Conversion and Retention Modeling

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What is Demand Modeling?

- Retention Modeling

- Conversion Modeling

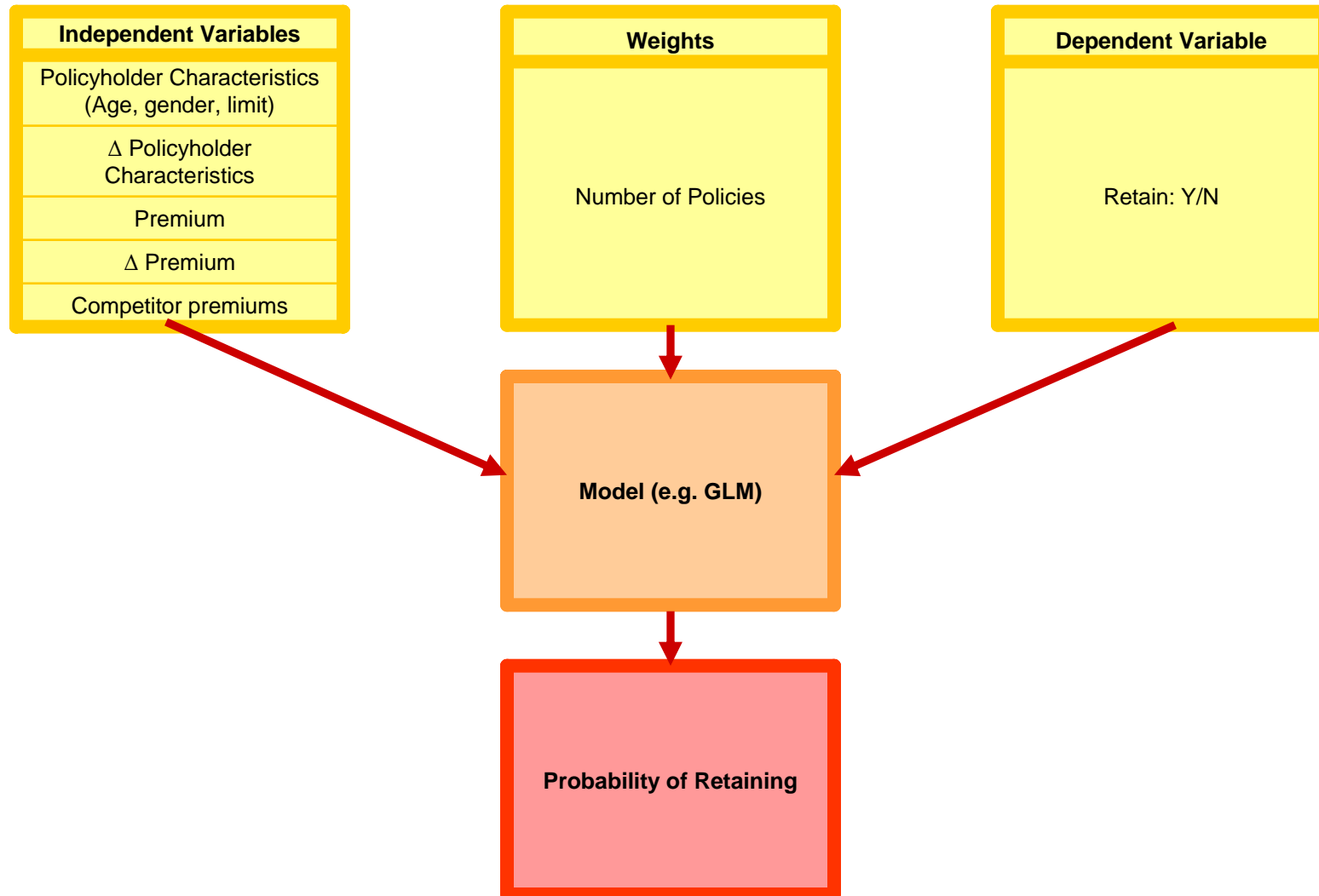- Elasticity Modeling

"Retention Rate"

Retention Rate:

- # renewals/ # offers
- # renewals/ # beginning policies
- Which policies – a cohort or just two periods of time?

Lapse Rate:

- # cancellations / # policies
- May include midterm cancellations
- May be 1- retention rate

Retention Modeling

Independent Variables	Weights	Dependent Variable
Policyholder Characteristics (Age, gender, limit)		
Δ Policyholder Characteristics	Number of Policies	Retain: Y/N
Premium		
Δ Premium		
Competitor premiums		

Model (e.g. GLM)

Probability of Retaining

"Conversion Rate"

- Also called "close ratio"

- # issues / # quotes

- Do you exclude some versions of quotes?
  - Quotes go through an iteration process
  - Trying different limits to check price
  - Adding activity later in process -> ordering MVRs

- Multiple quotes for the same person

Conversion Modeling
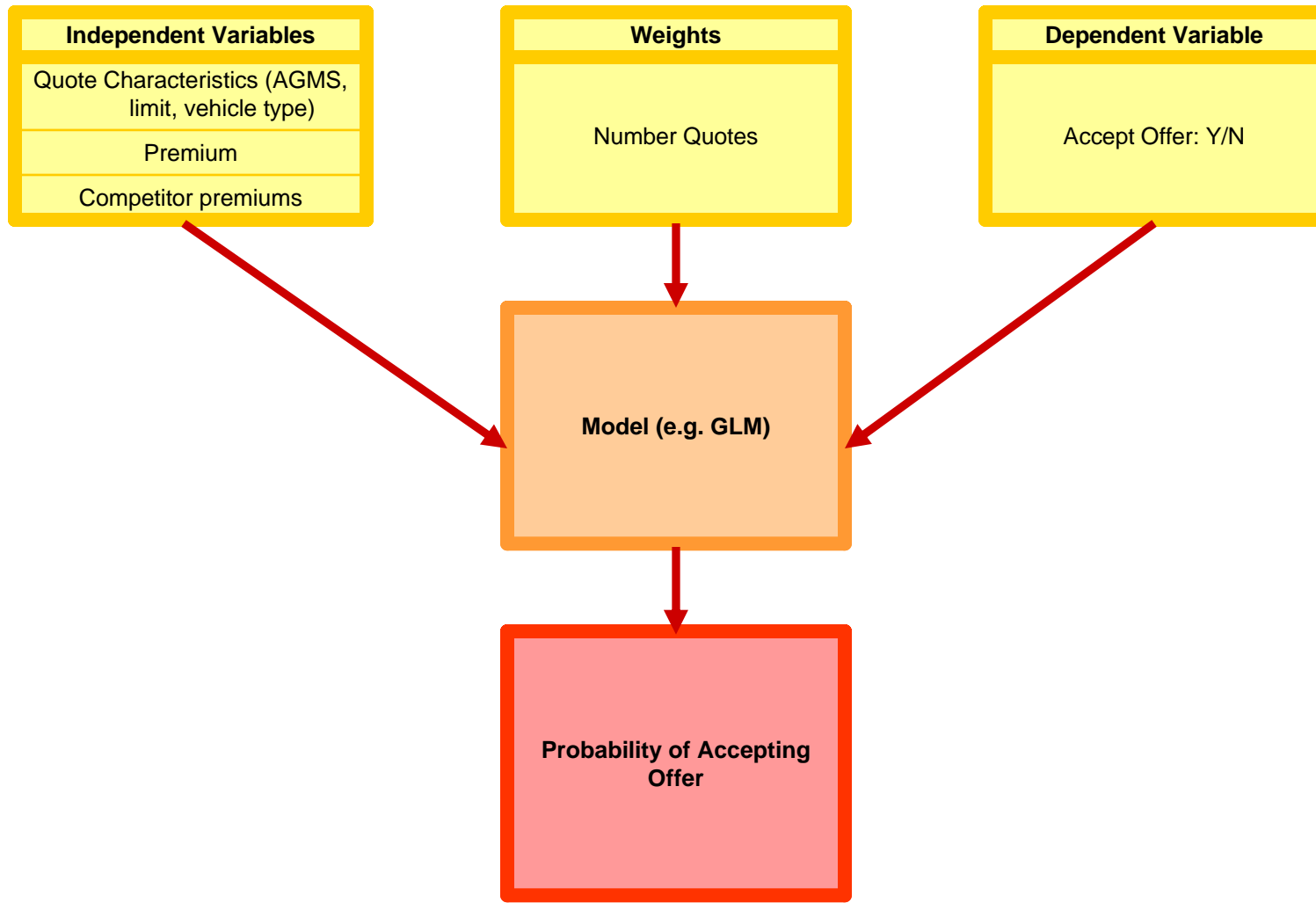
"Elasticity"

- A measure of price sensitivity

- Elasticity $= \dfrac{\% \text{ Change in Demand}}{\% \text{ Change in Price}}$

- % Change in Demand is % Change in Retention, Conversion, Cancel Rate ,etc.

Elasticity Example

- Elasticity $= \dfrac{\% \text{ Change in Demand}}{\% \text{ Change in Price}}$

- Price is reduced by 5%

- Likelihood to close increase from:
  25% to 28%

- The increase in demand is: (.28-.25)/.25 = 12%

- Elasticity = .12/(-.05) = -2.4

Elasticity Example Ctd.

- Elasticity = .12/(-.05) = -2.4

- Notes:
  - Usually expressed as 2.4 elasticity
  - Common to ignore negative sign since elasticity is generally negative
  - Positive elasticity is occasionally observed
    - Luxury goods
    - Large rate decreases

Elasticity Details

- Elasticity $= \dfrac{\text{\% Change in Demand}}{\text{\% Change in Price}}$

- Should you use % change in price or $ change?
  - Is a change of $50 worth shopping?

- Should you use % change in demand or change in number of policies sold?
  - Using % eliminates problems caused with scaling – appointing new agents, increase in marketing, etc.

Modeling elasticity?

- Predict Conversion (Retention) at two prices and calculate the slope

- Some prefer to model elasticity directly using a form other than GLM.

How can we use demand models? (1)

(1) General Business Decisions
- Changes the Discussion
- Competitiveness
- Agent Appointments
- Marketing

How can we use demand models? (2)
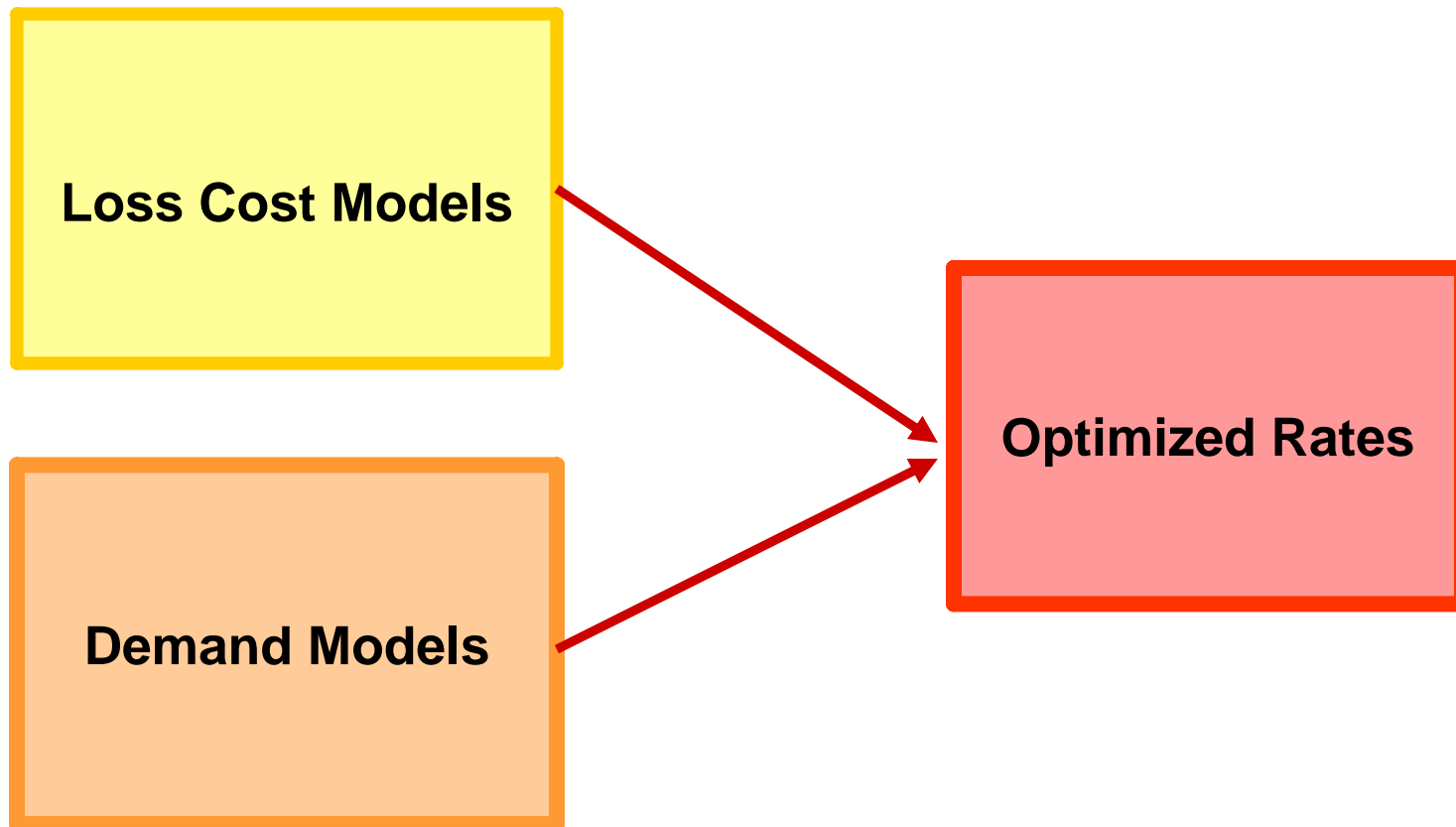
(2) Actuarial Pricing Improvement

- Trends
- Expense Allocation

How can we use demand models? (3)

(3) Price Optimization

- Lifetime value, NPV
- Capping
- Scenario testing
- Mathematical Price Optimization

Mathematical Price Optimization (1)

Mathematical Price Optimization (2)