given before, during or after TV advertising.

# What is Competitive Market Analysis in practice?

- CMA involves obtaining premium rates charged by insurer's competitors and "attaching" these premiums to each customer in the reference portfolio.
- From this database, produce one way and multiway analyses
- Provide a comprehensive picture of company's positioning against market
- Important to consider large portfolios of risks, significant variables and interactions
- Simple comparison on rate relativities is not enough
- Interpretation of assumptions and adjustment are necessary
- Not a trivial exercise
- **Qualitative assessment of rating structure and product offering**
- **Comprehensive picture of your strategic positioning, opportunities and threats going forward**
- Results used by top management and field management in the tariff making process and to liaise with distribution channels

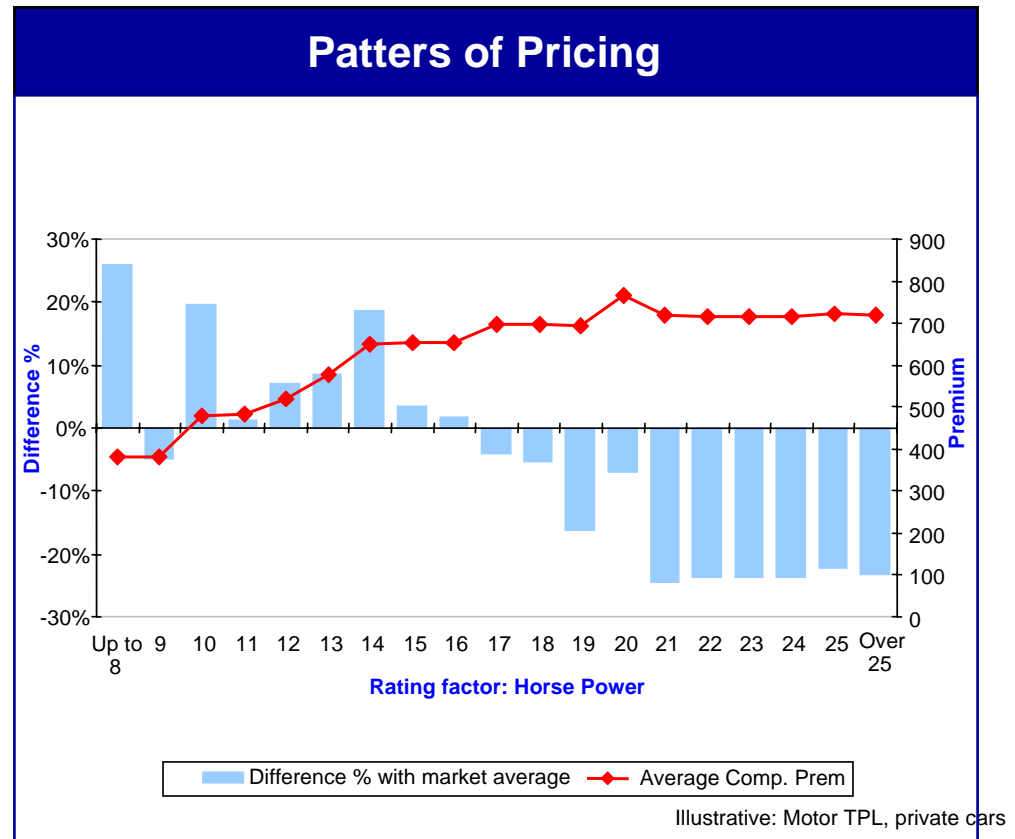
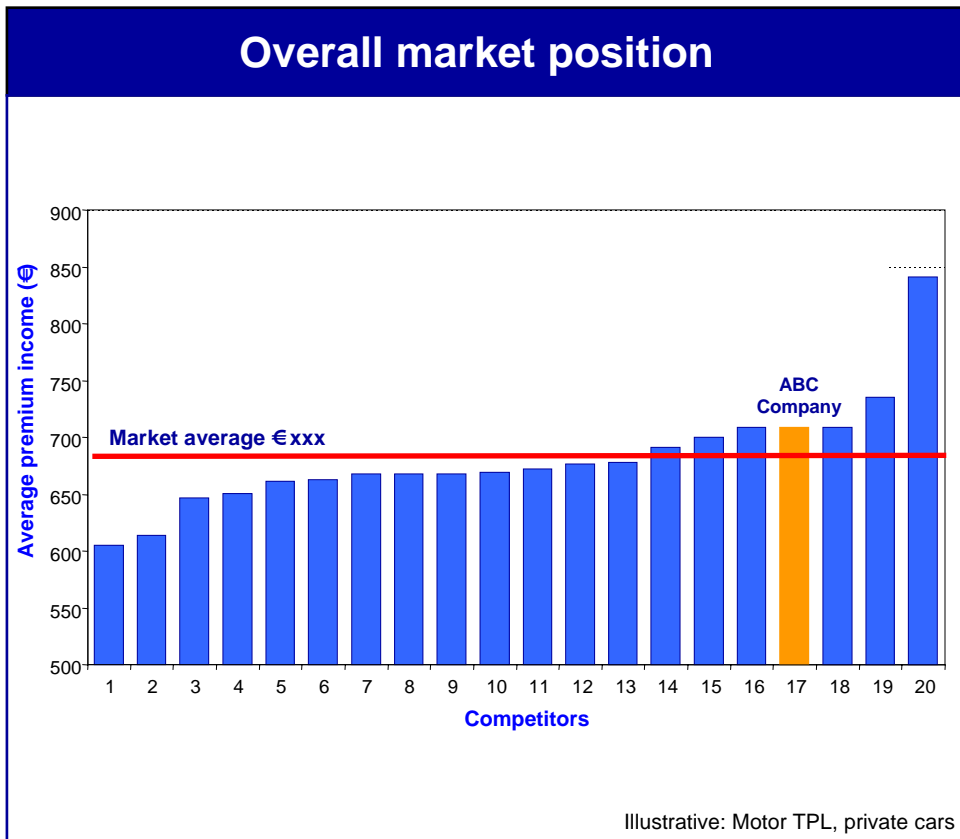
# Agenda

---

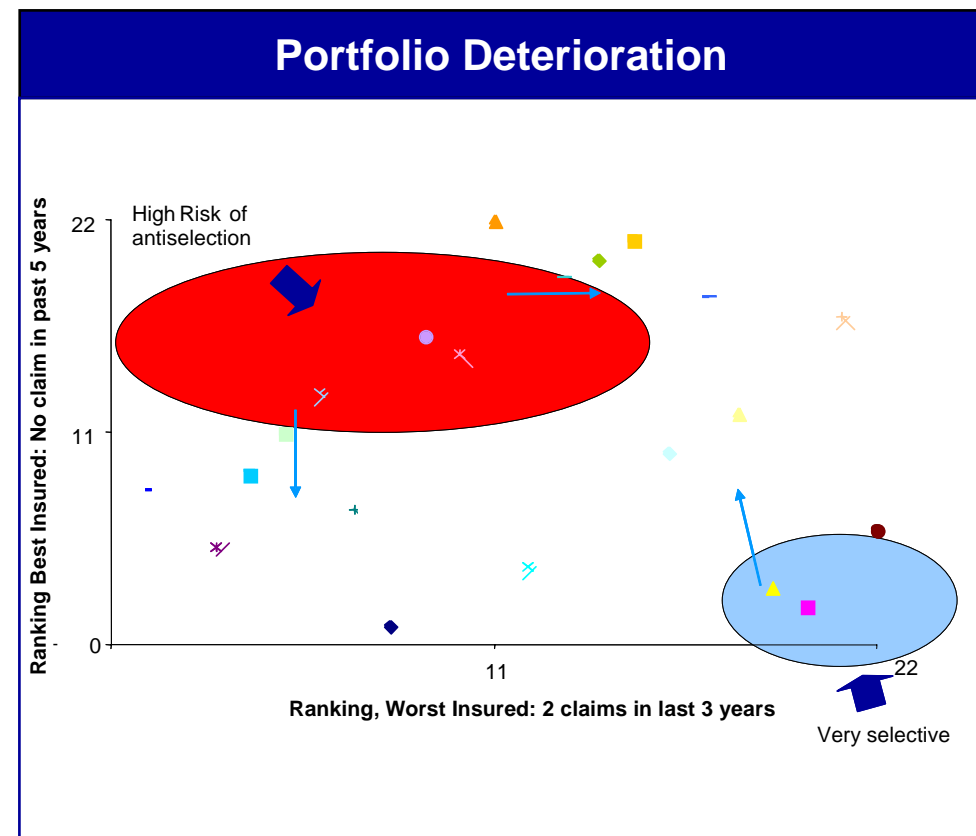
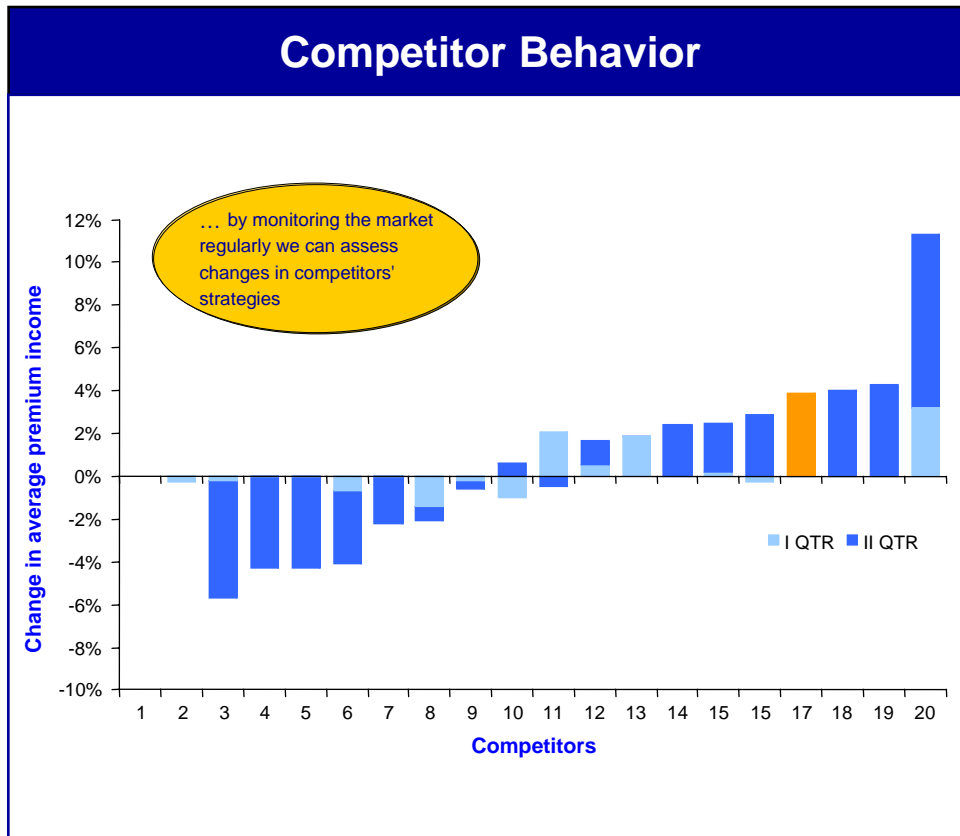
- Introduction
  - Why CMA?
  - The CMA process
- One way Analysis
- Tree based methods
- Multiway Analysis
- Conclusion

Begin with a view of your overall market positioning and identification of competitors, look for patterns of pricing above or below the market

ILLUSTRATIVE



And over time, track the competitor behaviour identifying who is going to experience a portfolio deterioration



# Agenda

---

- Introduction
  - Why CMA?
  - The CMA process
- One way Analysis
- Tree based methods
- Multiway Analysis
- Conclusion

## Tree-based methods are particularly suited for analyzing data with the following characteristics

---

1. The partitioning of the relevant variables is disjunctive; therefore, an observation cannot belong to two categories at the same time.
2. The independent variables can be either categorical (e.g., ZIP code) or continuous (e.g., age).
3. The nominal response can have more than two levels (e.g., nine competitiveness-price clusters).
4. There is non-additive behavior between the predictors and the response.
5. There are complex interactions between the predictors and the response.

## Tree-based methods are suitable for both regression and classification problems

---

- Regression trees

If driver age  $\leq 25$  and type of vehicle = small car, then

Price difference to market average = -10%.

- Classification trees

If driver age  $\leq 25$  and type of vehicle = inexpensive car, then

price by competitiveness cluster = Low intensity of competition/High price.

- The CMA example that follows in the next section is a classification tree. The process to create a tree is called recursive partitioning, which is a top-down algorithm.
- The decision trees are constructed by dividing the population into different nodes repeatedly until the stopping criteria are reached.

# The key elements of decision trees are

- Split search

- Splitting criteria (Gini)

$$g(t) = \sum_{j \neq i} p(j/t) p(i/t)$$

- j and i are categories of the response variable
- p(j/t) is the probability of category j at the node t
- searches for the split that reduces the impurity of a node

$$\Phi(s, t) = g(t) - p_L g(t_L) - p_R g(t_R)$$

- Stopping measure

- If not stopped, the tree algorithm will ultimately divide the tree to achieve a single observation in each node.
- *Minimal cost-complexity cross validation pruning.* For a splitting criteria S, a penalty parameter is introduced to take into account the model complexity of a sub-tree T.

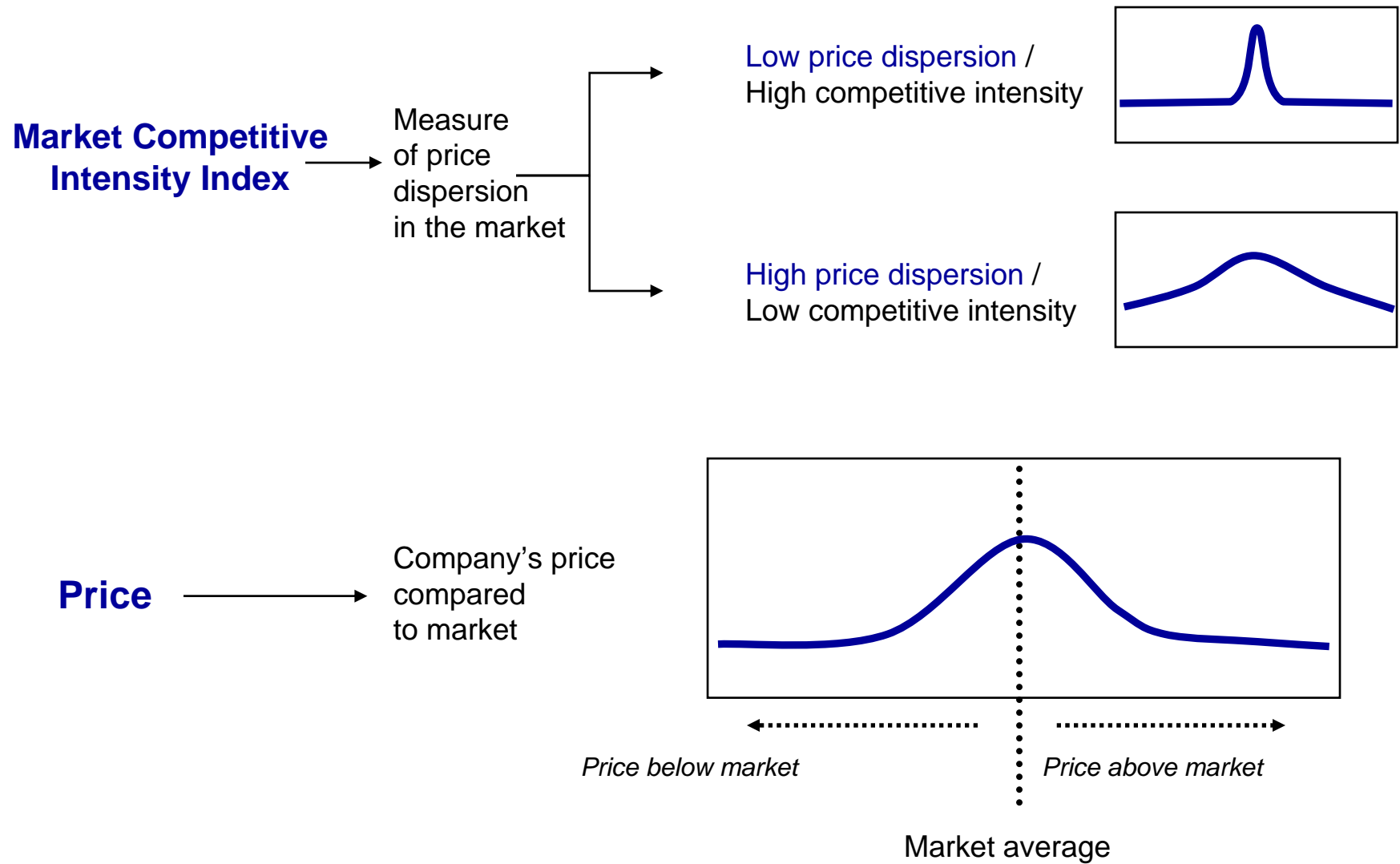
$$S_p(T) = S(T) + p \text{ size}(T)$$

# Agenda

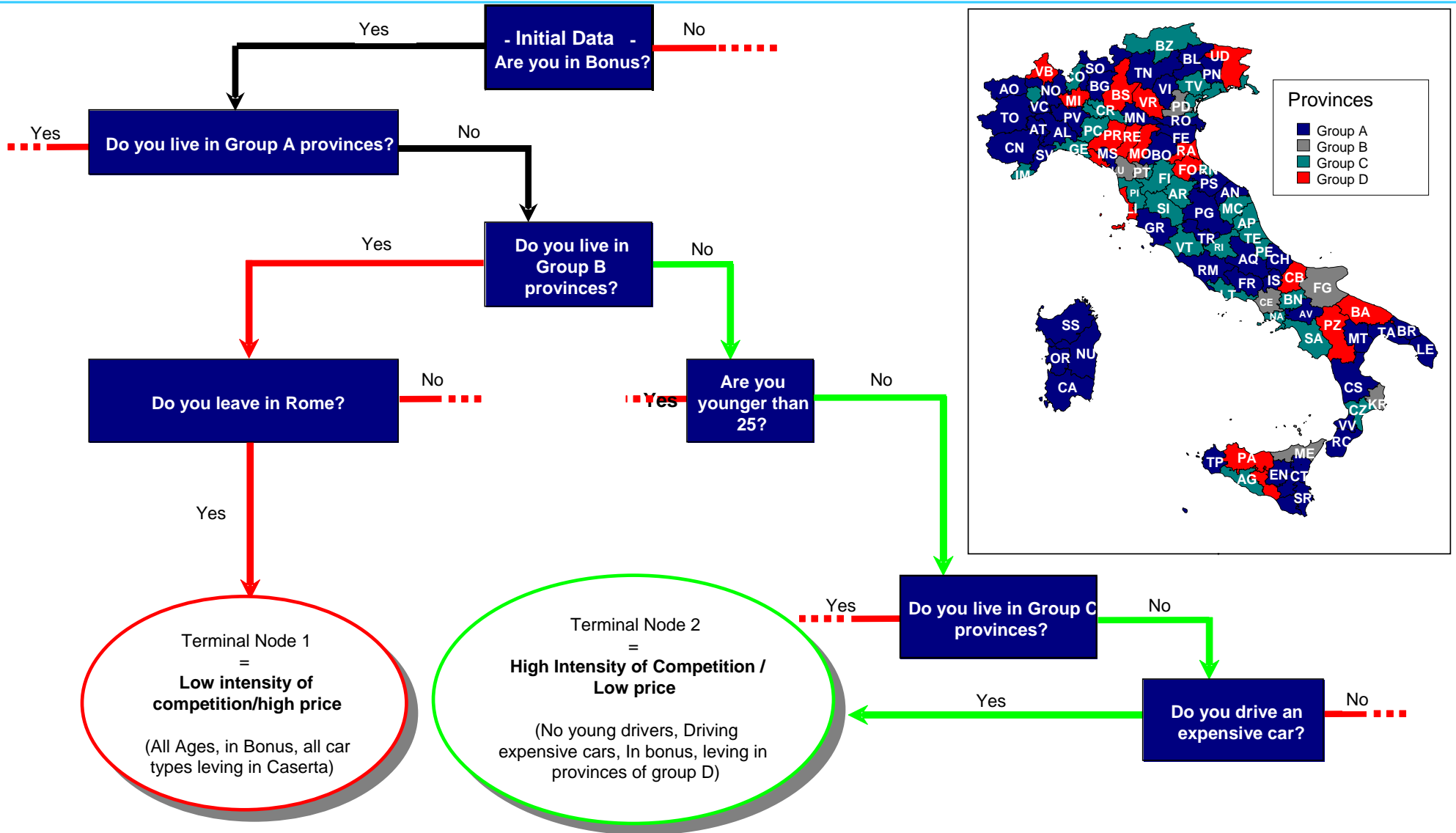
---

- Introduction
  - Why CMA?
  - The CMA process
- One way Analysis
- Tree based methods
- Multiway Analysis
- Conclusion

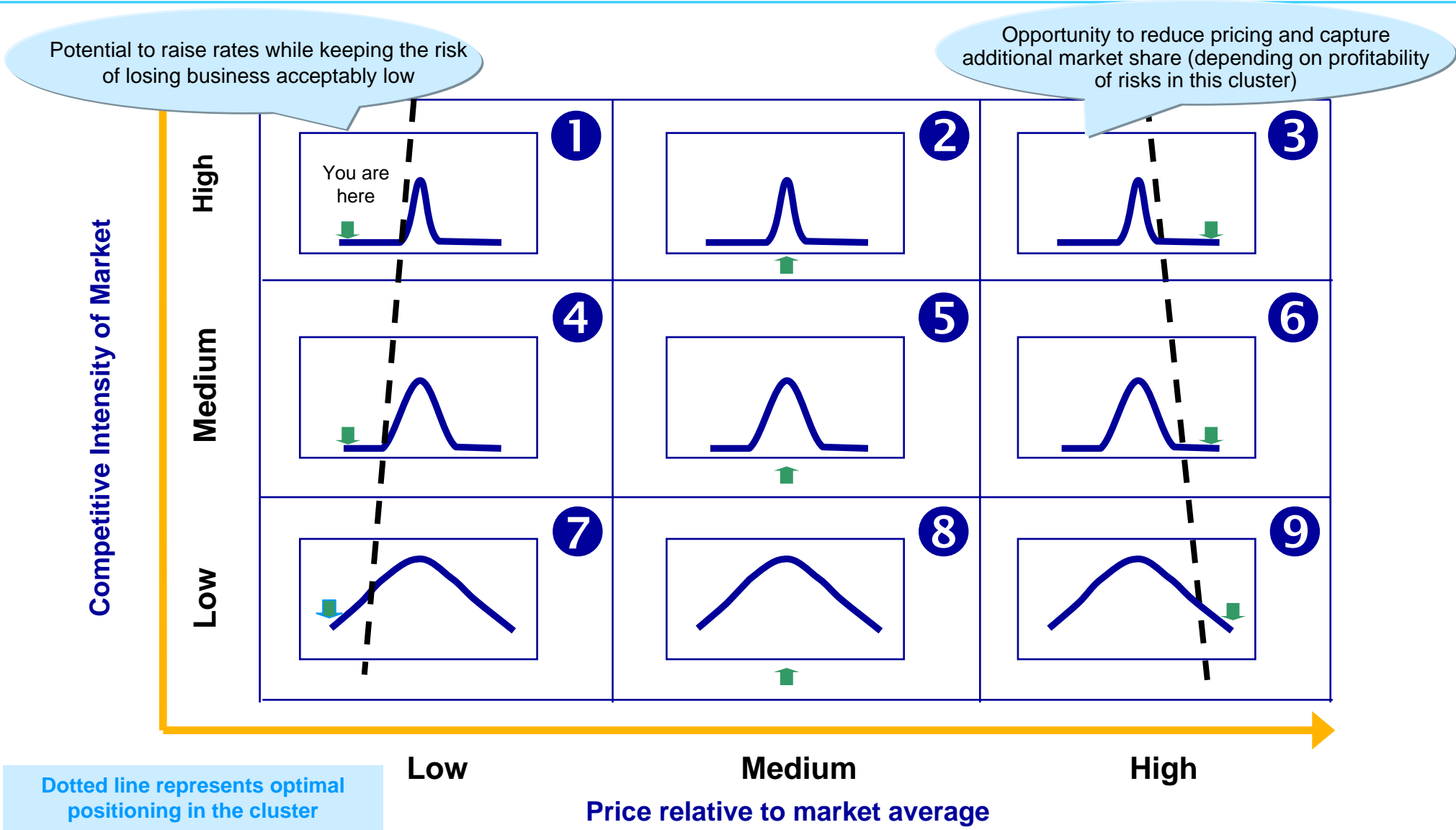
In addition to looking at the data one variable at a time, we examine each multi-dimensional rating cell for price level and market competitive intensity



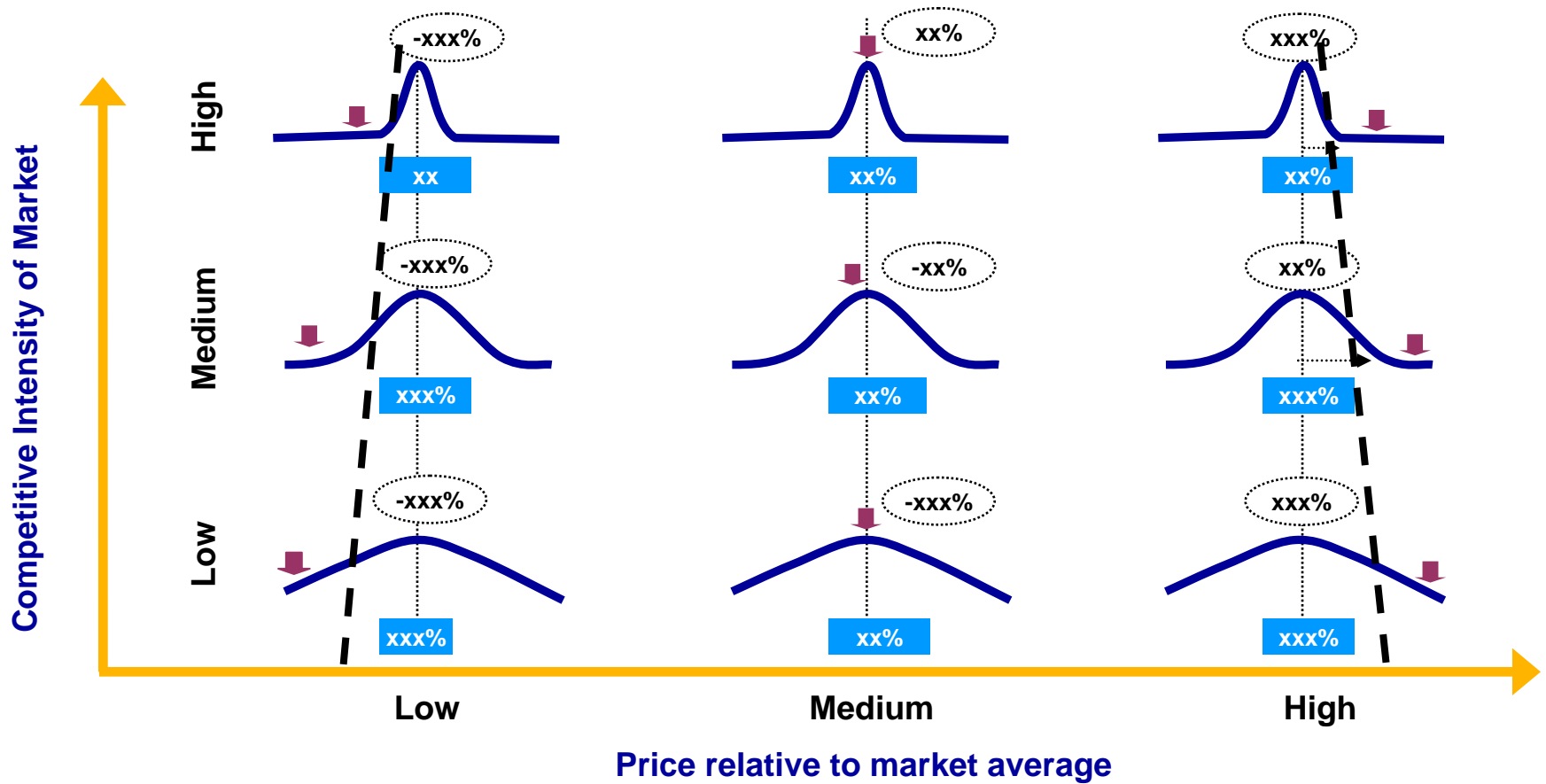
We adopt a binary partitioning algorithm to assign risk profiles to one of the 9 different combinations...



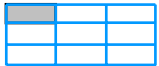
# And organize the result into 9 clusters



... and therefore suggest rating cells where competitive rating actions may be indicated



- % risks in this cluster
- % difference between company's price and market average
- Company's positioning

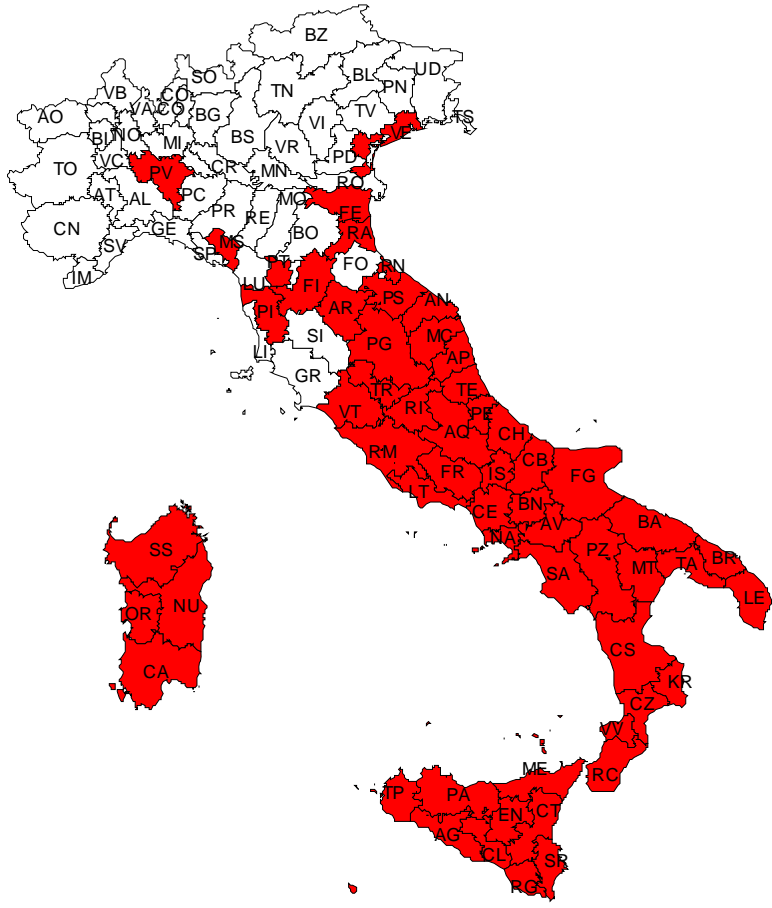


Results from this analysis allow ABC to assess the types of risks for which it is most and least competitively priced

**ILLUSTRATIVE**

Shading on map represents geographical areas that fall in this sub-cluster

Rating Variable	Values
Age	XXXX
Gender	XXXX
Other ins. Prod.	XXXX
Miles	XXX
Horse power	XXX
NCD	XXX



# Whatever ABC's competitive positioning overall, its positioning relative to individual carriers varies



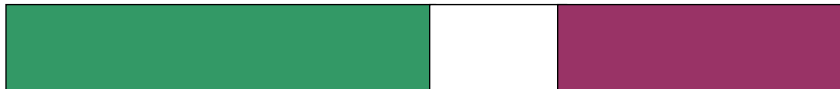
## vs. competitor 1



## Illustrative Customers



## vs. competitor 2



## vs. competitor 3



\*

# Agenda

---

- Introduction
  - Why CMA?
  - The CMA process
- One way Analysis
- Tree based methods
- Multiway Analysis
- Conclusion

# Conclusion

---

- Motor markets are increasingly competitive everywhere, and advanced statistical techniques are needed to successfully manage a motor portfolio.
- Using CMA techniques to understand and react quickly to competitors' action can bring more discipline in managing the underwriting cycle and articulating a strategy to "survive the next soft market"
- CMA and the integrated approach to pricing have been adopted by insurance companies to grow market share without compromising profitability.
- **In the near future we will see more and more companies adopting the approach we describe. First movers will, however, have a considerable advantage.**
- Implementing CMA and Price Optimization could lead to drastic changes to the current rating plan and "unpopular" decisions for the distribution force, **implementation and managing the change are keys to success**