Big Data and Pricing Analytics

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Advanced Analytics
Dow Chemical Company
Dow: An Innovation Company

Founded in 1897
120 years of growth

Largest chemical company in the U.S.
Ranked 56th in the S&P Fortune 500

$48 billion in annual revenue in 2016
~ 56,000 employees worldwide

Integrated value chains aligned to high-growth sectors

7,000 product families manufactured at 189 sites in 34 countries across the globe
Delivering Breakthroughs to World Challenges

Food:
Omega-9 Healthy Oils

~1.5 billion pounds of trans and saturated fat eliminated

Water:
DOW FILMTEC™ ECO Reverse Osmosis Elements

40% better purification with 30% less energy

Transportation:
BETAMATE™ Structural Adhesives

23.3 million metric tons of CO₂ emission avoidance

Health:
POLYOX™ Water-Soluble Polymers in Lifebuoy™ Soap

45% reduction in preventable disease from handwashing with soap
Why is Pricing Important?

Quality
Innovation
Customer Service

Efficiencies

Price

1% improvement
11.1% profit increase*

Costs, Volume

1% improvement
2.3% - 3.3% profit increase*

Fundamental Pricing Relationships

Profit Margin ($/kg) vs. Price ($)

Demand (kg) vs. Price ($)

Total Margin ($) vs. Price ($)

Max. Profit
Price Elasticity of Demand

Elasticity = \frac{\% \text{ Change in Demand}}{\% \text{ Change in Price}}
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Insight: Lower price if % profit margin \times \text{elasticity} > 1
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\% \text{ profit margin} \times \text{elasticity} > 1

Do we know these values? Does this demand curve apply? 
What are our constraints? What will competitors do? …
What if Non-Price Factors Affect Demand?

Remove GDP-driven demand-deflation

Remove GDP-driven demand-inflation
What if Non-Price Factors Affect Demand?

Here, ignoring external factors overestimates elasticity.
What if Non-Price Factors Affect Demand?

Demand (kg) vs. Margin ($/kg)
What if Non-Price Factors Affect Demand?

Overestimated elasticity drives underestimated optimal price
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Big Data Question:
How do external factors drive demand?
Different types of pricing decisions occur at different business levels:

**Industry**
- Establish brand and product family positioning
  - e.g. price product line X to gain share via world-scale efficiencies

**Market**
- Establish target price and volume for product
  - e.g. average price for product X set to $Y/kg

**Transaction**
- Maximize profit from a series of transactions
  - e.g. sell A units of product X in package B to customer C for $Y/kg

Microsegmentation: Optimizing Individual Transaction Prices

All Transactions:
Avg Price = $X

Region #1:
Avg Price = $(X-2)

Region #2:
Avg. Price = $(X+4)

Package #1:
Avg. Price = $(X-3)

Package #2:
Avg. Price = $(X-1)

Big Data Question:
How do transaction attributes drive customer value?
Pricing to Position Within Industry

Big Data Question:
How will competitors and customers likely respond?
80-20 rule still applies:
• 80% of value from 20% of modeling effort

Pricing has enormous leverage on profit
• Added fidelity usually justifies additional modeling effort

Incorporating Big Data is critical to fidelity
• Variety: Many different types of factors
• Volume: Huge amount of data to consider
• Velocity: Critical for real-time pricing

But simpler models may be initially preferable
• Quick + Broad vs. Slow + Narrow
• User acceptance and time value of money