



Scenario Testing

Example: Personal auto insurer is pursuing a 5% rate decrease in state X. An insurer would like to simulate two scenarios to help determine which one should be implemented.

- Scenario 1 5% base rate decrease
- Scenario 2 15% decrease for operators aged 25-30 off-balanced to an overall decrease of 5%

Assumptions

- Conversion/Retention Models
- Quote Growth Rate 5%
- Quote distribution constant over time
- Aging Vehicles & operators age by one every other period

		Policies Offered	Policies Written	Conversion Rate	Policies Retained	Retention Rate	Profit Margin	
Scenario 1 (Base Rate Change only)	o	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1	20,000	5,493	27.5%	4,669	85.0%	1.9%	1.8
	2	21,000	5,767	27.5%	4,902	85.0%	1.9%	1.8
	o	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scenario 2 (Targeting Ages 25-30)	1	20,000	5,646	28.2%	4,743	84.0%	1.8%	2.4
	2	21,000	5,928	28.2%	4,980	84.0%	1.8%	2.4



		Policies Offered	Policies Retained		
	o	50,000	44,000	88.0%	2.5%
Scenario 1 (Base Rate Change	1	44,000	41,287	93.8%	2.4%
only)	2	45,956	44,162	96.1%	2.3%
	o	50,000	44,000	88.0%	2.5%
Scenario 2 (Targeting Ages 25-	1	44,000	41,287	93.8%	2.4%
30)	2	46,030	44,155	95.9%	2.5%



	Period	Policies Offered	Policies Written	Policies Retained	Earned Premium	Profit Margin	Absolute Profit
Scenario 1 (Base Rate Change only)	o	50,000	50,000	44,000	\$35,250,000	2.5%	\$881,250
	1	64,000	49,493	45,956	\$34,486,258	2.3%	\$810,152
	2	66,956	51,723	49,064	\$36,412,258	2.3%	\$822,930
Scenario 2 (Targeting Ages 25-30)	o	50,000	50,000	44,000	\$35,250,000	2.5%	\$881,250
	1	64,000	49,646	46,030	\$34,729,064	2.3%	\$812,026
	2	67,030	51,958	49,135	\$36,692,114	2.4%	\$891,271



Applications

Price/Market Simulation Price Optimization

Structural Optimization

- Optimizes on the rating structure directly
- Easy to implement
- Fails to identify gaps in the rating structure
- Regulatory constraints

Individual Optimization

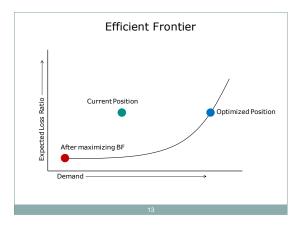
- Optimizes premium at the individual insured level
- · Provides opportunity to identify gaps in the rating structure
- Produces an efficient frontier
- Requires more time
- Some benefit lost during reverse engineering process
- Regulatory constraints

Benefit Function

$$BF_i = CD_i * (Q_i - L_i - E_i)$$

Where *BF* = Benefit Function

- CD = Cumulative Demand
- Q = Proposed Premium
- L = Pure Premium
- E = Expenses
- $i = i^{th}$ insured





Implementing Optimized Rates

- Potential conflict with traditional ratemaking
- Serves as a pricing tool
- Deviation from indicated