



# Empirical Analyses of Wholesale Electric Competition and Industry Restructuring

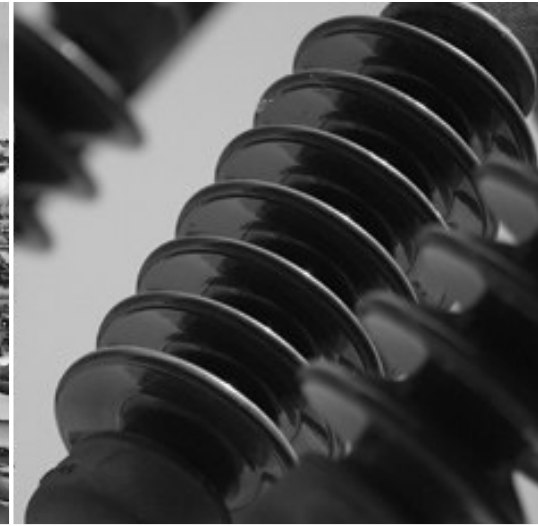
Energy Markets in the 21<sup>st</sup> Century: Competition Policy in Perspective

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# Agenda

- What are the relevant research questions?
- Are the relevant research questions intractable?
- Is current research sufficiently reliable to shed light on the relevant research questions?
- Is there any consensus on an appropriate standard for “workably” competitive markets?



## Identifying the relevant research questions

## There are several distinct questions about competition and restructuring that can be answered using empirical methods

- Have ratepayers been financially helped or harmed by electric restructuring and/or wholesale competition?
  - Dollars-and-cents impact on ratepayers of state restructuring and/or RTOs
- What have been the costs and benefits of electric restructuring to date, and what are they likely to be on a going-forward basis?
  - Includes broader assessment of costs and benefits, e.g. risk reallocation, environmental benefits of restructuring, demand-side management, etc.
- How do market prices compare to regulated prices?
  - Cross-sectional analysis or “but-for” analysis
  - May want to identify “equilibrium” market prices
- How competitive are actual markets?
  - Comparison of actual market prices to various models of competition
  - Are competitive wholesale prices “passed through” to retail customers?

## There are several distinct questions about competition and restructuring that can be answered using empirical methods (cont.)

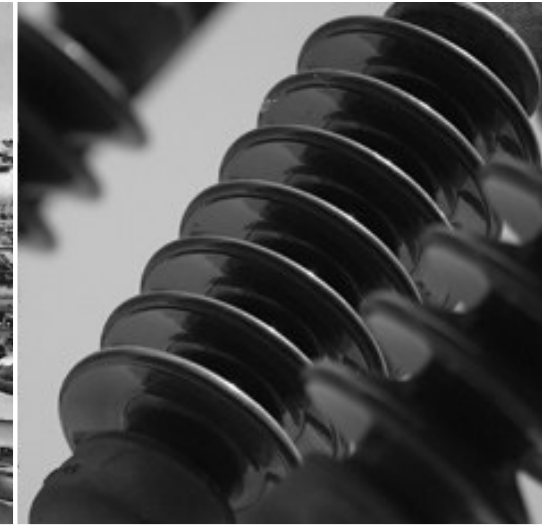
- What institutional features of markets make them more or less competitive?
  - Detailed “diagnostics” of well-functioning vs. poorly-functioning markets
- Has market expansion (e.g., via RTOs) resulted in production cost savings?
  - Reducing constraints on economic dispatch across wider areas
- Do (hybrid) “unrestructured” markets result in inefficient and/or anticompetitive outcomes?
  - “Efficiencies” of vertical integration vs. foreclosure and lack of market access by efficient merchant generation

**Even if not “bullet-proof,” a wide range of studies and approaches are broadly indicative of the actual and potential benefits of competition and restructuring**

## Recent restructuring debates have raised several issues regarding the appropriate scope and interpretation of empirical analysis

- Is it appropriate to consider rate freezes a “benefit” of restructuring?
- Is it appropriate to consider the generation investment “boom” of the 1999-2004 period a “benefit” of restructuring/competition?
- Have restructuring and competitive markets shifted risks associated with the development and ownership of generation from ratepayers to investors?
- Have empirical analyses of the benefits of competition and restructuring ignored market power issues?
- Are system marginal costs an appropriate standard for determining whether wholesale markets are “workably” or “reasonably” competitive?

**The appropriate approach to empirical modeling – and the treatment of these issues – will depend on the overall research question being addressed**



**The relevant research questions are empirically tractable**

## Estimating the impact of competition and restructuring is difficult

- No clear demarcation between “unregulated” and “regulated” period
- Cross-state comparisons can be difficult: which states are “comparable”?
- Identifying causality can be difficult: states that went through restructuring were generally high-price states
- Stranded cost recovery complicates the analysis: a legacy of cost-of-service rate regulation imposed on restructured markets
- Rate freezes complicate the analysis: restructuring “bargain” impedes market entry
- Creating estimates of “but for” restructuring prices is difficult: reflects the result of a regulatory process

## Despite the difficulties, quantitative methods can shed light on the impact of competition and restructuring

- Electric markets throughout the U.S. are very different than they were 10 years ago – basis for time-series analysis
- Significant differences in regulatory environments persist among states – basis for cross-sectional analysis
- Production cost models should be able to reveal whether generation cost savings from market expansion outweigh the costs of integration
- Production efficiency is measurable over time (e.g., nuclear capacity factors)
- Auction results can be examined to identify whether wholesale prices are being efficiently passed through to retail customers
- Other measures, e.g., customer switching

## Empirical analysis should recognize that electric restructuring remains a work in progress

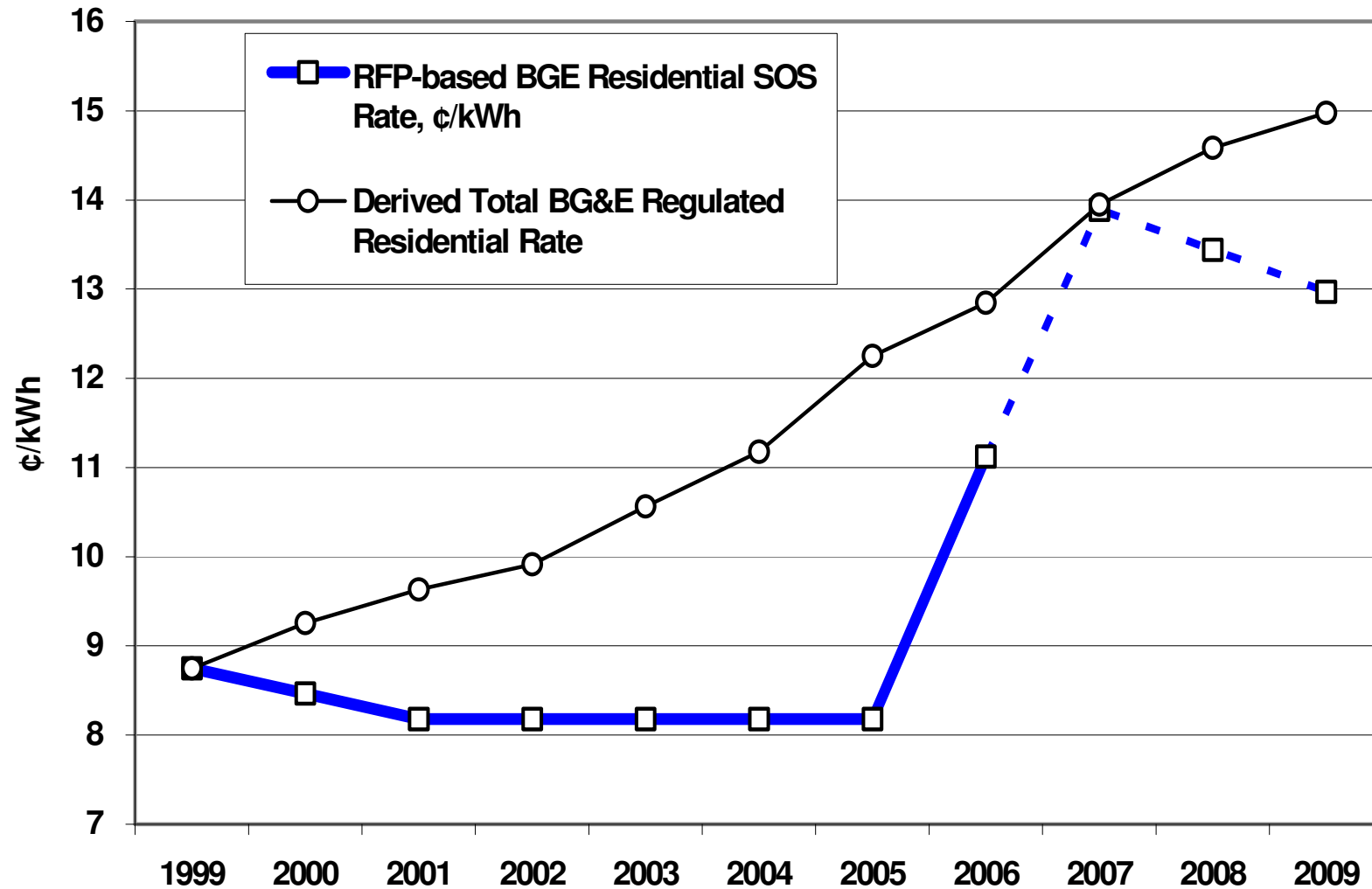
- The U.S. experience with electric restructuring is still relatively brief
- Even strongest “laissez-faire” proponents of competition generally recognize the need for continued improvements in market design
- Vigorous “competition policy” (e.g., antitrust or regulatory enforcement) is generally seen as an alternative to “heavy-handed” rate regulation
- “Competition policy” needs to strike a balance between ensuring competitive outcomes and injecting destructive regulatory uncertainty
- Continued challenges persist in dealing with “load pockets” and capacity markets
- Obtaining sufficient, but not “too much,” reliability can be a challenging task
- Any “verdict” on restructured wholesale markets needs to consider the constraints imposed on those markets
- Regulatory uncertainty in restructured states may be impeding new investment
- Flaws in previous market design should not be considered *inherent* flaws of restructuring, but rather guideposts for future policy

**Major policy changes should be based on solid research – most of the political clamor for “re-regulation” is not**

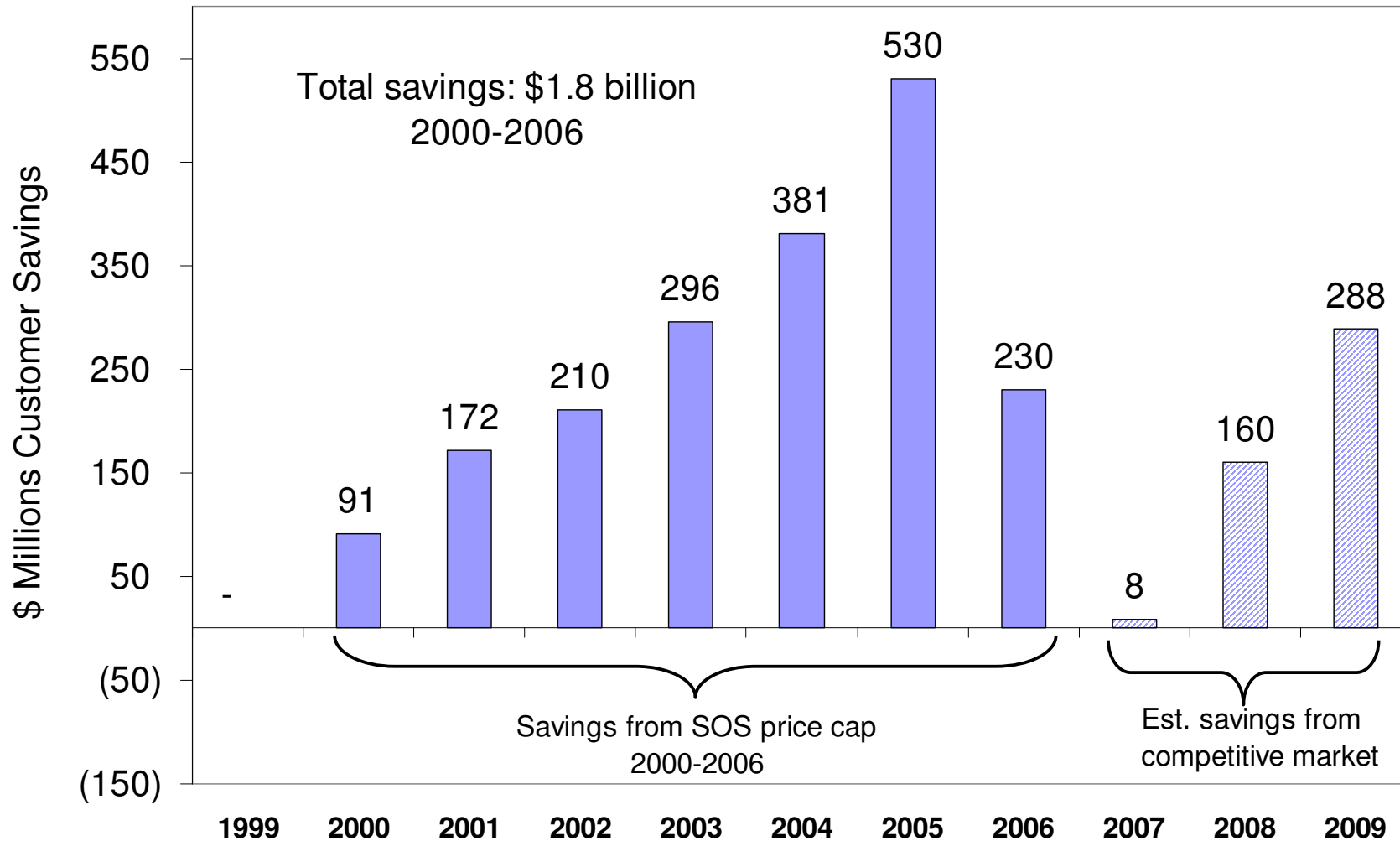


**Assessing empirical analyses: whether and how to consider rate freezes, excess supply, and market power**

# Impact of price caps should be considered in assessing dollars-and-cents impact of restructuring on ratepayers



## The monetary benefit of rate caps to Maryland consumers was substantial – their part of the restructuring “bargain”



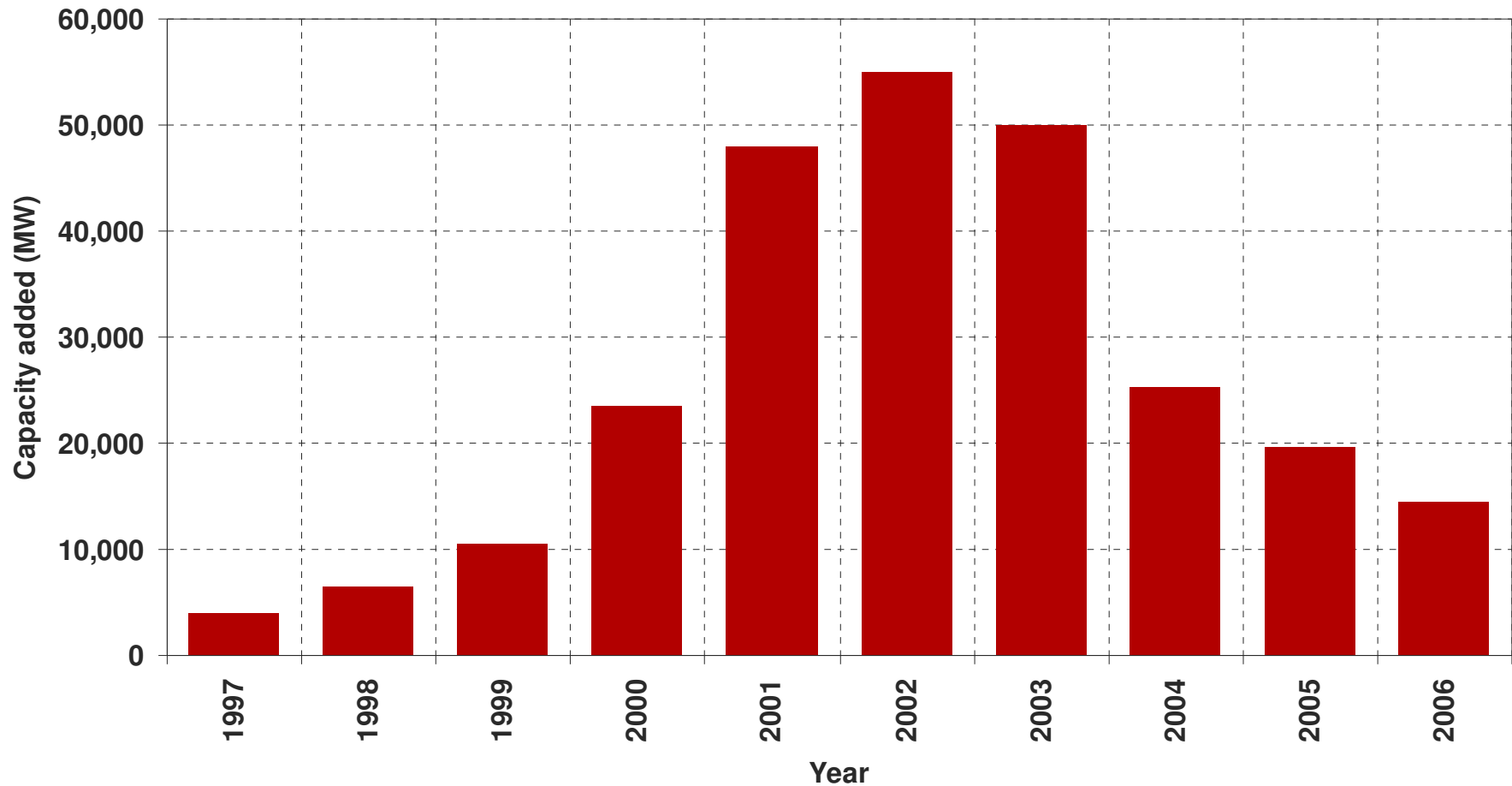
However, simply because rate freezes/reductions were a “profitable” part of the regulatory bargain for consumers does not mean they reflect good market design – generally, they don’t

## **“Surplus capacity” resulting from IPP investment should be considered a benefit of restructuring and wholesale competition**

- Reflects allocation of risks in competitive markets
- Competitive markets allocate risk efficiently
  - Market participants can offer ways of hedging risks
- Cost-of-service regulation imposes cost risks directly on captive retail customers
  - E.g., recent cost increases for new coal-fired facilities borne by retail ratepayers
- Debates often forget the lessons of the past, e.g., cost overruns borne by retail ratepayers, stranded costs, etc.

## The data indicate that this benefit of restructuring and wholesale competition was substantial

New U.S. generating capacity (MW)

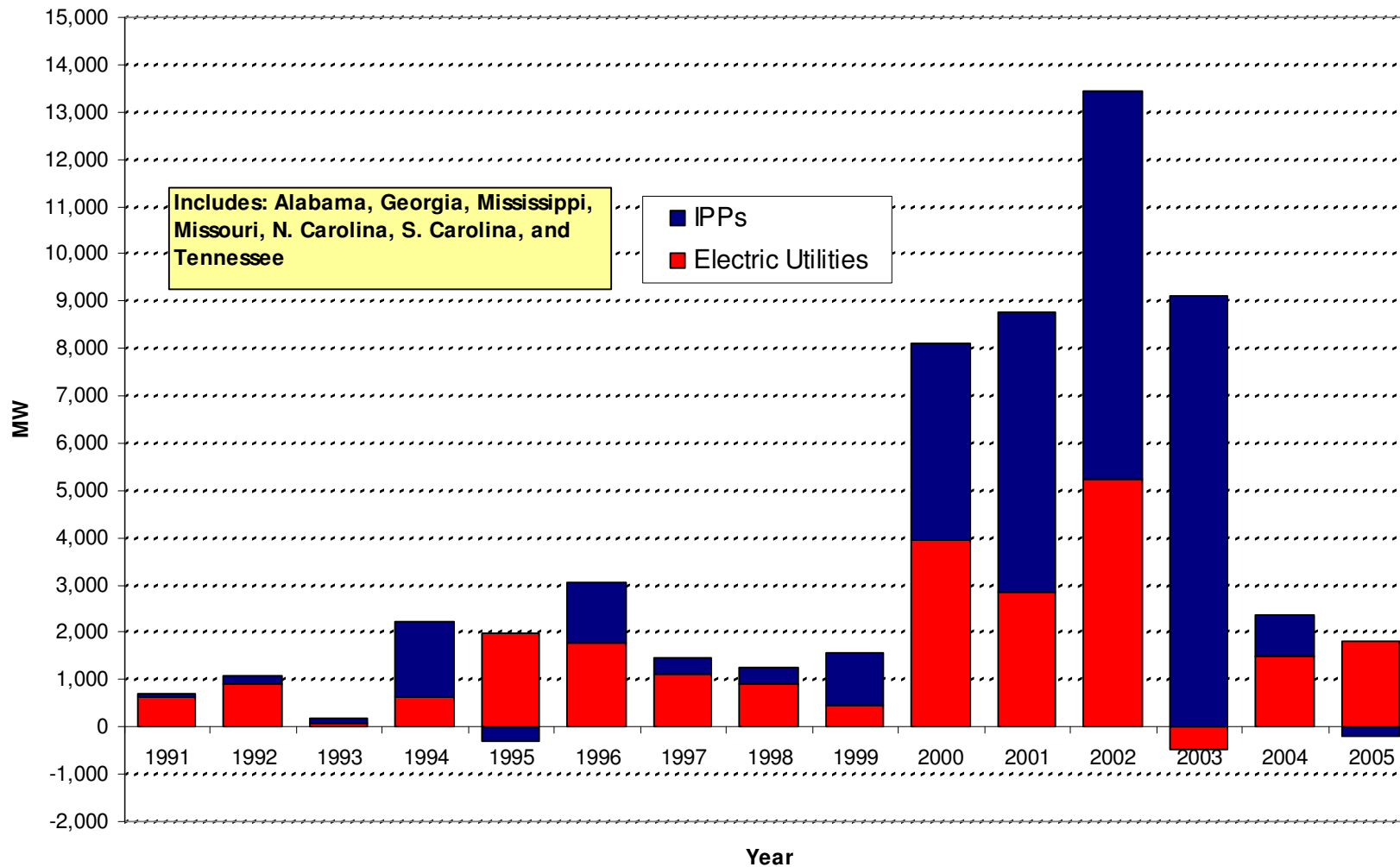


Source: EIA

About 80 percent of new generation capacity was built by independent power producers

# Substantial merchant investment also occurred in markets in which increased competition was expected but did not materialize

Net Annual Capacity Additions Southeast U.S.



Source: EIA

## Have market power concerns been appropriately considered in assessing the benefits of competition and restructuring?

- Issues of *potential* market power abuse are not unique to the electric industry
- Argues in favor of vigilant antitrust and regulatory enforcement, as well as getting market structure “right”
- With some notable exceptions, wholesale electric markets are generally seen as being reasonably competitive in most hours
- Most of the more recent and vocal concerns about “market power” are largely a reaction to high fuel prices
  - Example: PJM State of the Market Report 2006 – wholesale market competitive
  - Market prices have increased because of underlying increases in fossil and nuclear fuels
    - Natural gas: up 200% between 1999 and 2006 (Source: EIA)
    - Eastern coal: up 70% between 1999 and 2006 (Source: EIA)
    - Uranium: up 375% between 1999 and 2006; 2006 prices have doubled in 2007 (Source: Trade Tech-Uranium Info, [www.uranium.info](http://www.uranium.info))
  - Market prices have also increased because of increased electric demand

**Rumors of the imminent demise of competition in electricity markets are grossly exaggerated**

## Generalized market power concerns remove the focus from where it should be – on solutions to specific problems

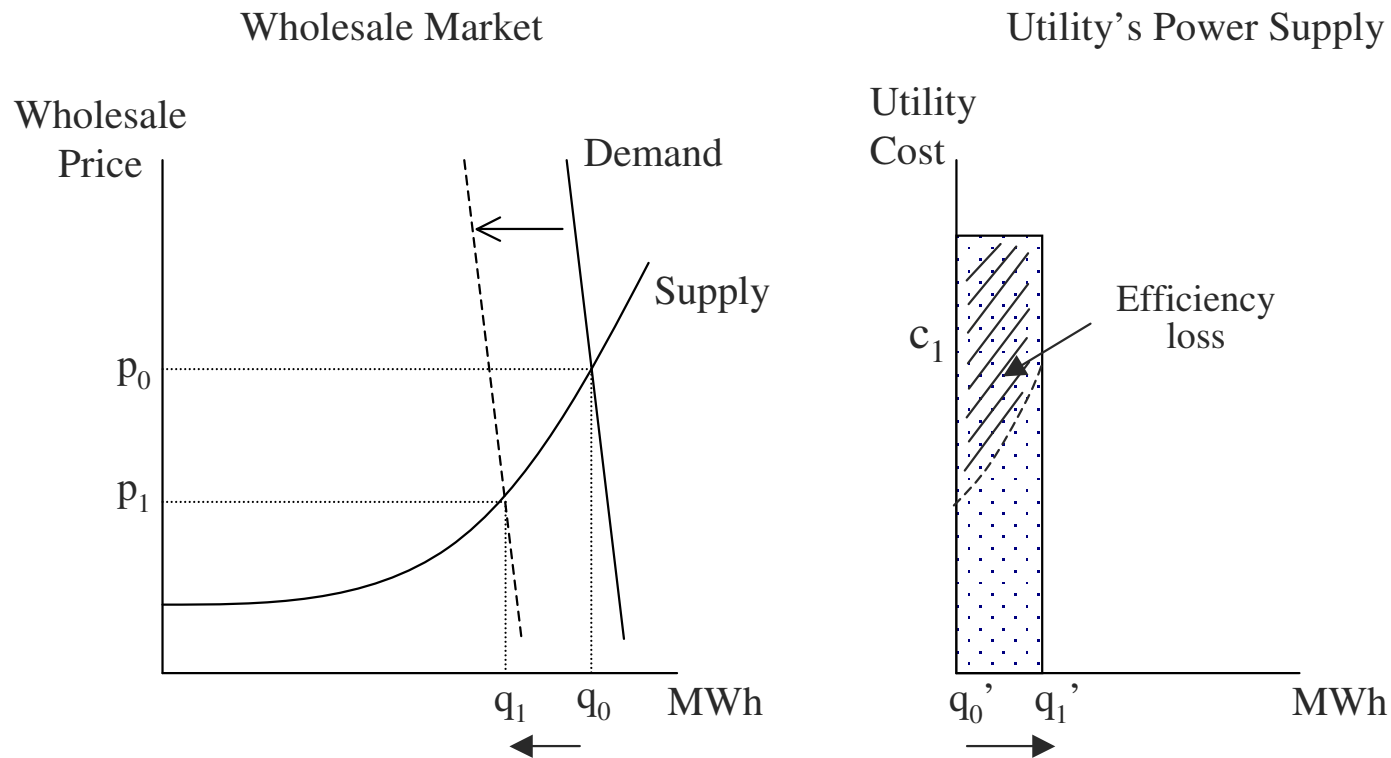
- Better to mitigate against possible market power in a few hours than to eliminate the market entirely
  - Example: Maryland 2007 SOS auctions
    - Bids received for six times the amount of generation requested
    - Commission monitors determined the entire process to be highly competitive
- Need to ensure that the structure of the market is sufficiently competitive
- Need to identify market rules that may hinder or promote competitive outcomes (e.g., longer term contracts), esp. in extreme conditions
- Need to focus on infrastructure development and reliability
  - Delays in siting and building new transmission facilities not caused by restructuring

## Recent debates have focused exclusively on market power concerns in restructured states, even though vertical market power continues to be a significant concern in non-restructured states

- Horizontal market power is often defined as the ability to profitably maintain prices above competitive levels for a significant period of time (*Horizontal Merger Guidelines, p.2*)
  - Focus on price effects of withholding one's own capacity
  - Increased concentration is assumed to lead to increased prices
- Vertical market power is often exercised by *foreclosure*—preventing other suppliers' capacity from reaching the market
  - “Monopoly power is the power to control prices *or exclude competition*” (*United States v. du Pont, 351 U.S. 377, 76 S.Ct. 994*)
  - Foreclosure is especially important in regulated industries in which there are some limitations on regulated firms' ability to increase prices

**Vertical market power – and particularly foreclosure – is of particular concern in non-restructured states**

# Foreclosure result: uneconomic dispatch of a regulated utility's own higher-cost generation despite competitive alternative



Market foreclosure not only harms competition but also increases energy costs

## One can test whether auction markets are competitive, i.e., whether they are efficient in passing through wholesale prices to retail customers

- Competitive process – auction, or RFP – establishes a fixed price for the generation supply component of retail rates for residential and small commercial customers
- The cost of such “full requirements” supply can be built up from observable components
  - Forward prices at main trading hub (e.g., PJM Western Hub, for NJ and MD), contemporaneous with bidding
  - Locational basis differential – the historical price difference between the hub and the delivery zone
  - Load shaping component – accounting for historical pattern of default service load
  - Ancillary services, network transmission, capacity costs, as appropriate
- Is the margin earned by successful bidders “excessive”?

**An analysis of competitive procurements for default service in New Jersey and Maryland show that wholesale market prices are being passed through to customers efficiently**



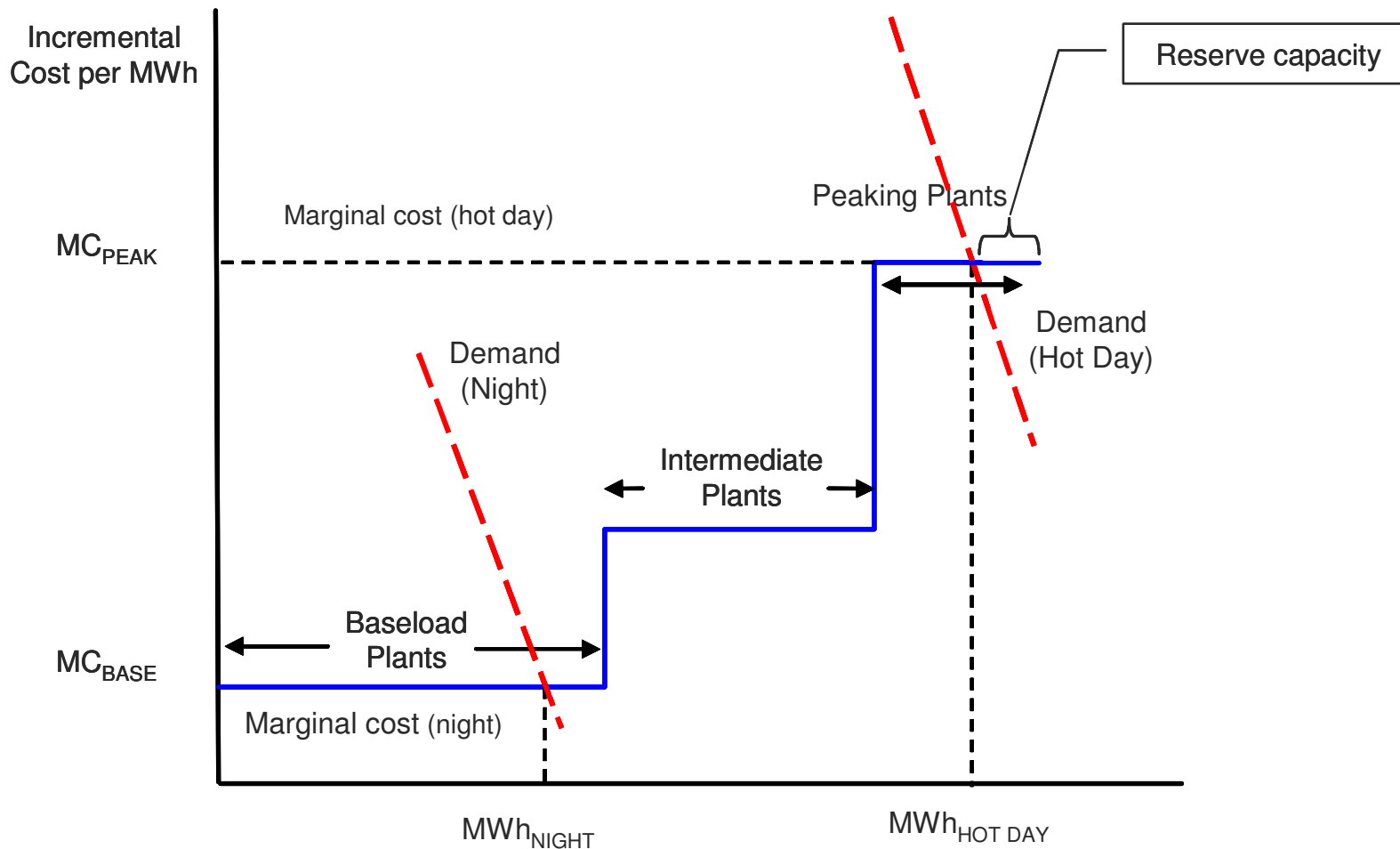
**Using marginal cost pricing as the standard for assessing whether market outcomes are competitive**

## Inexplicably, marginal cost pricing remains controversial in electric industry restructuring debates

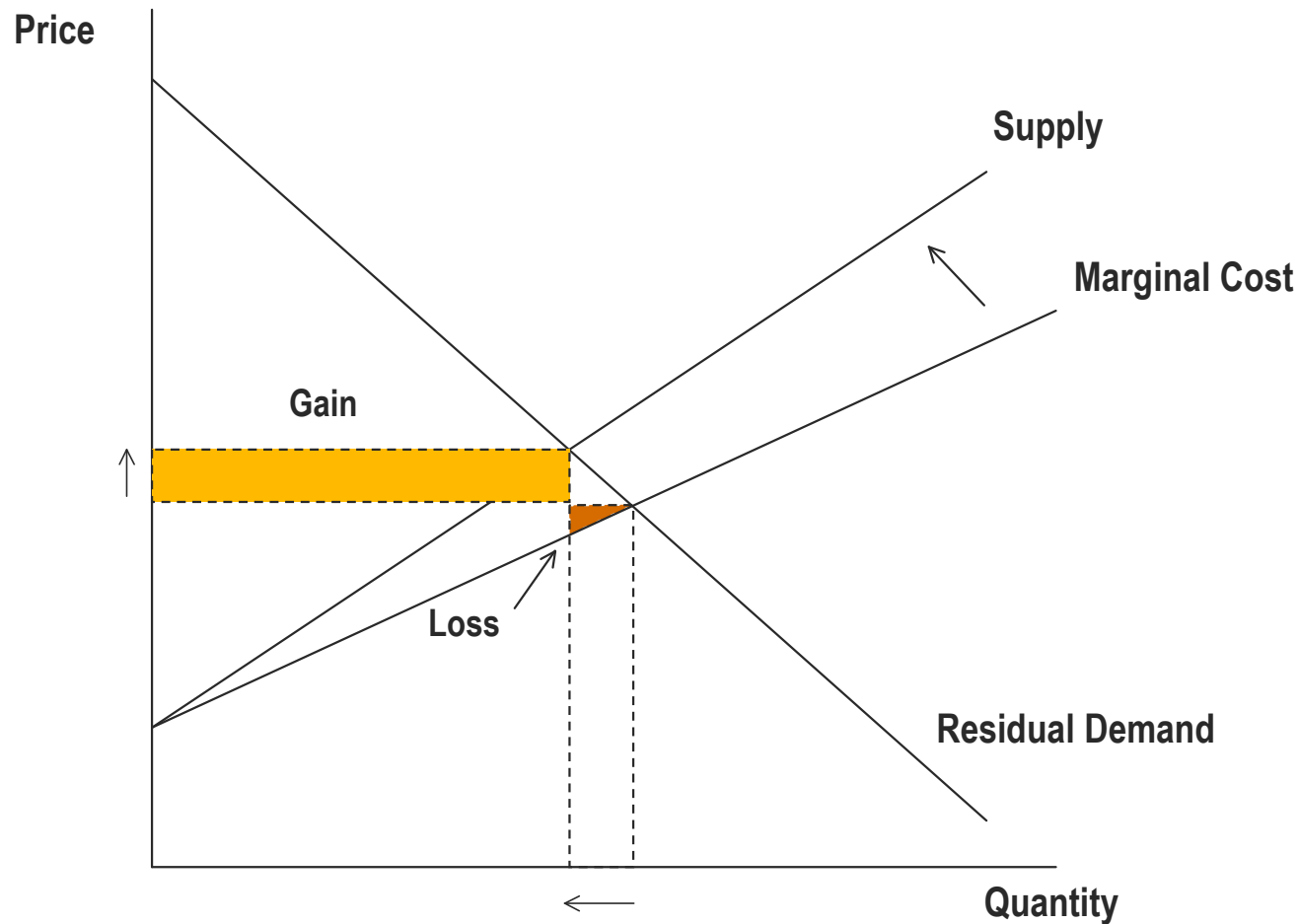
- Critics have increasingly lambasted the “dark spread”
  - The difference in cost between inframarginal units and market clearing price
  - Critics contend that the difference results in “windfall” profits
- Economists generally use marginal cost pricing as a benchmark for competitiveness in all markets – including all other energy markets
  - Inframarginal firms receive “above-normal” profits because they possess particular talent, innovations, technology, etc.
- Should the electric industry be an exception?
  - Alternative is COS rate regulation
    - Presumes that paying average cost for generation, plus a regulated rate of return will lower total costs – not demonstrated empirically
    - Presumes ratepayers should be “long” on generation assets
  - Assumes that the competitive price “proxy” provided by COS rate regulation is more reliable than actual market prices
  - If this is true for electricity markets, why is it not true for other industries?

**Competitive markets are not a guarantee of low prices – they provide appropriate signals of scarcity, of the consequences of consumption decisions, and for investments**

# The perfectly competitive ideal: market-clearing prices are set by “system” marginal costs



## Imperfect competition *in theory*: every bidder faces a price-quantity tradeoff that causes the supply curve to deviate from marginal cost



Policy-makers can take actions to affect the slope of the residual demand curve – and hence improve competitive market outcomes

## However, bidding behavior is also affected by market expectations and uncertainty – even in uniform-price auctions

- A market participant knows its own costs, but it must estimate:
  - Opportunity costs – including expectations of prices in other markets
  - Aggregate demand
  - Supply bids of other market participants
  - Financial risks associated with the transaction (e.g. creditworthiness)
- Uncertainty – and volatility – decreases incentives to engage in collusion (either tacit or explicit)
- Uncertainty causes substantial deviation of actual behavior from theoretical predictions
- Uncertainty is increased by diversity of market participants – and a diversity of strategies

# Imperfect competition *in reality*: wholesale prices in electric markets function reasonably well and often better than simple theoretical models predict

Example: Bushnell, Mansur, and Saravia, “Vertical Arrangements, Market Structure, and Competition in Restructured U.S. Electricity Markets”, CSEM WP 126, Feb. 2005

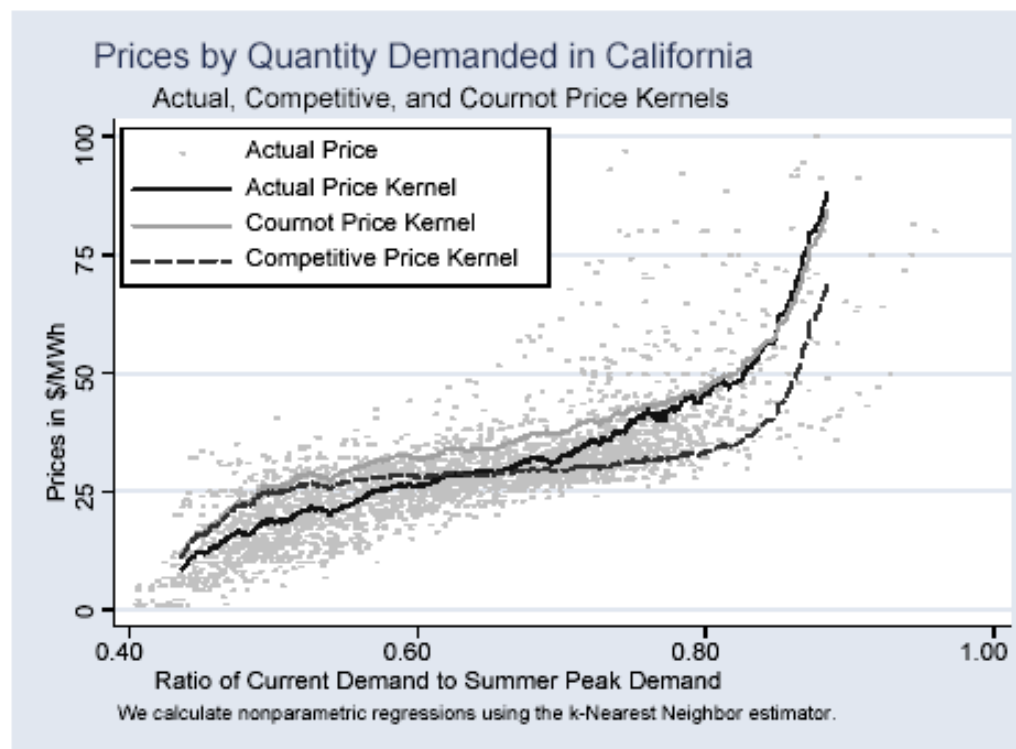


Figure 3:

## Imperfect competition *in reality* (cont.)

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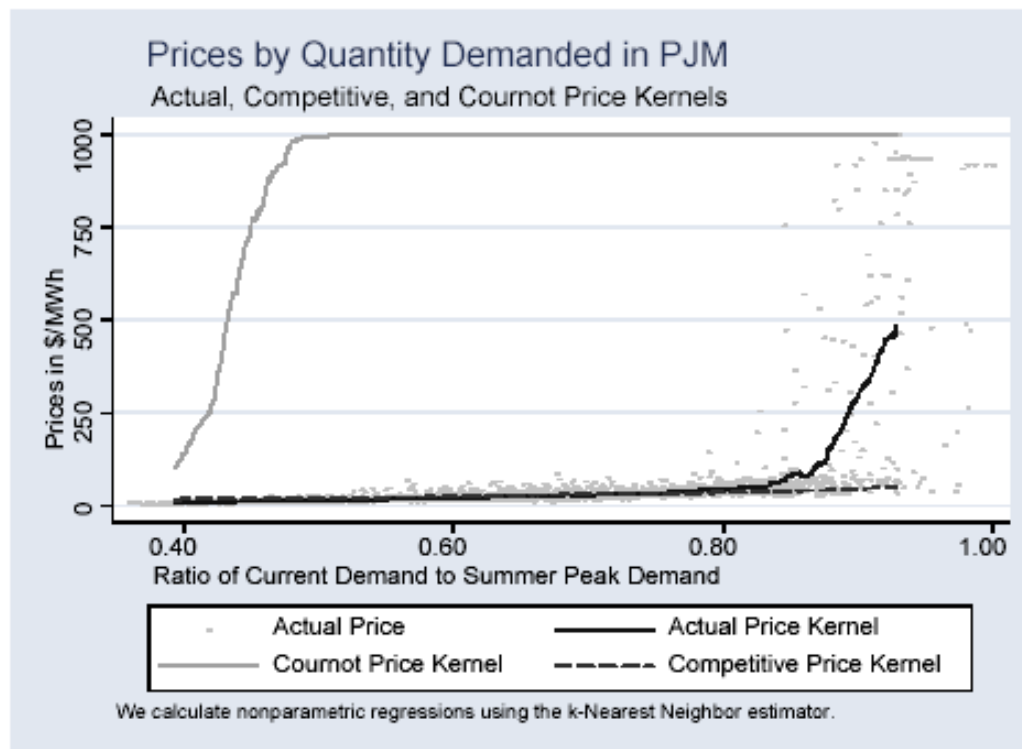


Figure 5:

## Imperfect competition *in reality* (cont.)

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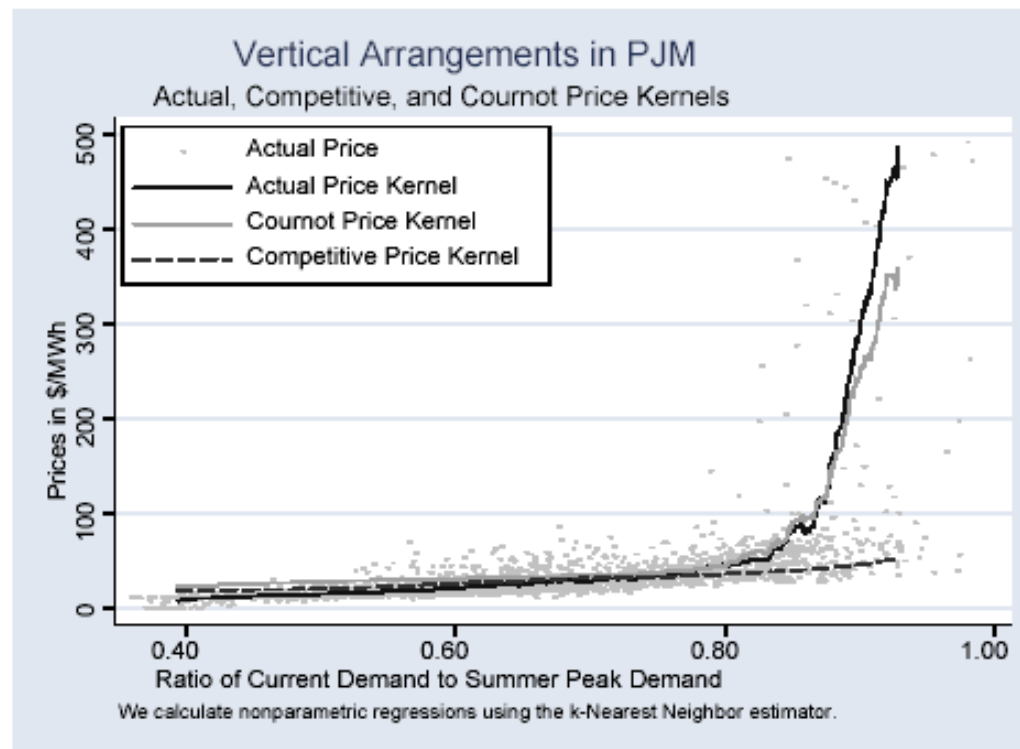


Figure 7:



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