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Market Power and Monitoring
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Conditions for a perfectly competitive market

- Large number of buyers and sellers
- Free entry and exit
- Product homogeneity
- Perfect information
- No externalities

- When these conditions exist,
  - outcome is efficient
  - no need for government action
  - but this is rare

Examples when these conditions are not met

- Entry barriers, such as significant sunk costs
- Information asymmetry
- Negative or positive externalities
- Public goods
- *A firm or group of firms with market power, such as, monopoly, natural monopoly, oligopoly, monopsony*

- These are examples of "market failure" and reason for government action
- The last one is what we will talk about here

What is Market Power?

- Market power is the ability of a firm or group of firms to raise *and maintain* the product price *significantly* above a competitive level
- This is the price leverage a firm has to raise the price above a competitive price
- Must be large enough and persist for an appreciable amount of time to be of concern
- Many firms have some degree of market power -- but it usually does not warrant government intervention

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Why is Market Power a Problem?

- This violates the assumption that all suppliers are "price takers" in a market and cannot control the market price
- Suppliers sell at a price they determine -- not the market -- when they have market power
- The reduced output and higher price causes an efficiency loss to society
- This is a type of market failure that, when significant enough and persists for a long period of time, warrants government intervention

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How is market power obtained and maintained?

- A source of market power, and the ability to maintain it, depends on having or creating *barriers to entry*
  - the higher prices and profits should entice other firms to enter the market
  - effective entry barriers prevent others from entering the market and allow the firm to continue to earn an economic profit

Two Basic Types of Market Power

- Two basic types:
  - Vertical Market Power -- limiting access to customers through price or non-price barriers, e.g., transmission and distribution
  - Horizontal Market Power -- ability to influence the price of a product through strategic use of market share or other special circumstances

What Determines a Firm's Price Leveraging Ability?

- A firm's price leverage increases as *firm demand* becomes more inelastic
- Firm demand becomes more inelastic:
  - the more inelastic the supply from other firms,
  - the more inelastic the *market* demand, and
  - the market share of the firm increases
- These characteristics provides a basis for detecting market power and developing policies to reduce it
- Unfortunately, all three indicate considerable market power in electric markets is possible

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What Makes Electricity Markets Different?

- Markets are concentrated regionally and highly concentrated locally
- There are significant entry barriers still exist
  - for new generation capacity
  - from transmission constraints
  - limited large-scale storage options, at this point
- Inelastic demand
- Continuous interaction of suppliers and knowledge about other suppliers' cost
  - increases the likelihood of strategic bidding and tacit collusion (not covered in FERC "Market Behavior Rules")

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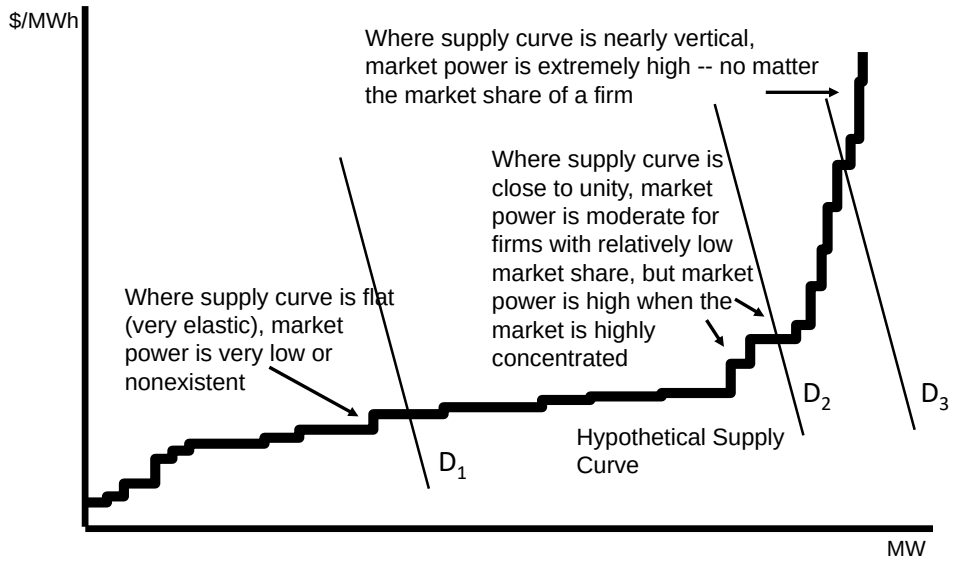
Electricity's characteristics that contribute to market power

- Inelastic supply
  - during supply constrained periods (from high demand, lack of capacity, or both) supply becomes nearly perfectly inelastic
  - long lead times to build new capacity, means it takes time to relieve the constraint
  - transmission constraints limit imports, in most of the country, it is more difficult to build new transmission capacity than generation
  - insufficient mass storage currently

A Firm's Price Leveraging Ability Depends On Where Supply Meets Demand



➔Demand often intersect all three parts -- *on the same day*

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Transmission access for alternative suppliers

- If transmission owners can deny access, it is a serious barrier to entry for potential competitors in the generation market
- FERC has addressed this issue through functional unbundling and operational independence of transmission
- However, current transmission bottlenecks and other physical constraints limit the extent of actual transmission access

Electricity's characteristics that contribute to market power *(continued)*

- Inelastic demand
  - customers cannot respond to price changes quickly
  - most customers have few substitutes for electricity (same for natural gas, and water has *no* substitute!)
  - some customers can generate their own power -- not an economic option for most customers to generate all or most of their power needs

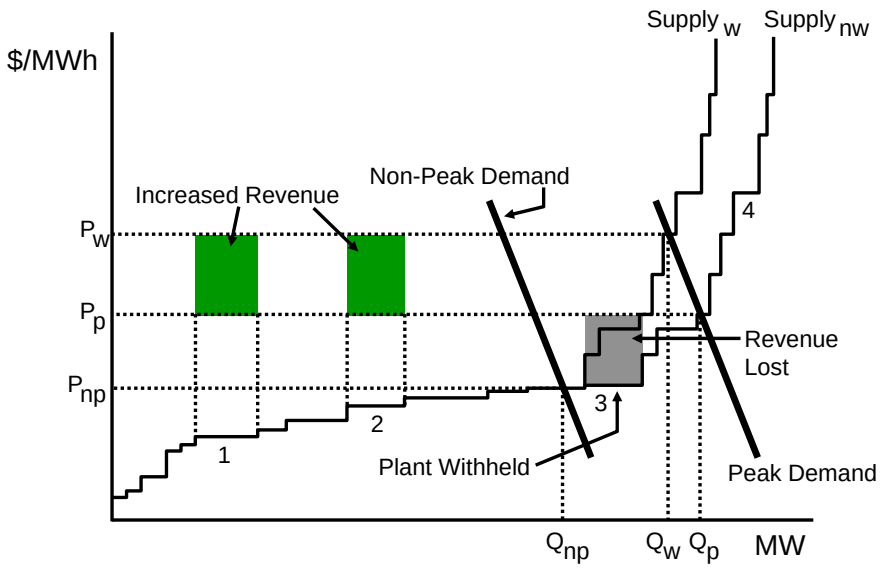
Generation Market Concentration

- Theory tells us that as market share of a firm decreases, its ability to control the price also decreases
- Electric markets are, generally, very concentrated in most areas
- Good economic reasons for some consolidation of generation owners
- There are legal and political impediments to requiring divestiture

How Suppliers Can Exercise and Benefit from Market Power

- Suppliers can create artificial scarcity by:
  - physically withholding capacity to raise the price or
  - economically withhold capacity to raise the price by bidding a very high price
  - of course, this is much easier if there already is scarcity of supply (inelastic supply from other firms) to start with
- Suppliers can also benefit from other suppliers' successful strategies to raise the price

Market supply and demand for non-peak and peak hours (example of "physical withholding" for a firm with 4 units)



Other Ways to Decrease Other Firms' Supply

- Strategic bidding
- Increasing or claiming transmission congestion
  - used as an artificial barrier to raise prices versus actual physical constraints
  - could compare actual power flow patterns with expected flows to detect

Market Power Issues with Demand Response Programs

- Some see demand response as a solution to limit, reduce, or eliminate market power in wholesale and retail markets
  - the argument is that increasing customer responsiveness limits price spikes during peak times
- However, this ignores strategic responses by suppliers (e.g., withholding) to offset demand reduction
- Still have to monitor market performance!

How is Market Power Detected?

- Market concentration measures can be used to characterize a market's structure:
  - market shares and number of firms
    - dominate firm with competitive fringe model example
  - Herfindahl-Hirschman Index (HHI)
    - sum of the squared market shares
    - often used, easy to understand
- These measures are screening tools to decide if further investigation is necessary -- *not for a definitive answer on market power or measuring market performance*

How is Market Power Detected? *(continued)*

- Pivotal Supplier Index
  - measures the percentage of load that can be met without the largest supplier
  - = (total supply capacity - largest supplier capacity) ÷ total demand
  - if the index is less than 100 percent, at least a portion of the largest supplier's capacity is needed to meet total demand and that supplier is "pivotal"

How is Market Power Detected? *(continued)*

- Lerner Index (also called "markup" index)
  - measures the markup of price over marginal cost (as a percentage of price)
  - in a simplified form: (P - MC)/P
- Firm demand elasticity =
  (market demand elasticity * (1/MS) +
  supply elasticity of other firms * (1/MS - 1))
- Landes-Posner Index
- Consider both short term and long-term measures

Measurement Problems

- Include definition of:
  - market
    - geographic size
    - which products compete
  - marginal cost
    - opportunity cost versus marginal cost estimate
  - data quality
  - data collection in a competitive market

What Market Power is *Not*

- Market power is *not* synonymous with market share
- A high percentage of market share is a necessary but not sufficient condition for market power
  - must be a large enough player in the market to have market power, but it is no guarantee
  - firms with relatively low market share will unlikely be able to maintain market power for a significant amount of time

Concentration Measures May Be Particularly Misleading For Electric Markets

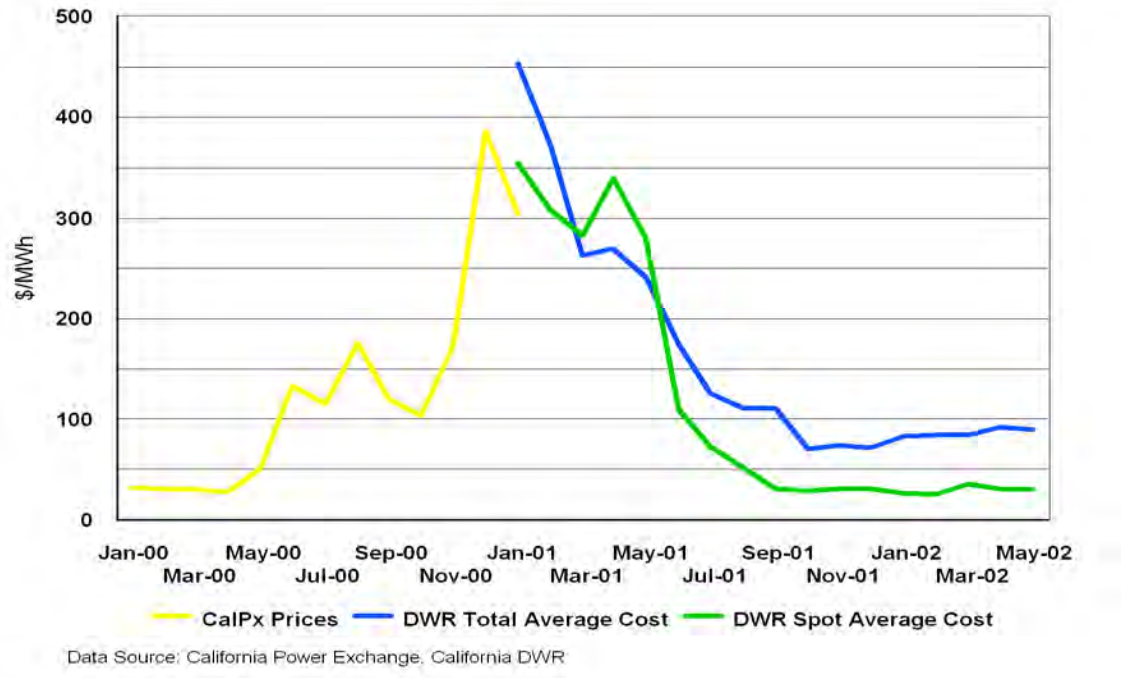
Company	California Market Share-July 1998	California Market Share-July 1999
PG&E	37.3	27.2
SCE	15.9	15.9
SDG&E	7.8	-
Duke	8.5	10.8
AES/Williams	12.6	12.6
Reliant	11.9	11.9
Dynegy	5.1	9.1
Southern	-	10.1
Other	1.0	2.4
HHI	**2104.8**	**1600.6**

*This would suggest that the California market has moved from "highly concentrated" to the gray area between 1000 to 1800, based on DOJ's *Horizontal Merger Guidelines.*

Market Power in California

- Higher wholesale prices were a result of a combination of scarcity conditions (e.g., low hydroelectric generation), higher natural gas prices, ***and*** market power impacts
- Market power may have *averaged* over 40% of the wholesale price in California during the 2000-2001 crisis
- The California wholesale market power problem was reflected in other western states as well

California Power Prices

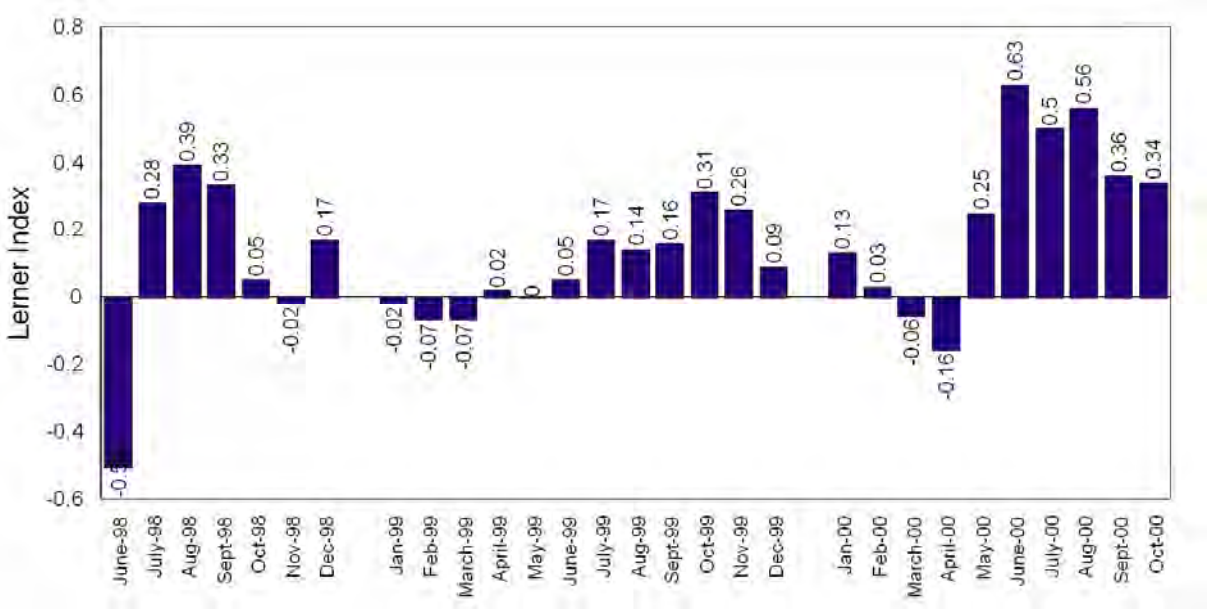


Average Market Power Markup and Percent of Wholesale Price in California

Time Period	MP markup ($/MWh)	Percent of Total Price
1998	3.5	1.2
1999	3.8	9
2000	44	30
Jun 00 - Jan 01	80	45
Aug 2000	116	64
Jan 2001	130	43

Source: Frank A. Wolak, "What Went Wrong with California's Re-structured Electricity Market? (And How to Fix It)"

California monthly Lerner Index for June 1998 through October 2000



Source: Borenstein, Bushnell, and Wolak, "Measuring Market Inefficiencies in California's Restructured Wholesale Electricity Market," June 2002.

Market Analysis Tools Used by FERC

- Market concentration measures
  - Herfindahl-Hirschman Index (HHI), Pivotal Supplier Index
- Monitor for market manipulation (deception and fraud) or affiliate abuse
- Vertical structural requirements for transmission operation
- *FERC's emphasis is on concentration measures, behavior (manipulation and fraud), and transmission operational control and vertical market power*

FERC's Anti-Manipulation Rule

Title 18: Conservation of Power and Water Resources

PART 1c—PROHIBITION OF ENERGY MARKET MANIPULATION

§ 1c.2 Prohibition of electric energy market manipulation.

(a) It shall be unlawful for any entity, directly or indirectly, in connection with the purchase or sale of electric energy or the purchase or sale of transmission services subject to the jurisdiction of the Commission,

(1) To use or employ any device, scheme, or artifice to defraud,

(2) To make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in the light of the circumstances under which they were made, not misleading, or

(3) To engage in any act, practice, or course of business that operates or would operate as a fraud or deceit upon any entity.

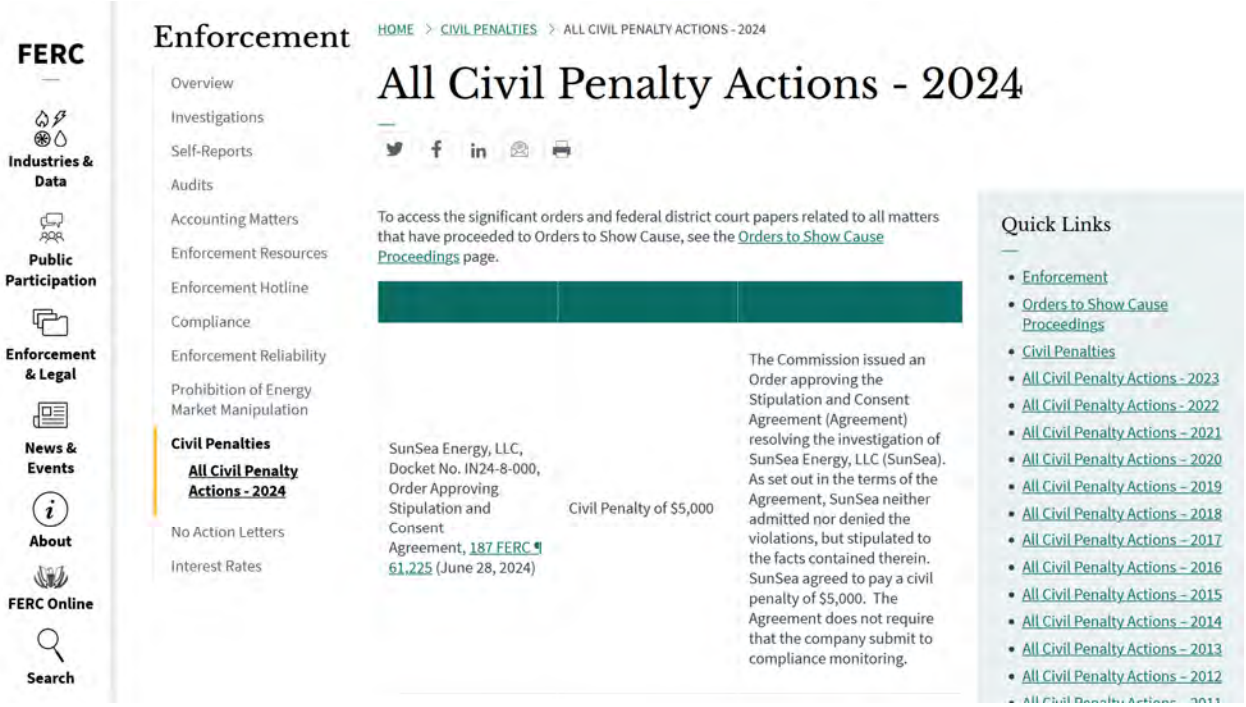
(b) Nothing in this section shall be construed to create a private right of action.

Source: 18 CFR § 1c.2

Order No. 670, Prohibition of Energy Market Manipulation, Issued January 19, 2006.

Prohibition of Energy Market Manipulation | Federal Energy Regulatory Commission (ferc.gov)

Information on FERC's energy market manipulation investigations and enforcement activities



https://cms.ferc.gov/civil-penalties/all-civil-penalty-actions-2024

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Market Monitoring – for market power detection and mitigation

- What about market power that is not manipulation or fraud?
- That's why FERC requires RTOs to have an independent market monitor (IMM)
- They do some mitigation, under certain market conditions
- Could be <u>much</u> improved, more market analysis and be more independent

Market Monitoring

- Monitoring markets
  - supply/demand conditions
    - entry barriers, transmission access/constraints, new entry and entry conditions, price responsiveness
  - prices
  - market power detection
  - evaluate each of the ISO/RTO's markets and other relevant markets (e.g., neighbors with significant interchange)

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Market Monitoring *(continued)*

- Reporting
  - to RTO governing bodies, FERC, states, public, etc.
  - annual and other regular reports
  - reports on special issues or topics
- Suggesting improvements in market structure, procedures, regulations, etc.
- Can identify problems with liquidity, access, or performance in markets and suggest solutions

Final Thought

- Just like a high market share does not always mean there is an ability to exercise market power, high *prices* also do not mean there is market power
- When prices are increasing noticeably, consumers say prices are too high--which happened from about 2002 to 2008—and that renews interest in market power and market design
- But “high” prices is not proof that there *is* market power
- Conversely, when wholesale prices are relatively low, for example, as they were (in many places) after 2008 through 2021, this causes suppliers to complain that they cannot earn sufficient revenue to cover their costs
- But “low” prices is also not proof that there is *no* market power
- You must do the analysis under all conditions, not just when there is a price level change or a crisis