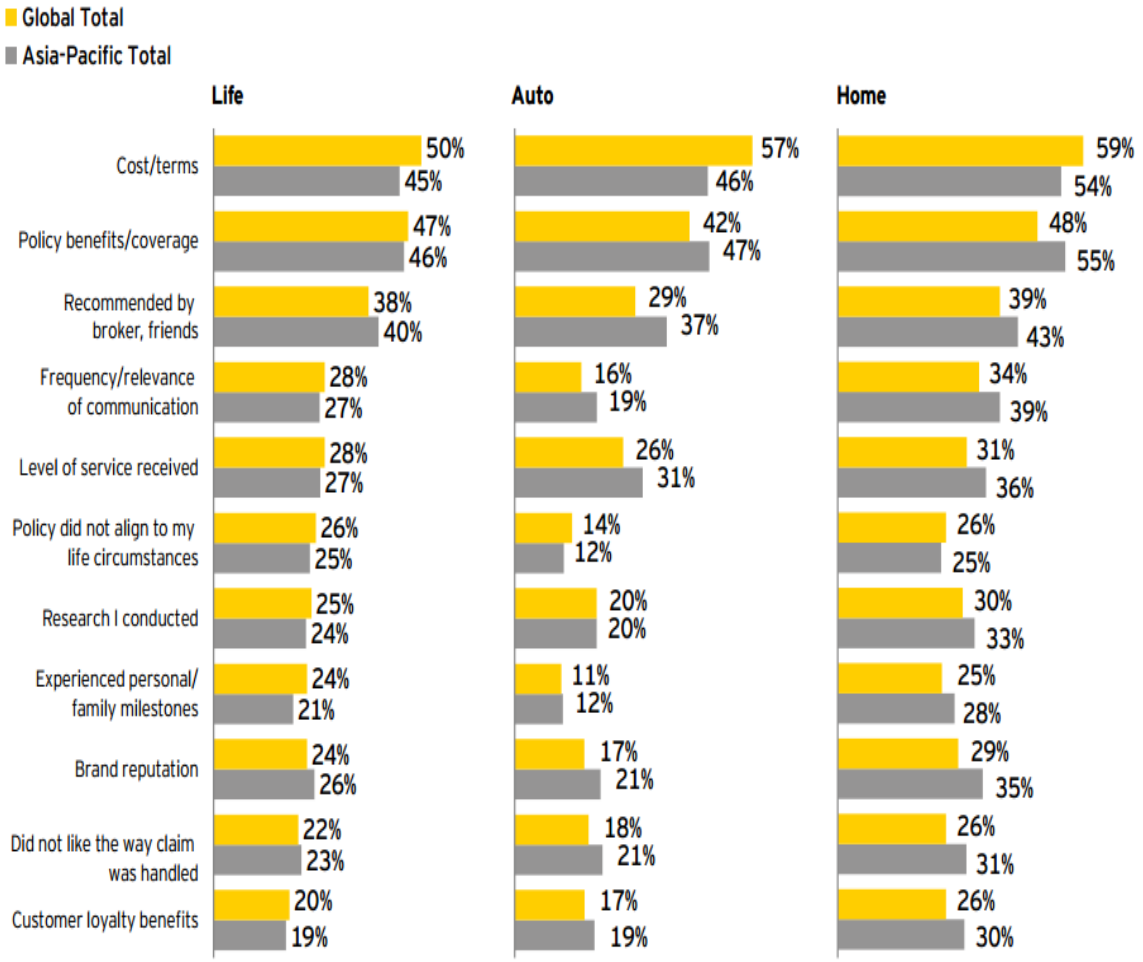
Price Optimization in Motor Insurance

28th May 2015

Building a better working world

Price – A main reason for customers to switch provider!

Top Reasons for closing or replacing a policy

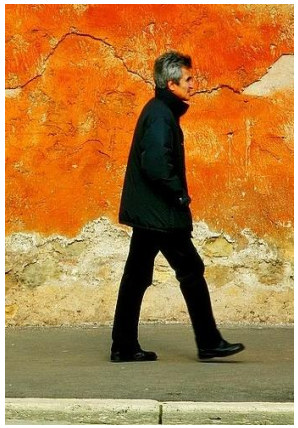


Source: EY Customer Survey, 2014

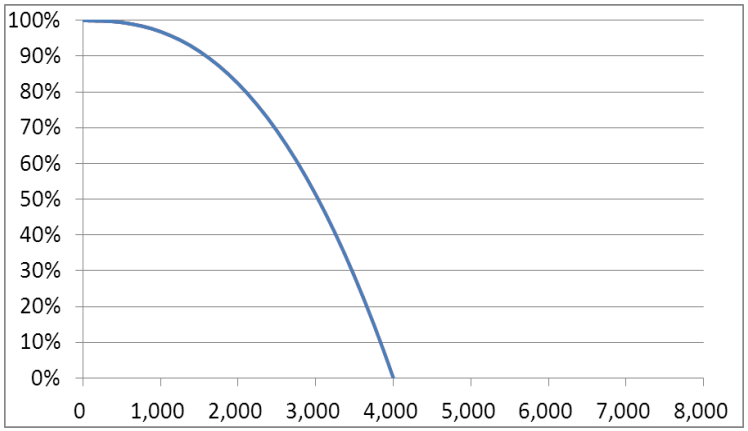
Is it all about price?

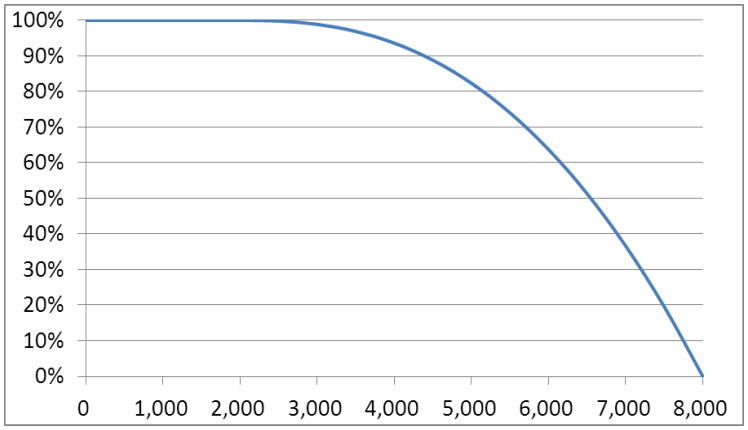
- Price is the most important factor while buying an insurance policy
- In the highly competitive environment, increase of price results in the loss of market share
- Customers are eager to change their insurance provider, if the price offered by competitors are lower
- Product coverage is the second known reason for switching out
- There are many other reasons why customers choose to change provider as Policy benefits, recommendations from brokers,service quality,etc.

Demand Modeling: Strong Premium interaction

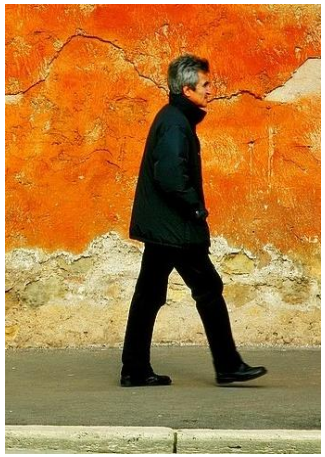


Conversion Likelihood against Premium





Price Optimization – Scenario I



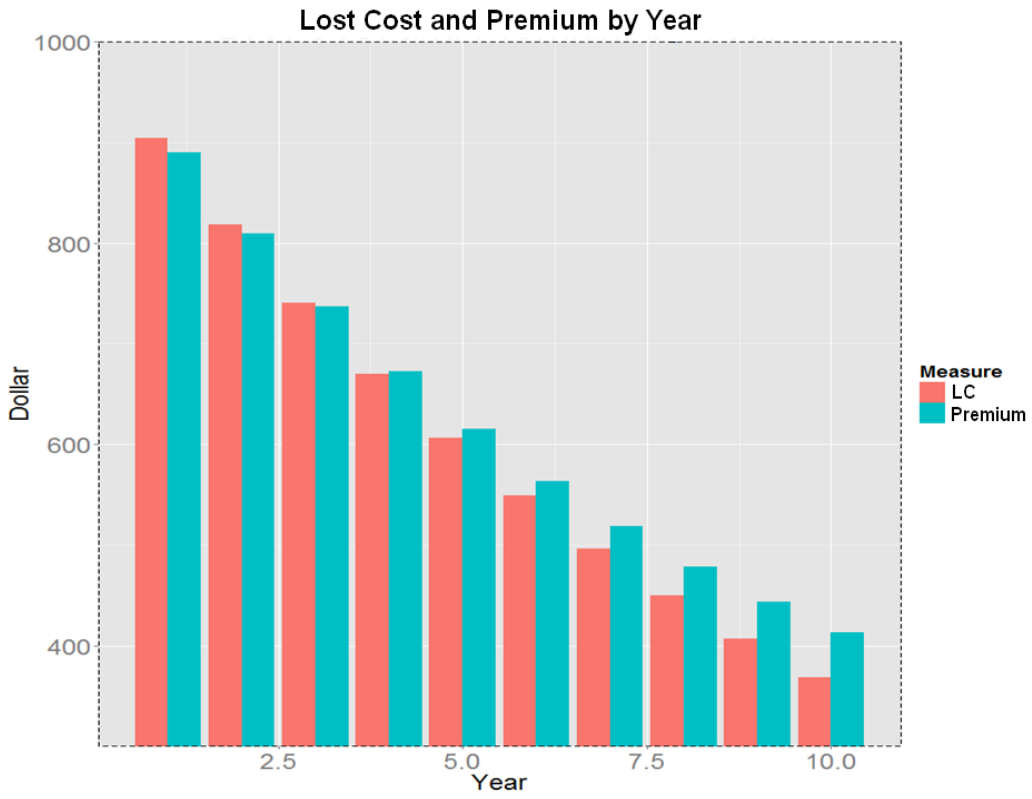
Break Even Premium = $ 1,200

Company A: $ 2,000
Company B: $ 2,500
Company C: $ 2,200

Optimal Price = $ 1,900

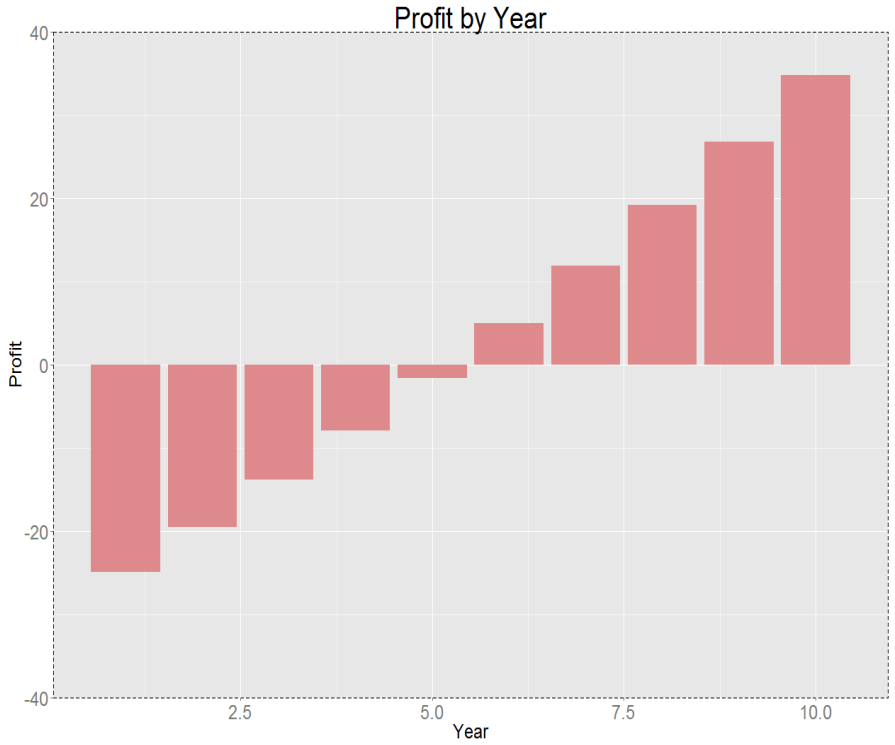
Price Optimization – Scenario II

Loss cost usually decreases as policyholder ages (reversal may happen at the tail)



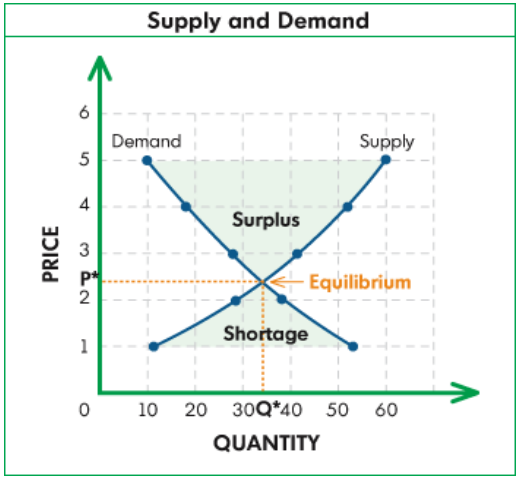
Price Optimization – Scenario II

The initial loss that secures the conversion of customer can be beneficial



Demand modelling
Understanding Competitive Edge

- In competitive market, commodity price and quantity are decided based on the demand (competitive edge) and supply (cost).



- In traditional actuarial pricing, premium is solely based on the cost.

$$\text{Premium}_i = \frac{\text{Loss cost}_i}{1 - \text{Variable expense} - \text{Profit margin}}$$

$$\text{Premium}_i = \frac{\text{Loss cost}_i + \text{Fixed expense}}{1 - \text{Variable expense} + \text{Profit margin}}$$

$$\text{Premium}_i = \frac{\text{Loss cost}_i + \text{Fixed expense}_i}{1 - \text{Variable expense}_i + \text{Profit margin}}$$

- If a policyholder is willing to pay $2500, why would you charge $1500? Just because it is the cost? Or because you don't know their demand?
- In hotel and flight, demand modelling is considered the most important piece of intelligence!
- A big opportunity is available to insurers if we are able to incorporate the intelligence of customers' demand into the pricing algorithm.

What is Price Optimization

Price Optimization is:

Optimizing certain objectives by tempering the price offered

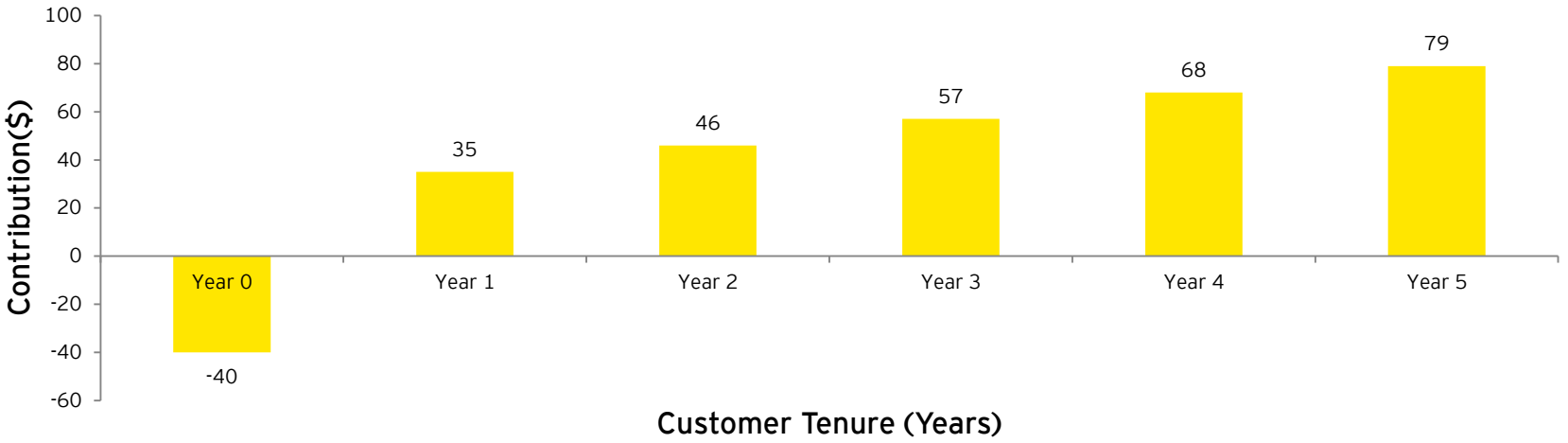
- More Profit
- More Volume
- More Retention
- More Cross-selling

Price Optimization is not:

The only way nor the best way for some objectives.

- Customer's satisfaction
- Comprehensiveness of Product
- Social reputation

Price optimization can be in a long horizon

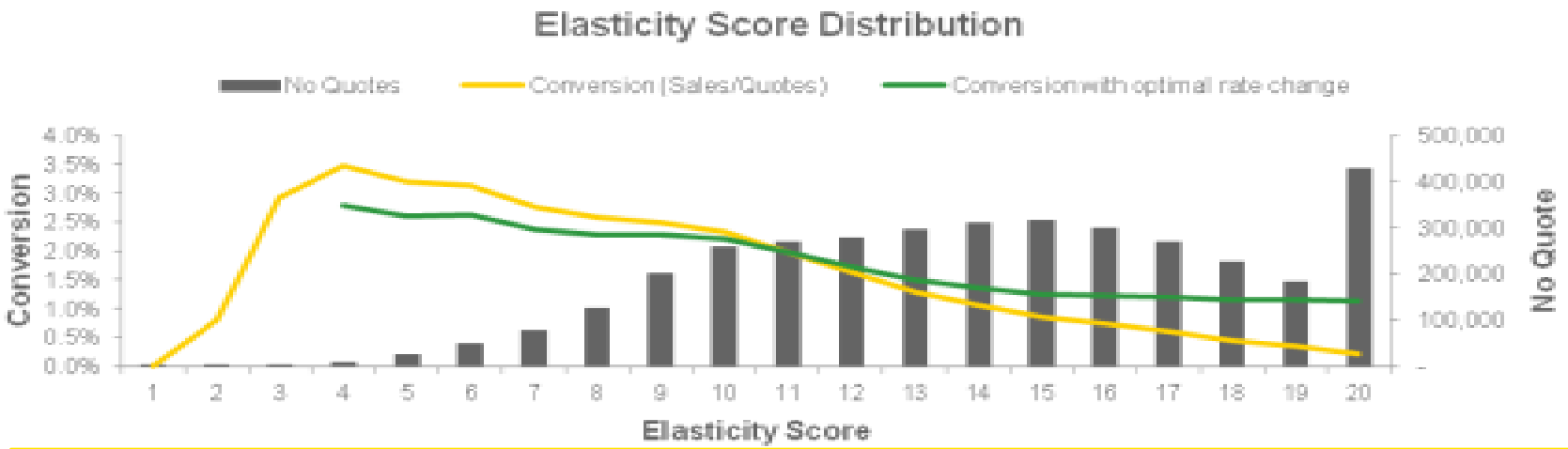


- We can also go beyond single policy period framework
- It can be an optimal decision to make a loss in the first year and recoup the profit later on.
- By expanding the time frame of any business case, senior management can make a more informed decision on which initiative is more beneficial to the company.

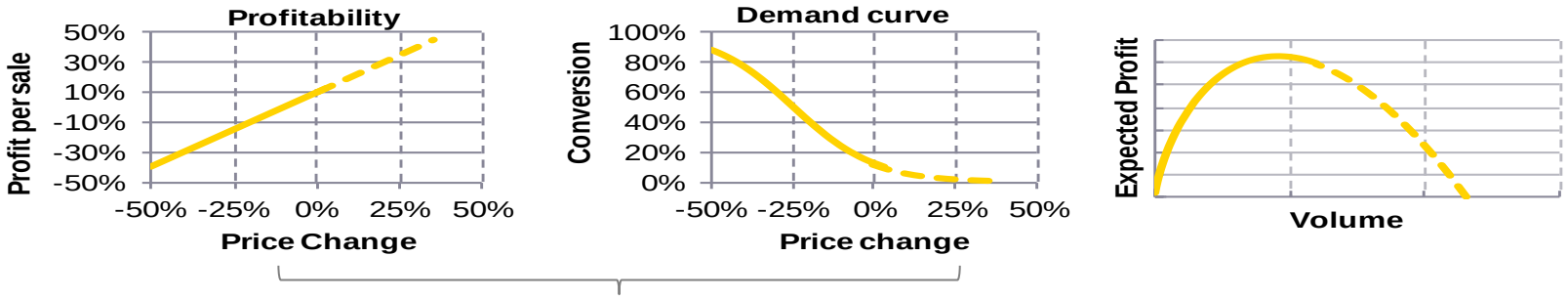
Why price optimization

- Price is the most important metric to both insured and insurers.
- Personal Lines pricing 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
- Acquiring new business is costly. Insurers want to make sure they are attracting risks that will stay long enough to cover the acquisition cost

Price Optimization Visualization



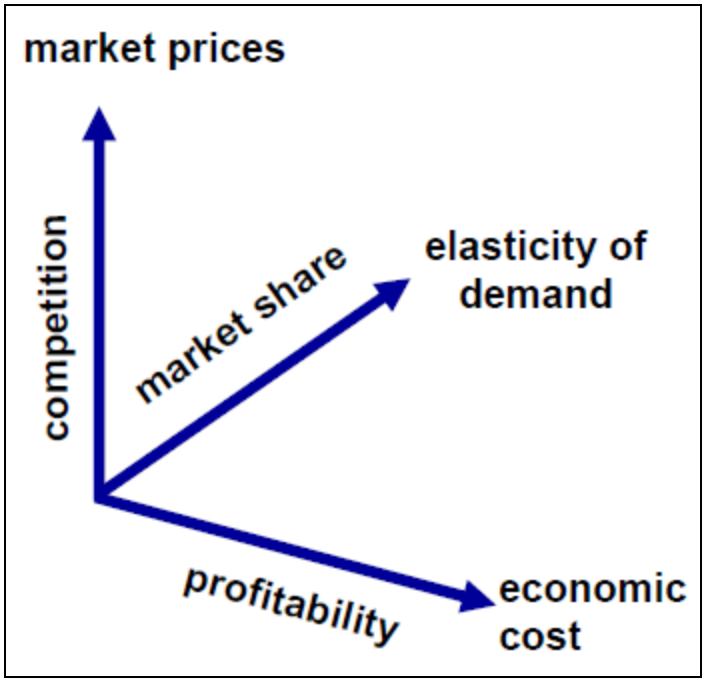
The above diagram shows the price elasticity of conversion rate for customers in various segments. A score of 5 means that there is a change in the conversion rate by 5% for every 1% change in price



The diagram on the left shows how customer analytics is used to understand the impact on the profitability and new business volumes, ultimately to find out the optimal position

To set optimized prices we need

- **Profit (Cost) Models** which predict the net claims and other costs for different types of customers
- **Competitive Market Analysis** which provides a thorough understanding of market place in which the company is operating
- **Customer Price elasticity models** which reflect market competition and customer behaviors 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 objectives and constraints.

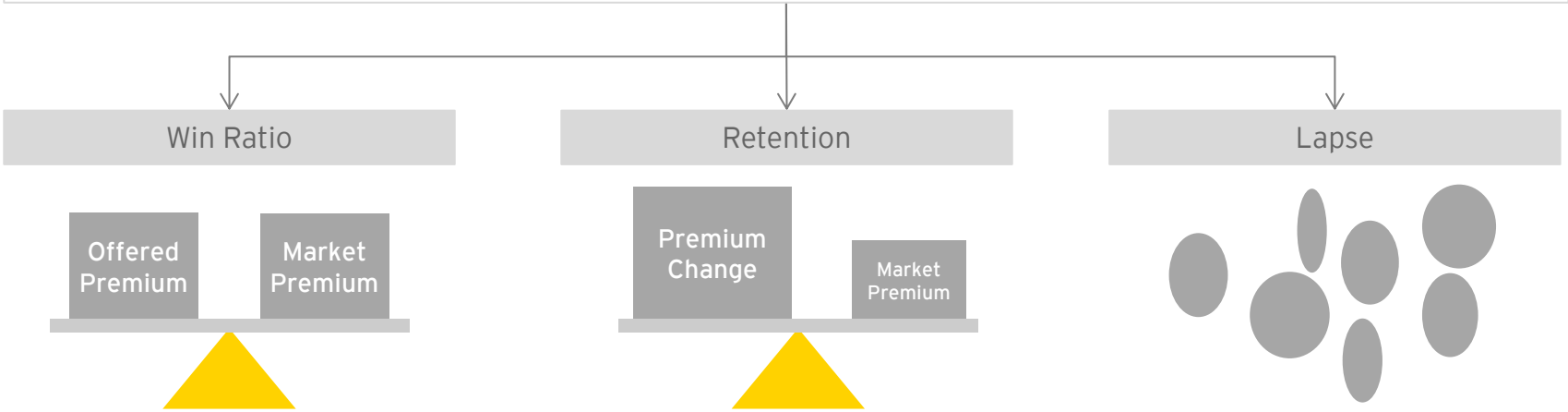


Other considerations

- Expense – by new business or renewal,
- Expense – by fixed, variables and overhead
- Regulatory concern
- Client centric optimization vs Product optimization
- Regulatory environment
- Competition

Demand Modeling – 3 Key components

Three measures relevant to demand modelling – win ratio, retention and mid-term lapse. Each behaves very differently.



- Offered premium and market premium are equally important
- Premium change is the key, then market premium
- Not as much premium related
- Unsatisfied customers

- Valuable customers are usually hard to win but they tend to stay long.
- High win ratio is not necessary a good thing
  - Cost of acquiring new business is high. E.g marketing, underwriting expense can be 4 times higher than maintenance
  - Young drivers and high risk drivers usually exhibit high win ratio, but they tend to stay short. → Transient clients
  - Should derive an algorithm to make clients stay as long as possible.

Dos and Don'ts

- **Do think about price optimization. Don't go too deep at first.**
- **Interaction of variables with Premium is critical. GLM does not assuming that by default. Searching for appropriate interaction can be tricky.**
- **The resulting pricing algorithm comes from convolutions of many modules. Do make sure the individual modules are appropriately diagnosed before using them.**
- **Do consider capping the deviation of pricing and costing differentials to gain the sense of comfort.**

Conclusion

- **Advanced statistical techniques** are available and 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!**