Edison Electric Institute

Power by Association℠

ScottMadden Management Consultants

Pricing: Past, Present, and Future

EEI Strategic Issues Roundtable

April 4, 2013

Is There True "Pricing" in Our Industry? Or Just Ratemaking?

Are we constrained by our legacy? Or can we consider other models?

As the industry faces declining demand and more stringent regulations, addresses the need for increased capital investments, and considers technology enhancements to enable broader customer choices, what can/should we think about for the future? During this interactive discussion we will discuss how to navigate the spaces between investors, customers, and regulators and brainstorm some future options.

Discussion Outline

- Past
  - Bonbright – Principles for Rate Making
  - Principles of Efficient Pricing
- Present
  - Some Current Ratemaking Mechanisms
  - A Few Typical Rate ("Pricing") Structures
- Future
  - What Are the Forces Driving Pricing?
  - Price Elasticity
  - Pricing vs. Ratemaking (Some Principles)

"It doesn't work to have Smart Meters if you have Dumb Prices!"

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Past

Bonbright – Principles for Rate Making

While development of revenue requirements is largely a science, rate design is more of an art.

Desired attributes

- Effectiveness
  - Recover allowed capital and operating costs and a fair return
- Fairness
  - Fairly apportion the cost of service among different customers (rates reflect cost causation)
  - Avoid undue discrimination
- Efficiency
  - Promote the efficient use of energy (and competing products and services)
  - Support economic efficiency – set prices to reflect marginal costs
- Stability
  - Ensure revenues (and cash flow) are stable from year to year
  - Minimize unexpected rate changes that may be adverse to existing customers
- Simplicity, understandability, public acceptability, and feasibility of application

Principles of Efficient Pricing

- Efficient pricing means setting the price equal to the marginal opportunity cost (P = MC)
  - In retail electricity markets, the marginal opportunity cost is the wholesale market price (in any given hour, one can buy or sell additional power at the market price)
  - Competitive markets automatically tend toward efficient pricing (attempts at P>MC will result in lost sales to competitors)
  - Efficiency involves maximizing total net economic value (the sum of consumer and producer surplus)
- Does efficiency matter to rate design objectives?
  - Effectiveness – No; flat, load-weighted prices can still recover embedded costs
  - Fairness – Yes; diversity of customer loads within each class, plus average pricing, implies that low-cost loads will subsidize high-cost loads
    - Equity, or fairness, involves distribution of net value among consumers and producers
      - Efficient allocations may appear unfair
      - Fair distributions may not be efficient
  - Efficiency – Yes; efficient prices (P = MC) can reduce costs and expand net economic benefits, if customers respond to prices
  - Stability – Yes; efficient prices can be better aligned with incurred costs
- Why efficient pricing matters
  - Results in the lowest-cost and highest-valued allocation of economic resources
  - Essential for survival in competitive markets (e.g., if consumers have retail access)
  - Improves market performance (e.g., reduces costs) in non-competitive (regulated) markets

Present

Some Current Ratemaking Mechanisms

Many of the current rate-making innovations are targeted at reducing regulatory lag.

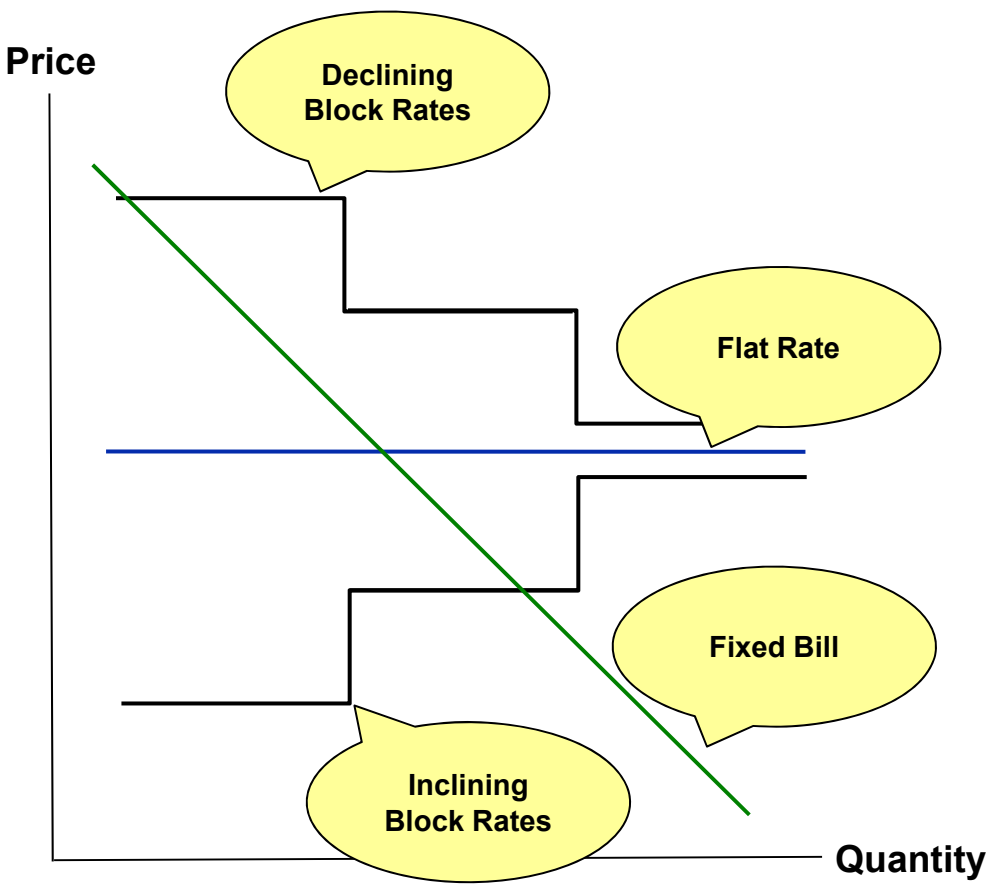
Name	Description	Pros/Cons
Construction Work in Progress (CWIP) in Rate Base	Allows for the recovery of financing expenses on CWIP. Construction costs are entered into rate base as they are incurred so investments begin to earn their allowed return sooner.	Enhances cash flow to support favorable credit metrics during multi-year construction projects. Reduces cost of capital. Minimizes rate shock that could otherwise occur when assets are placed in rate base only after becoming used and useful.
Cost Trackers	Mechanisms that expedite recovery, outside of general rate cases, for volatile and/or rapidly rising costs such as those for energy, energy efficiency, pensions and benefits, and major capital additions.	Can reduce rate case frequency by addressing major reasons why costs are increasing more rapidly than sales. Can also incorporate performance-based incentives that allocate some risk (e.g., of cost overruns) to shareholders.
Rate and Revenue Caps	Multi-year rate plans that cap growth in rates or revenue requirements. Caps may involve escalation factors with terms ranging from three to seven years.	Increases operating flexibility and provides incentives to manage long-term productivity growth. Incentive mechanisms can be added to define specific performance standards and provide penalties and/or rewards when actual performance varies from the standard.
Formula Rate Plans	Mechanisms that make regularly scheduled rate adjustments outside of rate cases to help a utility's revenues track its pro forma cost of service.	Utilities earn their target return on equity, and avoid over- and under-earning. Performance-based provisions are sometimes added to strengthen incentives in targeted areas (costs, customer satisfaction, and service quality).
Forward Test Years	Uses forecasts of utility costs and billing determinants.	When unit costs are rising, forward test years mitigate regulatory lag and give utilities a better chance to earn their allowed return on equity.
Revenue Decoupling	Ratemaking approaches that make base rate revenue less sensitive to delivery/sales volumes.	Useful when sales per customer are declining due to large energy efficiency programs or structural changes in the economy that lower sales growth. Decoupling ensures that utilities recover approved fixed costs; eliminates a potential utility disincentive to promote energy efficiency goals.

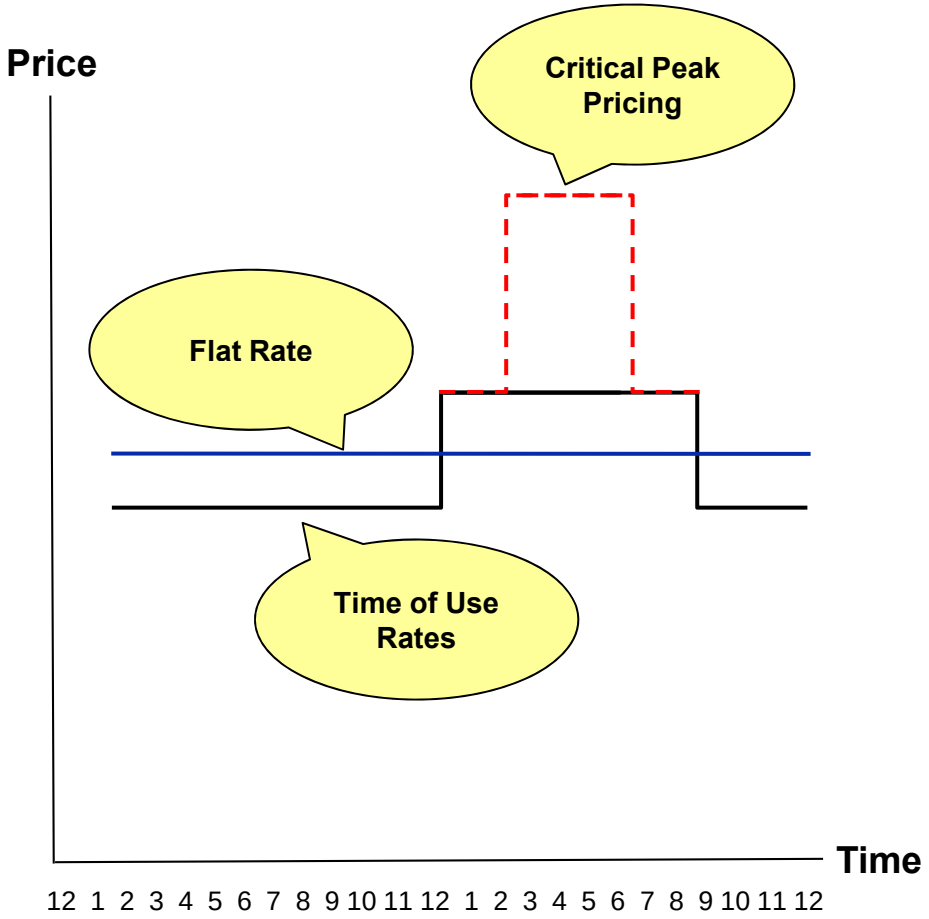
Source: "Innovative Regulation: A Survey of Remedies for Regulatory Lag," Edison Electric Institute, April 2011

A Few Typical Rate ("Pricing") Structures

Tariffs today reflect a variety of price vs. quantity, or price vs. time, trade-offs.

Additional rates have also been developed to address differing levels of demand, energy consumption, and load factors.





Many utilities are moving to simplify their current tariff structure through consolidation and redesign.

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Future

- Forces driving pricing
- Price elasticity
- Pricing vs. ratemaking, some principles
- Brainstorming

What Are the Forces Driving Pricing?

Cost-Related Drivers Affecting Revenue Needs

Driver	Trend	Comments
Debt service (interest) costs	⇔	Federal Reserve policy continues to keep rates low
Capital expenditures		
◆ New wires (T&D)	⇧	New facilities; customer growth
◆ System hardening	⇧	Distribution system improvements; cyber-protection
◆ Advanced metering	⇧	Data flood – classes vs. segments (of one?)
◆ New generation	⇧	Gas-fired to backfill coal retirements
◆ Environmental retrofits	⇧	CSAPR; MACT; 316(b); CCR, greenhouse gases?
Operating costs (O&M)	⇔	Contained, but skilled labor costs increasing
Renewable resources	⇧	Owned or contracted generation; renewable energy certificates
Equity returns	⇔	ROEs; dividend increases
Pensions and benefits	⇧	Funding needs with tepid fixed income returns
Taxes	⇧	State and federal fiscal pressures continue
Purchased power	⇩	“Shale gale” driven, but unclear how long

What Are the Forces Driving Pricing? (Cont'd)

Factors Driving Interest and Capability to Execute Refined Pricing

 **Metering advances**	◆ Real-time, time-of-use capabilities
 **Customer information and response capability**	◆ Smart, programmable appliances ◆ Price signal transmission (e.g., "energy orb")
 **Computational power**	◆ Complex billing and related algorithms ◆ "Big data" depositories
 **Customer expectations**	◆ Comfort with mass customization ◆ Aggregators "educating" customers
 **Regulatory interest**	◆ Demand management emerging focus ◆ Reliability (especially during peaks) ◆ FERC, federal, and some state (e.g., NY) encouragement of demand response, energy efficiency
 **Ratemaking flexibility**	◆ Decoupling and lost revenue adjustment ◆ Energy efficiency performance incentives
 **Wholesale market maturity**	◆ Capacity markets (demand resource bidding; DR price signals) ◆ Megawatt-negawatt pricing parity (FERC Order 745)

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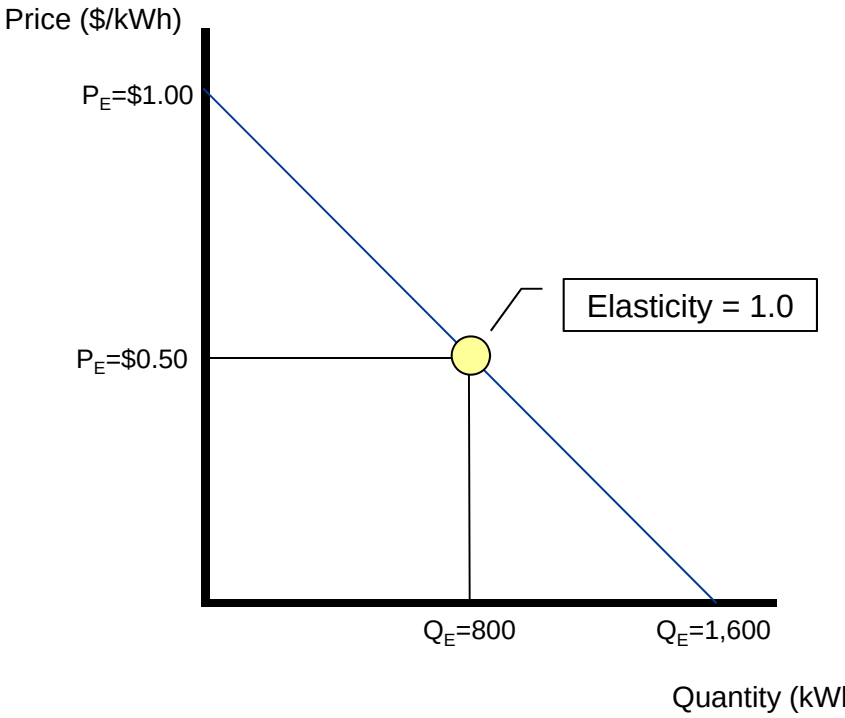
Price Elasticity Defined

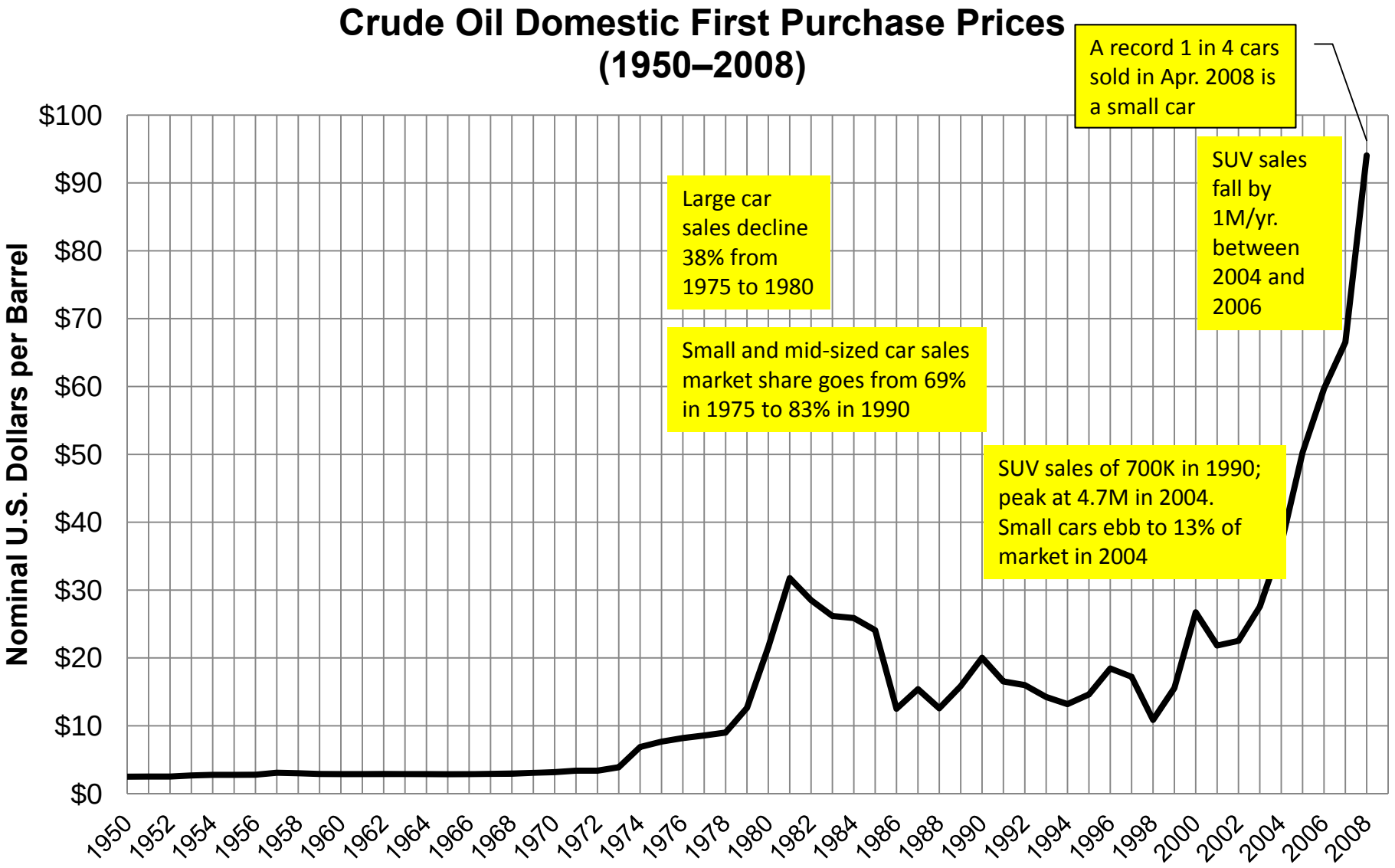
Formula	Metric	Definition		Time Horizon	
$\frac{\%\ \Delta\ \text{Quantity}}{\%\ \Delta\ \text{Price}}$	**> |1| = highly elastic** **< |1| = low elasticity** **0 = inelastic**	**Own:**	Change in demand with a change in price of a good (usually a negative value)	**Short term:**	Hourly; daily; less than 1 year
		Substitution:	Change in demand for another good with a change in price of a different good (e.g., natural gas demand vs. electricity price or off-peak usage vs. on-peak electricity price) (usually a positive relationship)	**Long term:**	Multi-year



- The slope of the demand curve defines own-price elasticity of demand
- Elasticity may vary at differing points of the demand curve since the demand curve for a product is typically not perfectly linear (as shown at left)
- A flatter slope means demand is more elastic; a more vertical slope means demand is less elastic to price changes

Source: EPRI; ScottMadden research

Analogue: Oil Price Shocks and Responses



Source: http://www.eia.doe.gov/emeu/aer/txt/ptb0518.html

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One Macro-Analysis Found Different Variables Impact Elasticity for Different Customer Classes

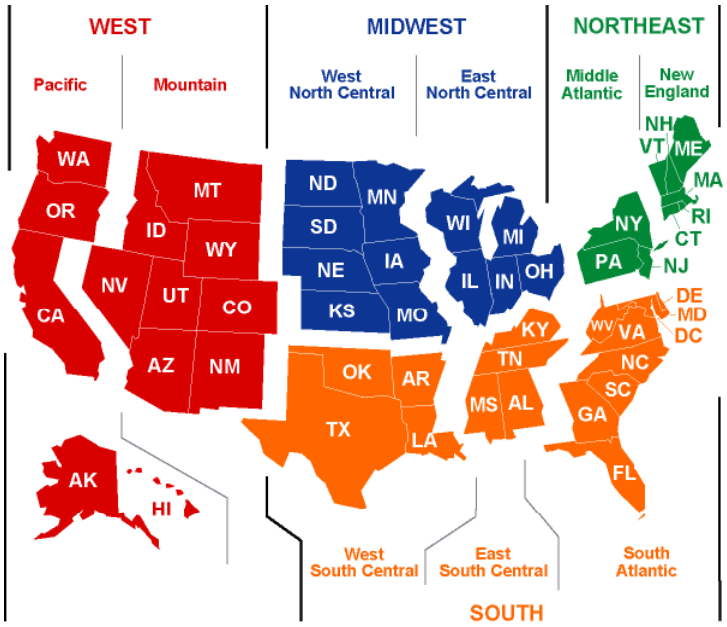
	Residential	Commercial
Short-run own-price elasticity	-0.24	-0.21
Long-run own-price elasticity	-0.32	**-0.97**
Independent variables in regression analysis	**Electricity demand in previous year**	**Electricity demand in previous year**
	Electricity price in current year	**Electricity price in current year**
	Electricity price in previous year	**Electricity price in previous year**
	Income in current year	Commercial GSP (econ. output) in current year
	Income in previous year	Commercial GSP (econ. output) in previous year
	Population in current year	New floor space in current year
	Population in previous year	New floor space in previous year
	Natural gas price in current year	Natural gas price in current year
	Natural gas price in previous year	**Natural gas price in previous year**
	Climate–heating/cooling degree-days	**Climate–heating/cooling degree-days**

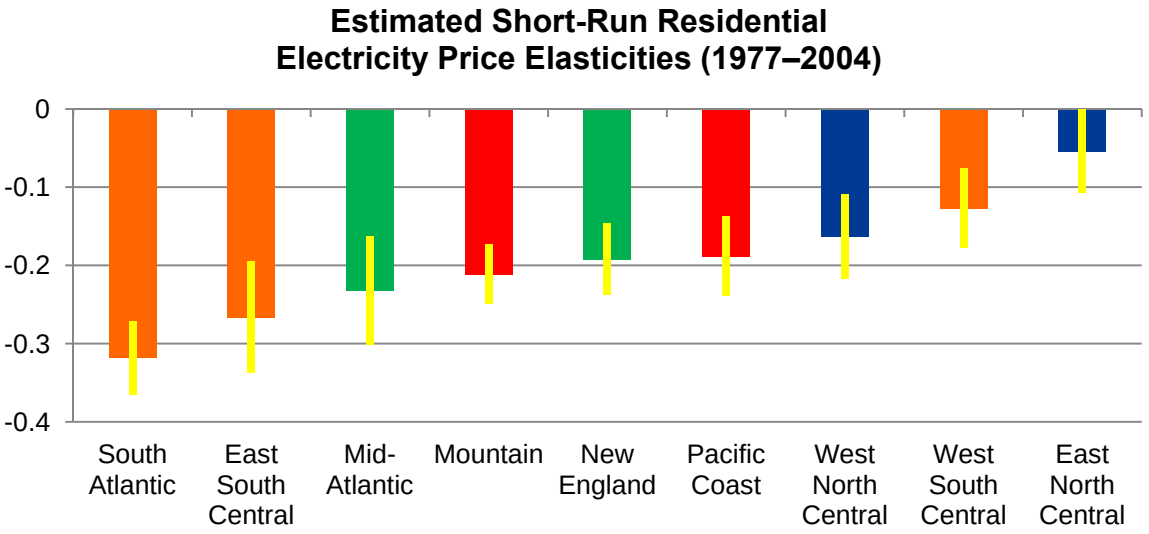
Key Takeaways

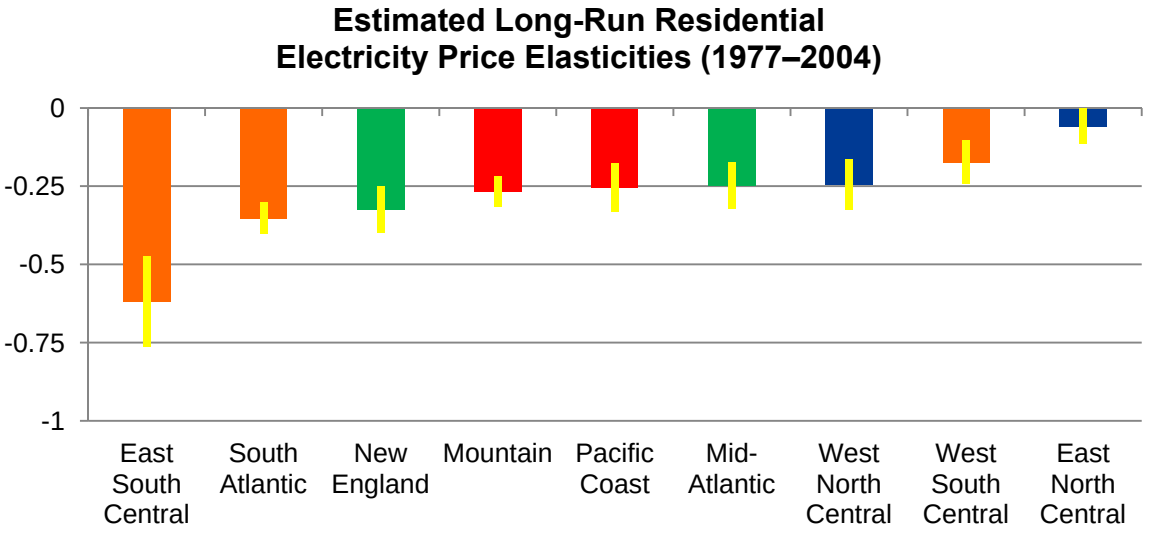
- Price has an effect on electricity demand
- A number of significant variables impact own-price elasticity of demand
- Price elasticity varies by customer class
- Long-term price elasticity tends to be higher than short-term price elasticity

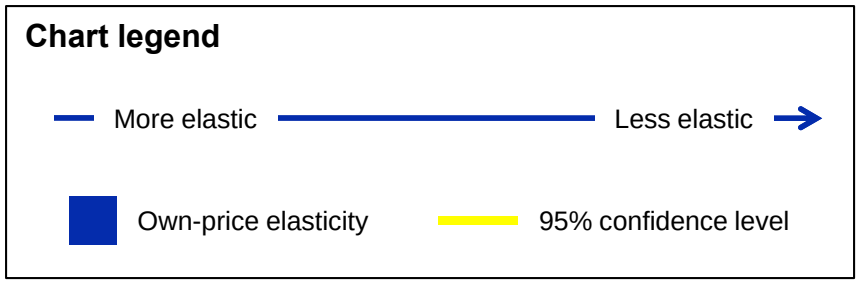
Notes: **Bold** font means statistically significant
Data derives from a regression analysis of macro data; not particular programs)
R-squared for analysis was .99
Source: RAND Corporation

The Same Analysis Found that Price Elasticity Exhibits Regional Differences









Source: RAND Corporation (note: taken from macro data, not particular programs)

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Observations and Conclusions About Electricity Demand and Price Elasticity

A Price-Demand Relationship for Electricity Exists

- A relationship does exist between price and electric demand
- The price-demand relationship in electricity is complex
- This relationship has not changed significantly over time – own price elasticity for power consumers from the 1980s

How Elasticity Is Characterized Varies

- There are different types of elasticity – elasticity of substitution and own-price elasticity. Pricing studies frequently look at substitution elasticity, characterized by load-shifting
- Defining what is elastic varies; some say >|0.5| is elastic, others characterize |0.2| and greater as elastic

Studies Point Out Some Similarities

- Elasticity estimates are across the board: differing results for differing pilots and macro-analyses
- Because most pricing and demand response programs are voluntary and often designed with a specific purpose in mind, there is an element of self-selection: customers most likely to take advantage will enroll as well as "the Hawthorne effect." It is very difficult to find generalizeable, scientific evidence
- There are different ways customers respond to price signals; in many programs, load shifted to off-peak periods

Observations and Conclusions About Electricity Demand and Price Elasticity (Cont'd)

Elasticity Varies Among and Even Within Regions, Customer Classes, and Types

- Elasticity levels are not homogeneous: they vary among customer groups and within groups
- Industrial customers have higher elasticity, especially where they have or can pursue onsite generation options
- Residential demand is more elastic than commercial

A Number of Factors Affect or Contribute to Price Elasticity for Electricity

- There are income and weather effects on elasticity
- There are wealth effects that impact elasticity. The ability to act upon price signals may depend upon the numbers and types of appliances, for example
- Residential customers appear to exhibit more demand elasticity if they have more appliances
- Other factors impact relative demand for electricity and the price elasticity – including relative price levels and relative income (or energy spend as % of total income)

Elasticity Varies By Time and Location

- There is a difference in short- and long-run elasticity. In the long run, customers tend to exhibit higher demand elasticity
- Elasticity varies by region; it is not a uniform value across the United States

Pricing vs. Ratemaking (Some Principles)

- Pricing is a management art and science and can be (and is) used, even in commodity service industries such as ours, to create shareholder value
- Effective pricing is based on value received by the customer (**not** what it costs us to provide that value)
  - Value to the customer is the price ceiling
  - Our "cost to serve" is the price floor
  - Competitor pricing and internal factors can create other pricing constraints
- Customers differ in how they value the product, their price sensitivity, and what it costs to serve them. Therefore, we want to:
  - Identify which customer segments are likely to fall into which price segments
  - Figure out how to charge:
    - Higher prices to buyers who are less price sensitive, often to build margin
    - Lower prices to buyers who are more price sensitive, often to build volume

"There is no such thing as a commodity. All goods and services are differentiable. Though the usual presumption is that this is more true of consumer goods than of industrial goods and services, the opposite is the actual case." *Theodore Levitt*

"The usual presumption about so called undifferentiated commodities is that they are exceedingly price sensitive…That is seldom true except in the imagined world of economics textbooks." *Theodore Levitt*

Source: Adapted from materials by Dr. Jay Klompmaker

Pricing vs. Ratemaking (Some Principles) (Cont'd)

- There are 10 factors which we can understand and influence to reduce buyers' price sensitivity and increase our likelihood of earning higher prices

Factor	Discussion
Perceived Substitutes Effect	Buyers are more price sensitive the higher the product's price relative to the prices of the buyers' perceived substitutes
Unique Value Effect	Buyers are less sensitive to a product's price the more they value any unique attributes that differentiate it from competing products
Switching Cost Effect	Buyers are less sensitive to the price of a product the greater the added cost (both monetary and non-monetary) of switching suppliers
Difficult Comparison Effect	Buyers are less sensitive to a product's price the more difficult it is to evaluate competing offers
Price Quality Effect	Buyers are less sensitive to a product's price to the extent that a higher price signals that the product is of higher quality
Expenditure Effect	Buyers are more price sensitive when the expenditure on the product is larger
End Benefit Effect	Buyers are more price sensitive: 1) When they are more sensitive to the cost of the end benefit to which the product contributes 2) When the product's price accounts for a larger share of the total cost of the end benefit
Shared Cost Effect	Buyers are less sensitive to the price of a product the smaller the portion of the price they actually pay (because others bear some cost)
Fairness Effect	Buyers are more sensitive to a product's price when it is outside the range that they perceive as "fair" or "reasonable" given the purchase context
Inventory Effect	Buyers are more price sensitive in the short run when they hold inventories

Source: Adapted from materials by Dr. Jay Klompmaker

Pricing vs. Ratemaking (Some Principles) (Cont'd)

- Understanding margin and margin bands is critical
- Calculating margin bands requires a different treatment of cost than that used for traditional accounting
  - Relevant costs are those that are incremental, avoidable to the pricing decision
  - These costs are specific to the customer, product, and location at hand, not based on averages
  - A single cost can be relevant, irrelevant, or partially relevant to a decision
  - Opportunity costs can be important
- Margin analysis has several purposes
  - Determine breakeven and profit implications of changes in price and volume (contribution analysis)
  - Assess dollar contribution of margin per unit of the most constrained resource
  - Guide pricing and marketing policies similar to those discussed earlier for price bands

Source: Adapted from materials by Dr. Jay Klompmaker

Pricing vs. Ratemaking (Some Principles) (Cont'd)

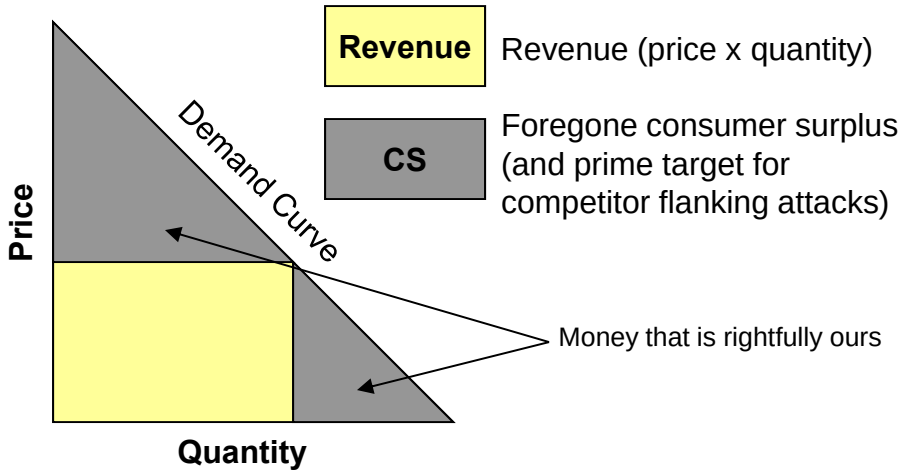
- There are a number of lessons learned from tactical pricing
  - Avoid averages – averages hide pricing opportunities
    - Analyze pricing at the transaction level
  - Develop a detailed understanding of your margin generation by customer
    - Push hard to understand all decrements to dollars between customer revenue, pocket price, and customer margin
    - Do not rely on your existing accounting system to identify all such decrements
  - Know your customers
    - Know how they define value
    - Understand what yardstick they use to compare price
    - Use detailed historic pricing data to understand customer behavior and attractiveness
  - Know your competitor
    - Understand his products, costs, mentality
    - Regularly analyze in detail how his products and prices align with yours
    - Use historical pricing data to understand competitor strength and strategy

Source: Adapted from materials by Dr. Jay Klompmaker

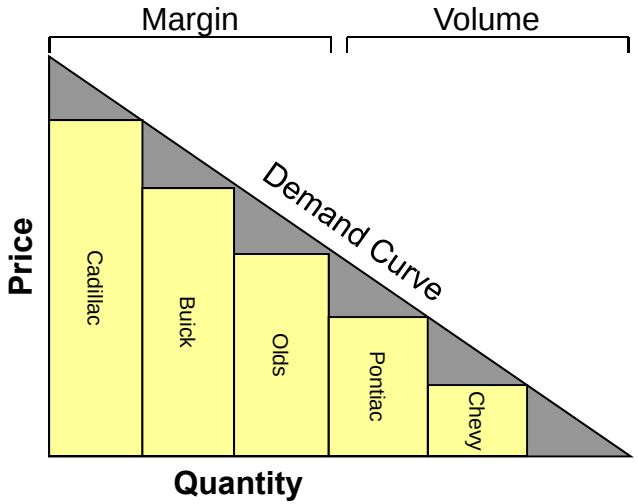
Pricing vs. Ratemaking (Some Principles) (Cont'd)

- This approach is called segmented pricing and can require some differentiation of products, as illustrated by the classic demand curve illustration of General Motors' segmented pricing strategy below

"One-Size-Fits-All" Pricing Leaves Money on the Table



Segmented Pricing Creates Value and Blocks Competition



- Pricing can be segmented along many lines, such as:
  - Buyer characteristic
  - Time of purchase
  - Purchase location
  - Purchase quantity
  - Value of end use
  - Product design
  - Product bundling
  - Tie ins
  - Value-based metering

Source: Adapted from materials by Dr. Jay Klompmaker

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