



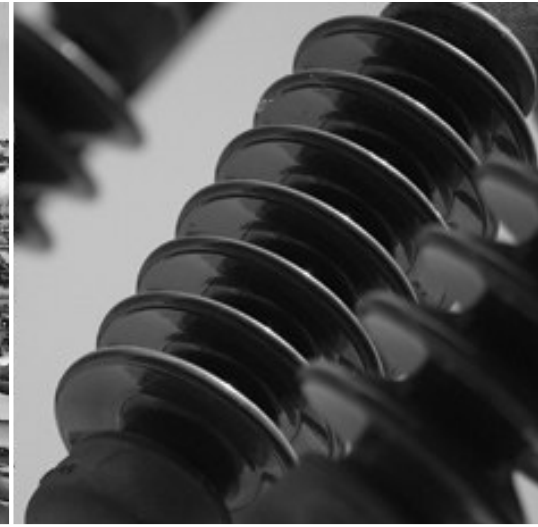
Economics and Energy Regulation: Implications and Challenges for the Electric and Natural Gas Industries

**Law Seminars International
Energy Markets and Regulation**

**Dr. Jonathan A. Lesser
March 15, 2007**

Agenda

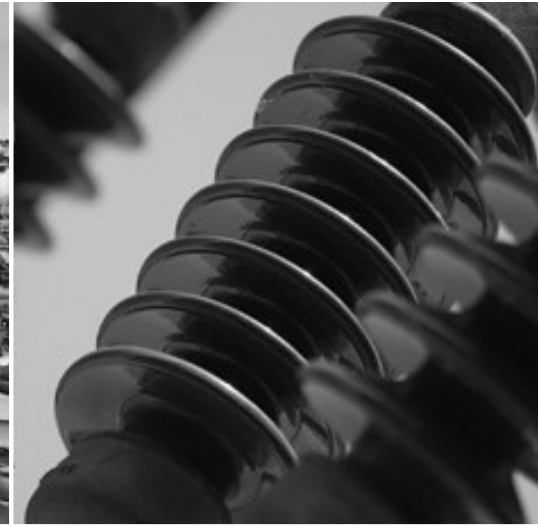
- Overview
- Economic concepts: why regulate?
- Pricing, costs, and rate setting
- Emerging market and regulatory challenges
 - Has electric restructuring benefited retail customers?
 - Environmental regulation



Overview

Natural gas and electric markets today

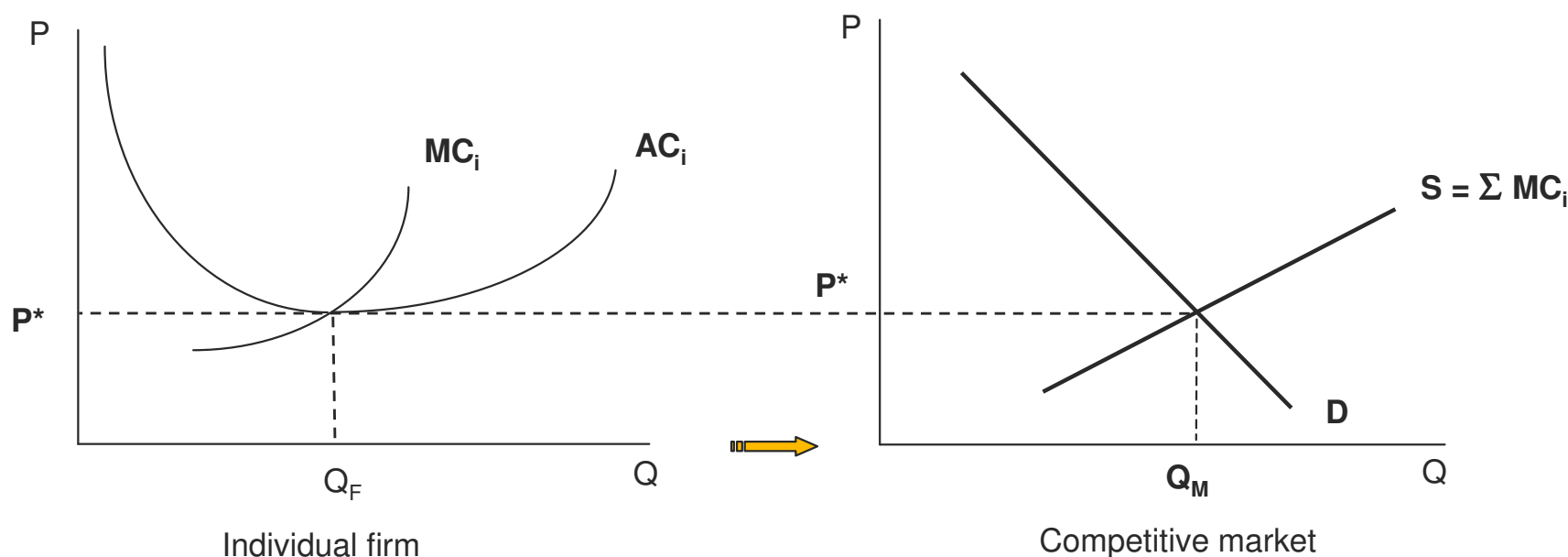
- Natural gas
 - Complete production deregulation
 - Pipelines no longer control production and distribution
 - Open access to pipeline transport
 - Future supply—how much is out there?
- Electric
 - Competitiveness of markets
 - Intense debate over whether restructuring and competition have benefited customers
 - Issues regarding integrated regional markets (e.g., PJM, ISO-NE, NYISO)
 - Bidding (one-price vs. pay-as-bid, “tacit” collusion, and other market power issues)
 - Environmental issues (Clean Air Act compliance, global climate change)
 - Transmission facility siting and development



Economic concepts: why regulate?

The competitive ideal: market price equals marginal cost, and the overall market value is largest

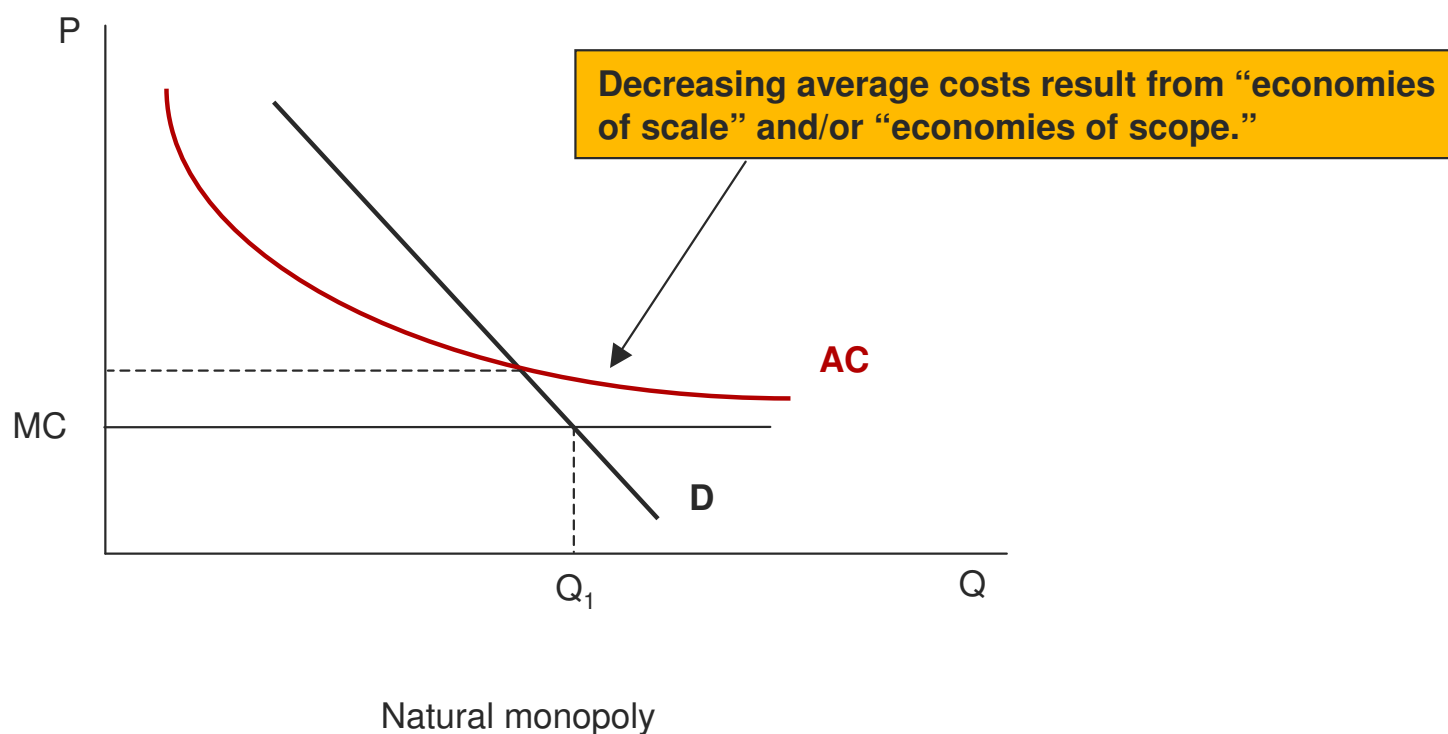
- Perfect competition: each firm produces where $AC = MC = \text{market price}$



The market supply equals the sum of the individual firms' MC curves

Natural monopoly—one firm can meet all demand at the lowest average cost

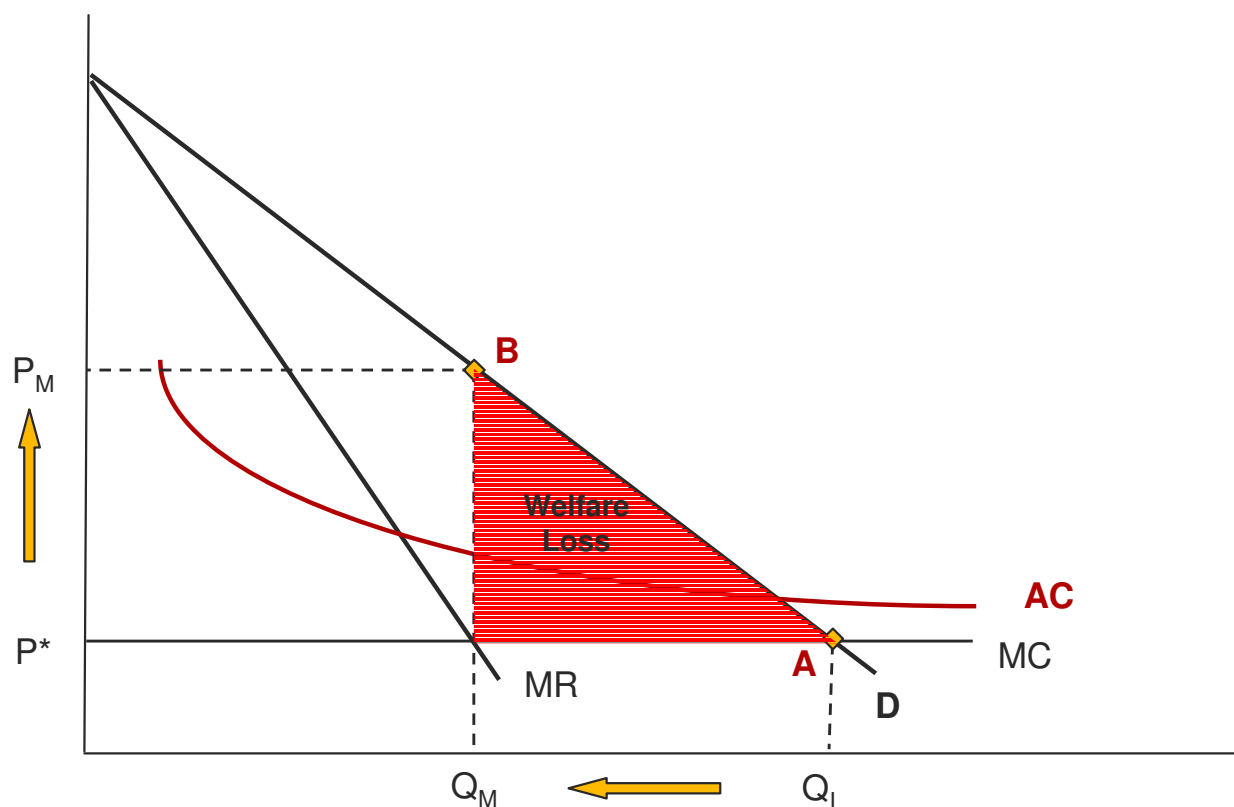
- Gas and electric transmission/distribution industries have natural monopoly characteristics, which resulted in regulation
 - Courts determined that both industries were “affected with the public interest”



Electric generation was once thought to be a natural monopoly. PURPA and the Energy Policy Act of 1992 changed that thinking.

How monopolies maximize profits

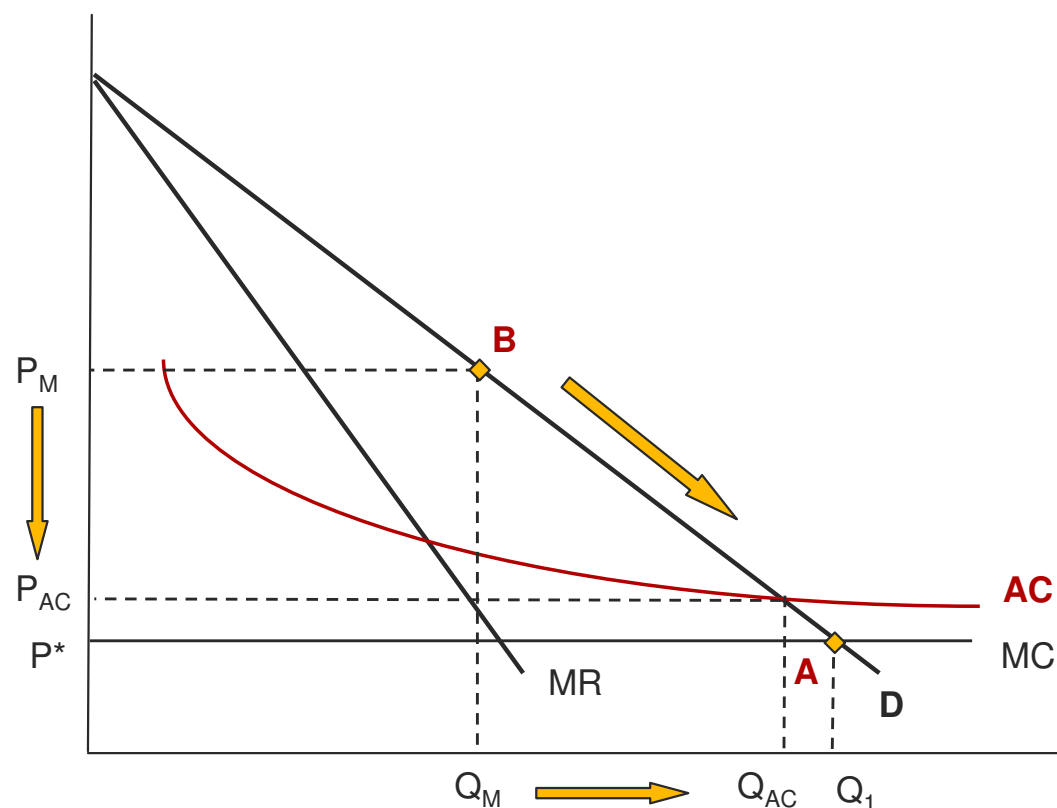
- Monopolies don't price to sell at the lowest cost, they price to maximize profits
 - Results in lost economic value



Instead of the competitive solution (Point A), an unrestricted monopolist will set the price where incremental revenue (MR) equals incremental cost (MC) (Point B)

The regulatory challenge: balance market efficiency vs. cost recovery, and ensure that prices charged are “fair, just, and equitable”

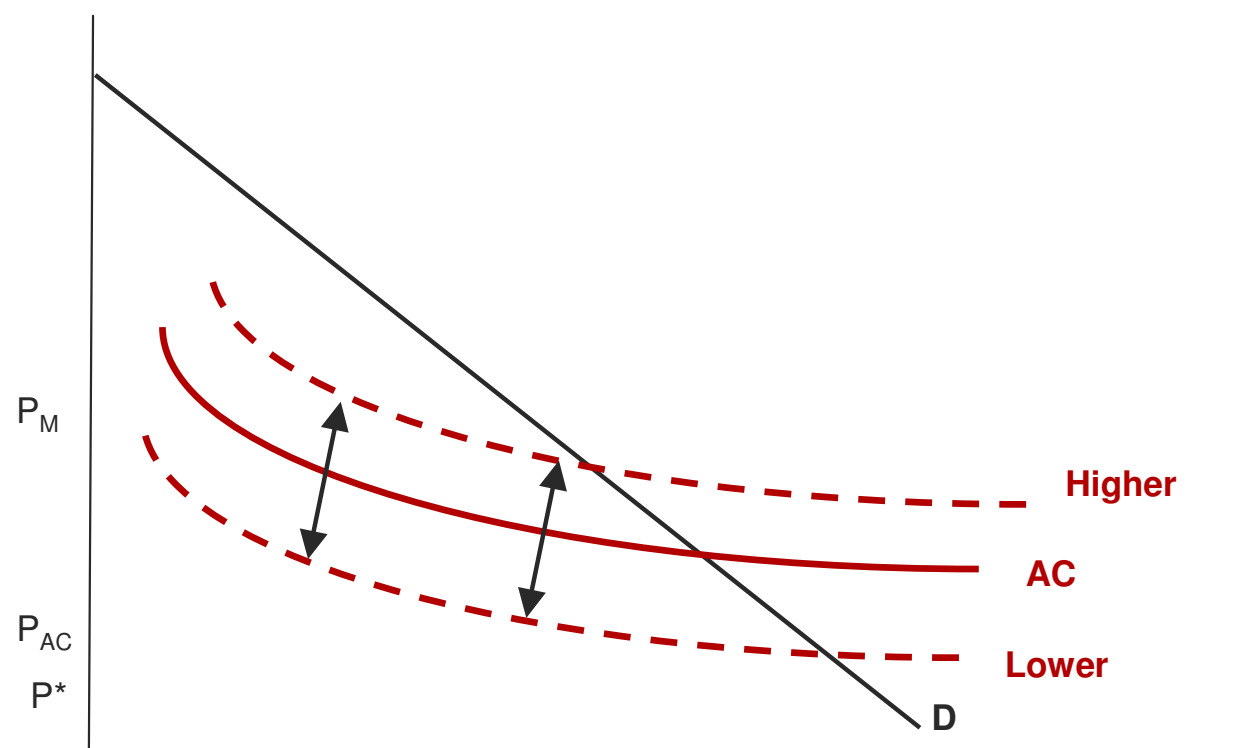
- Force the firm to sell Q_1 at price P^* and the firm will go out of business ($AC > MC$)
- How to regulate the firm so that it will produce at “A,” but still recover its costs?



The economic case for electric and gas regulation focuses on moving firms from B to A, while taking advantage of economies of scale

Complicating factors for regulators

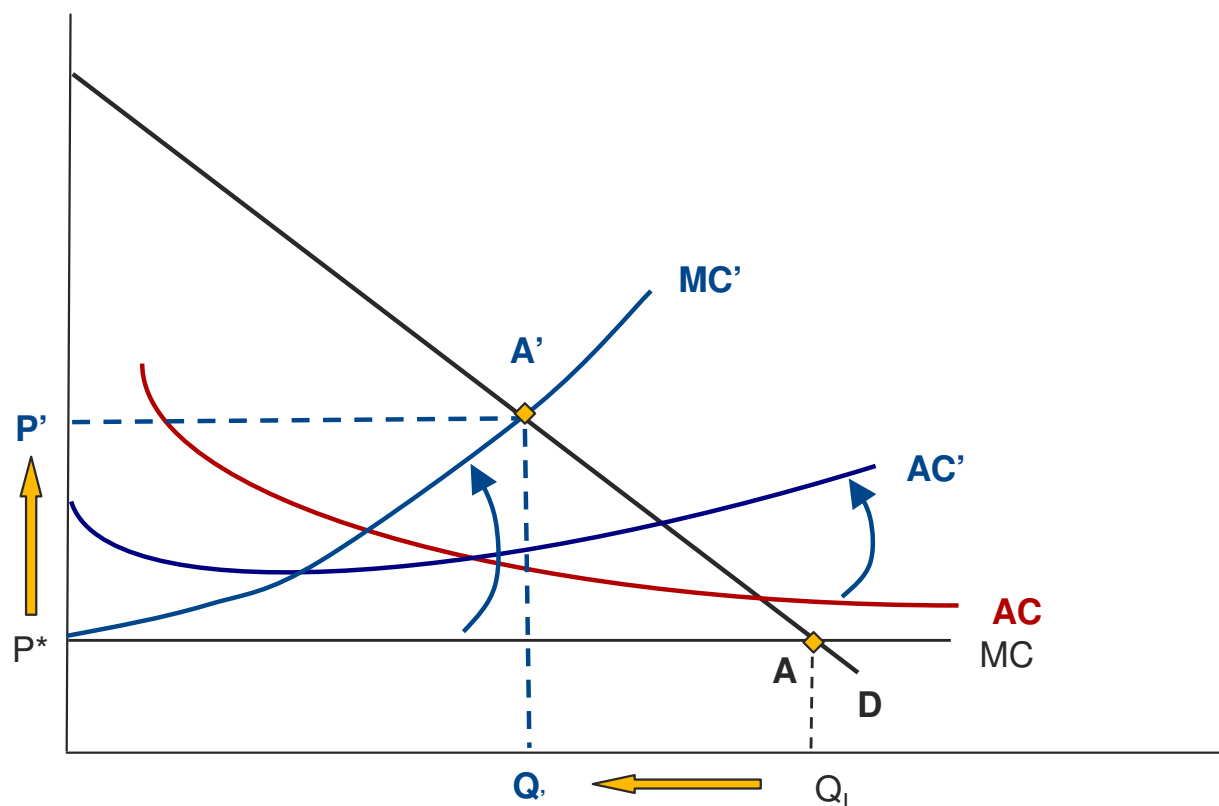
- Regulators don't know what the firm's AC curve really looks like
- Lack of competition can increase a firm's costs



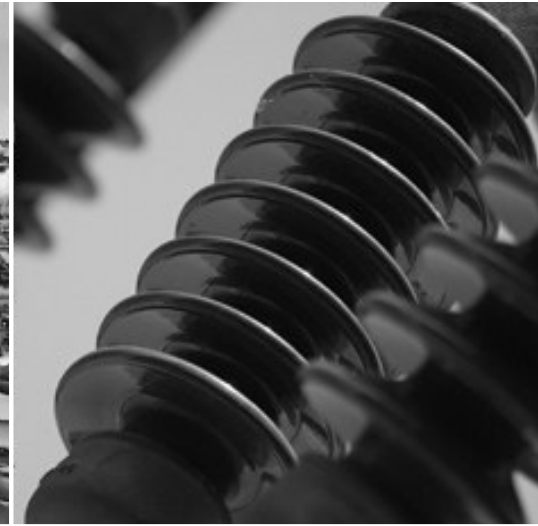
Firms have a much better idea of “true” costs than regulators and also have an incentive to increase their capital costs

Complicating factors for firms

- Regulators sometimes implement policies that increase firms' costs



Regulators sometimes see utilities as “tax collectors” or “policy vehicles,” and may impose new costs on utilities and customers



Pricing, costs, and rates

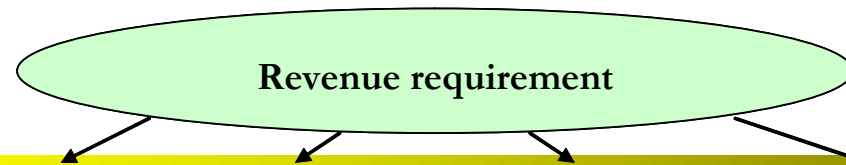
Determining regulated rates and tariffs

- Establish rates using a five-step process
 1. Revenue requirement underlies all forms of regulation (COS, PBR, model company, etc.). Estimate firm's base level of operating costs in the test year.
 2. Functionalize costs. What costs are for which purposes (transmission, distribution, etc.)?
 3. Classify costs—fixed, variable, or customer?
 4. Allocate costs—distribute to different rate classes
 5. Set rates/tariffs
 - Regulators must often balance multiple goals, which can complicate how tariffs are designed

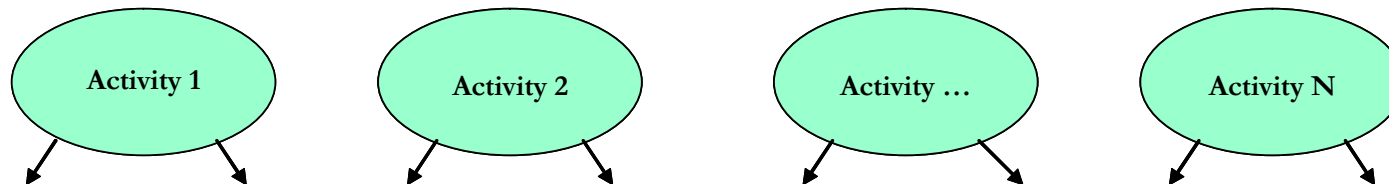
Deviating from traditional “efficiency and equity” policy goals can complicate price setting

Determining regulated rates and tariffs: the five-step rate process

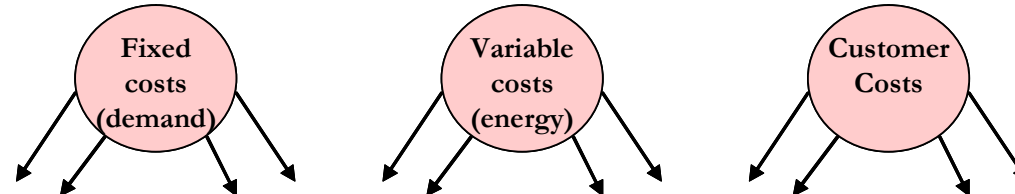
Step 1. Determine the revenue requirement:



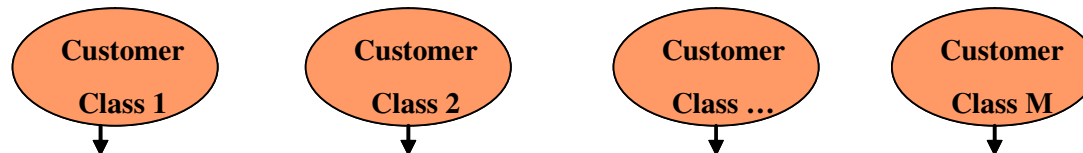
Step 2. Functionalize costs



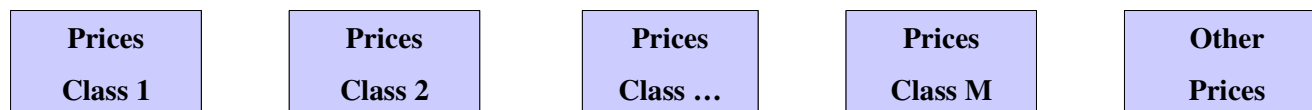
Step 3. Classify costs



Step 4. Allocate costs



Step 5. Establish rates and tariffs



Setting the revenue requirement

- Evaluate costs
 - Determine whether operating expenses are reasonable
 - Operating costs—are they “known and measurable?”
 - Depreciation costs—how estimated?
 - Determine if capital investments are “prudent” and “used-and-useful”
 - Prudence
 - First reference: Justice Brandeis’s dissent in Mississippi ex rel. Southwest Bell vs. Missouri Public Service Comm’n, 262 U.S. 279 (1923)
 - Requires an economic decision model: **how would a utility make a capital investment decision based on the information that was known at the time?**
 - Used-and-useful
 - First reference: Denver Union Stockyard Co. v. United States, 304 U.S. 470 (1938)
 - Really a “literal” test of an asset’s function
 - Some regulators interpreted test as having an economic basis, i.e, that generation was not “useful” if cost was above the “market”

Prudence and used-and-useful determinations became prominent regulatory issues as a result of nuclear plant cost overruns

Setting the revenue requirement (cont.)

- Establishing a “fair” regulated rate of return on capital investment
 - Challenge: the return investors “require” cannot be directly observed
 - Legal Origin: the “fair value” doctrine in Smyth v. Ames, 169 U.S. 466 (1898)
 - Changed to a basis of “comparable” risk assessment: Federal Power Comm’n v. Hope Natural Gas, 320 U.S. 591 (1944)
 - Because of ongoing market changes, a comparable risk assessment involves making predictions about the future industry landscape
 - Emerging issues
 - How to determine comparability of new entities (e.g., independent transmission companies?)
 - How does the financial risk of existing companies (e.g., pipelines) change when their customer mix changes (say, because of deregulation)?
 - ROE incentives to encourage transmission investment, how much and who should receive them?
 - Recent FERC ROE rulings (Kern River, Bangor Hydro) revealed contradictory reasoning

Functionalize and classify costs

- Functionalization
 - Important to distinguish between regulated and unregulated costs
 - Avoid cross-subsidies
 - Straightforward, except for items such as nonallocable costs like “overhead” (“A&G costs”)
 - Different methods used (Kansas-Nebraska, Massachusetts)
- Classification
 - Fixed, variable, or customer
 - Important because tariff structure may want to distinguish between them, recover fixed costs from “fixed” tariff component, variable from usage
 - Idea behind FERC SFV tariff structure for interstate gas pipelines

Allocate costs

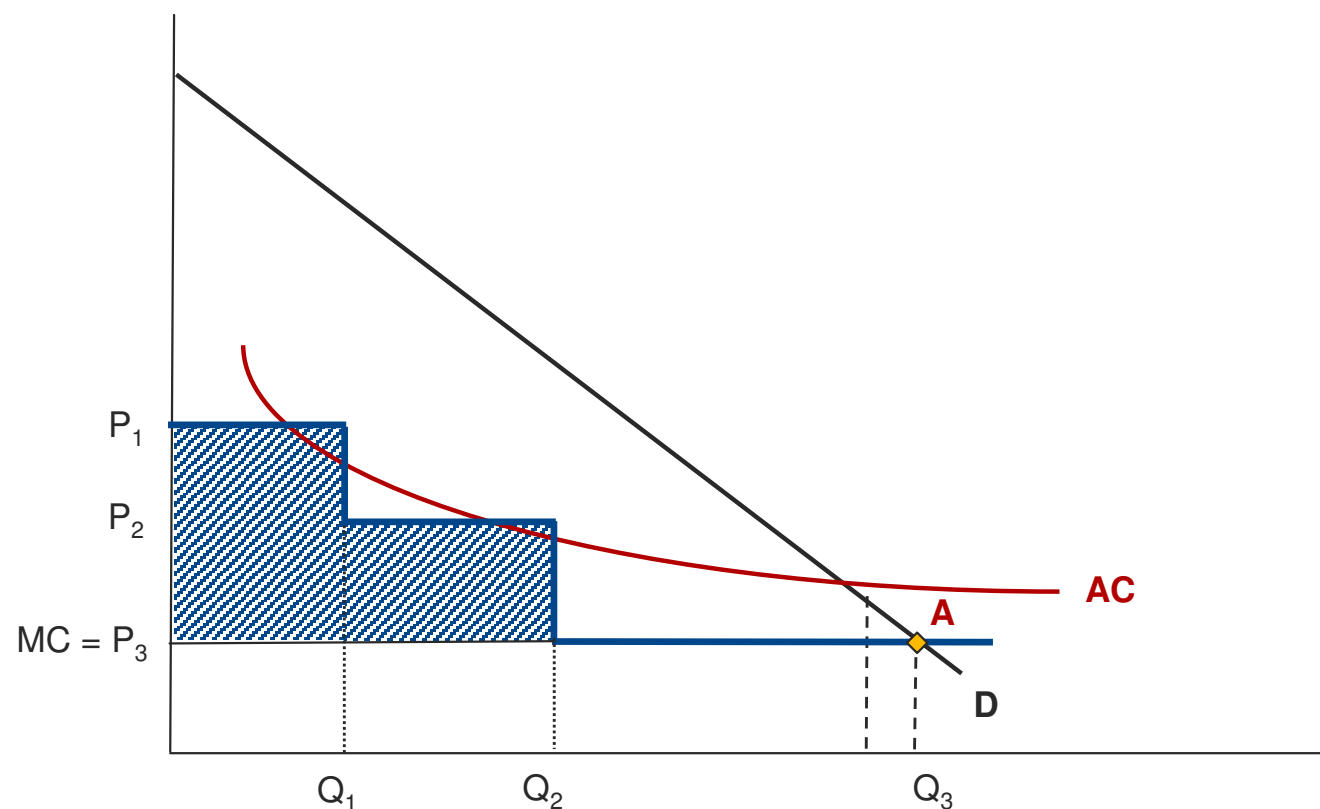
- Controversial—ultimately a zero-sum game.
 - Groesbeck v. Duluth, S.S. & A. Ry., 250 U.S. 607, 614-16 (1919). “It is much easier to reject [cost allocation] formulas presented as being misleading than to find one apparently adequate.”
 - “*Considerations of fairness, not mere mathematics, govern the allocation of costs.*” Colorado Interstate Gas Co. v. F.P.C., 324 U.S. 581, 591 (1945).
- Complicated by “joint” costs
 - Joint costs arise when goods/services must be produced together
 - Classic example: a steer provides meat and leather. How much of the total cost of raising the steer should be allocated to each?

Setting rates and tariffs

- Rate setting attempts to balance multiple goals
 - Political considerations
 - “Fair, just, and equitable”—difficult to define empirically
 - Cross-subsidies
 - Universal service established as a goal for electricity as part of Rural Electrification Act (1936)
 - Urban customers tend to subsidize rural customers
 - Commercial and industrial customers tend to subsidize residential customers
 - High-use customers tend to subsidize low-use and low-income customers

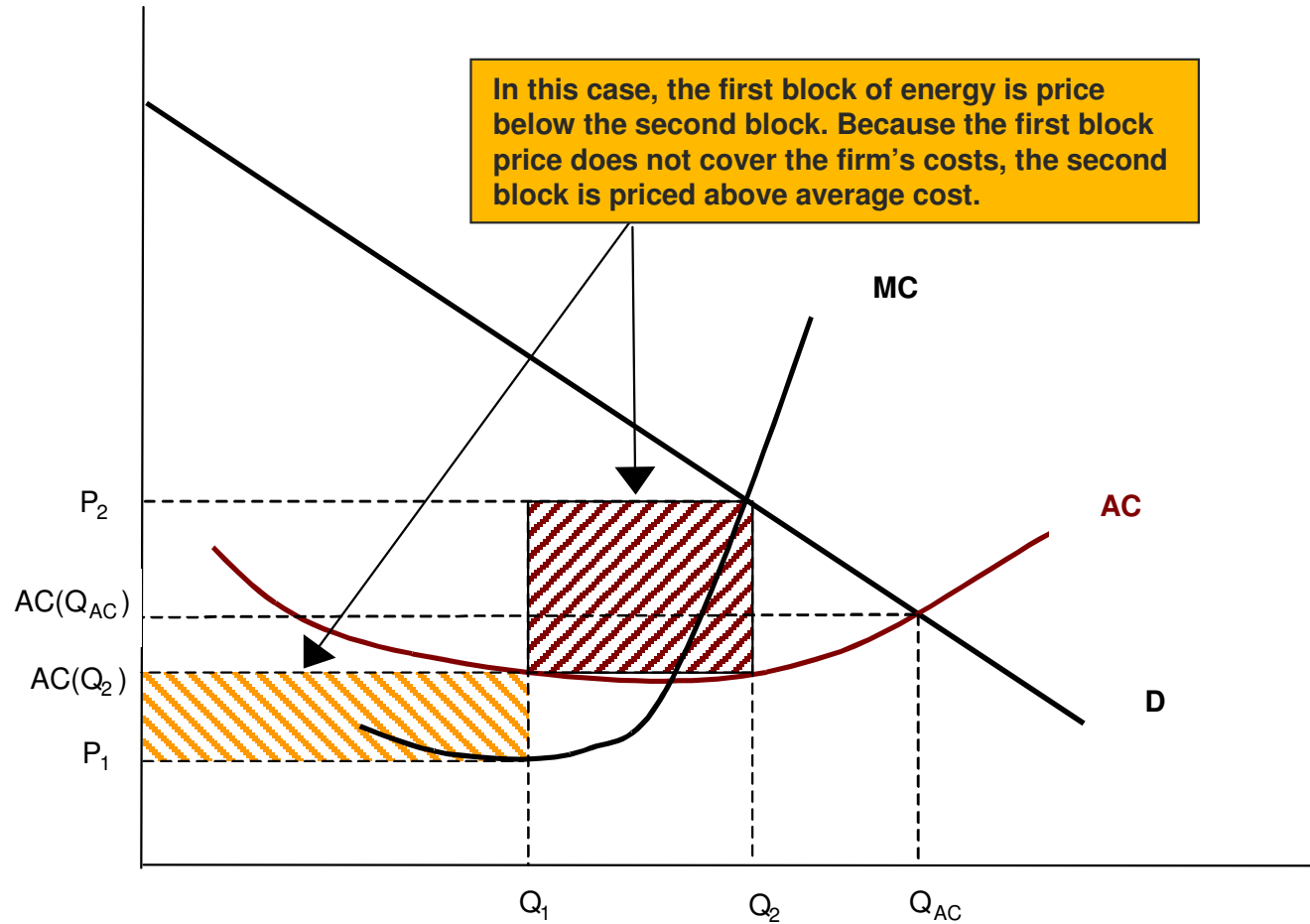
Pricing for economic efficiency

- Two primary approaches to pricing economic efficiency, depending on the market segment
 - Combine a high fixed charge with marginal price for variable consumption
 - FERC's SFV approach
 - Use a multipart tariff, in which prices vary with the amount of consumption



Multipart tariffs can be used to achieve the economically efficient outcome (Point A), while still recovering a firm's total costs

Multipart tariff (increasing costs)





Emerging market and regulatory challenges

Electric industry challenges

- Generation
 - How competitive are wholesale generation markets?
 - Market power, allegations of “tacit collusion”
 - Pay-as-bid vs. clearing price
 - What to build, and where? (renewables, nuclear, coal, etc.)
- Transmission
 - How to improve reliability, security (short-term), and adequacy (long-run)
 - Issues surrounding installed capacity markets, markets for other ancillary services
- Environmental regulation
 - Global climate change: demarcating state and federal roles
 - Market-based vs. “command and control” regulation
 - Allocation of CO2 emissions permits
 - Renewable portfolio standards

Natural gas industry challenges

- Pipelines
 - How should LNG storage be integrated into existing pipeline and LDC systems?
 - How risky are pipeline investments?
 - Are market-based rates for pipelines reasonable
 - Is there sufficient competition?
 - Regulated rates of return and depreciation
 - How risky are pipeline investments?
 - Economic lifetimes and future natural gas supplies—how much natural gas is out there?

Market power and its impacts

- With deregulated markets, balancing market power mitigation is crucial
 - Firms with market power can increase prices and restrict output, reducing economic efficiency
 - But, market monitoring to prevent potential market power abuse can be too heavy handed, reducing competitive benefits
- Two types of market power
 - Horizontal
 - Vertical
- Electric and natural gas markets are susceptible to market power abuses
 - High “barriers to entry” mean less price discipline and higher costs
 - Opportunities for self-dealing, cross-subsidies, and affiliate abuse

Typically, economists determine whether markets are “workably competitive.”

Significance of market power on mergers, deregulation, and market-based rate applications

- Regulators assess market power in numerous circumstances
 - Mergers and acquisitions
 - Market concentration versus economies of scale and scope
 - Market-based rate applications
 - Are the markets in which wholesale electric generators operate competitive?
 - Markets for specific services
 - Gas pipeline storage services
 - Generation capacity markets

**Small firms can benefit from the market power of a dominant firm.
This is sometimes referred to as a “ price umbrella.”**

Measuring market power

- Regulators use different tests
 - Market share tests
 - Pivotal suppliers' test
 - Herfindahl-Hirschman Index (HHI)
 - Delivered price test

Evaluating barriers to entry in different markets is crucial

Economic withholding—bidding above marginal costs

- In competitive markets, suppliers still bid above marginal cost
 - Creates profits
 - Attracts more competition
 - Produces economies of scale
 - Reduces overall costs
- Bidding above marginal cost does not necessarily mean:
 - Collusion among participants
 - Dominant suppliers
 - Insufficient generation supply
 - Demand that is unresponsive to price
- Induces new entry by other firms

Bidding above marginal cost occurs whenever the *residual* demand curve is upward-sloping—a characteristic of almost any real market

Creating new electric transmission markets

- Transmission market design is relatively new and complex.
 - Transmission markets provide multiple related products
 - Electrons obey Kirchoff's laws, not economists' market designs
 - Need to balance market "watchfulness" versus onerous regulation
 - Overcome transmission operators' reliance on cost-based agreements with generators
 - Locational marginal prices can improve economic efficiency
- Determine appropriate transmission system investments
 - Should a competitive market be as reliable as a fully regulated one?
 - How to allocate investment costs across regions?

Transmission systems are "bottleneck facilities": without access to transmission markets, wholesale generators cannot compete

Is wholesale electric competition working?

- Calls to reregulate in the wake of higher “default service” prices
 - Caused by run-ups in natural gas prices
- Concerns that organized regional markets (e.g., PJM, ISO-NE) are not competitive
 - Market power resulting from “tacit” collusion (i.e., bidders gaming markets because of multiple auction rounds)
 - Single-price bidding means that consumers are paying “too much” for low-price resources, like nuclear power and baseload coal
 - Are we forgetting the problems of the past—cost overruns of nuclear plants, poor operating records, imprudence, etc.?

Wholesale electric markets are highly competitive. Significant benefits have resulted from expanding these markets.

Is wholesale electric competition working (cont.)?

- Empirical evidence is that wholesale competition is working
 - Improved operating efficiencies at unregulated plants relative to regulated ones
- Wholesale competition far better at allocating risks to those who can best manage them, rather than ratepayers, who cannot
- These concerns are unfounded
 - Tacit collusion (“conscious parallelism” in antitrust terms) not illegal. Impossible to not take into account others’ bids
 - Single price—cheap power would not be “cheap” under alternate auction design called “pay-as-bid”
- The “good-ol’-days” weren’t necessarily that good

“Those who cannot remember the past are condemned to repeat it” – George Santayana (1905)

Environmental issues

- States are increasingly adopting their own environmental regulations
 - Renewable portfolio standards
 - CO₂ emissions caps
 - Not if, but when and how stringent
 - Other CO₂ restrictions possible—e.g., carbon taxes
 - More stringent restrictions on Clean Air Act criteria pollutants than federal laws
 - Example: Maryland Healthy Air Act

Building new infrastructure—risks in today's environment

- Without sufficient infrastructure, gas and electric markets don't work
 - Lack of infrastructure creates market barriers and increases costs,
- All infrastructure investment has risks and nonmarket costs
 - LNG facilities—fear of terrorist attacks that will cause explosions
 - Baseload electric generation—environmental opposition
 - Gas pipelines—visual impacts, fear of explosions from leaking gas underground
 - High-voltage transmission lines—visual impacts, health fears from EMF

Regulatory uncertainty creates market barriers

- Firms need regulatory certainty, especially when regulators create new markets
 - Balance “fixing what’s broke” vs. changing rules midstream
- Developers face financial hurdles
 - Banks reluctant to provide equity capital
 - Buyers unwilling to sign long-term contracts
 - Uncertainty about future environmental regulations
 - Uncertainty about reregulation

In 2004, utilities repurchased \$2 billion worth of unregulated generating assets and placed those assets into rate base

Summary

- Energy regulation continues to evolve, especially for the electric industry
- Fundamental economic principles still apply
- Deregulation has created a more complex regulatory framework
- Gas and electric industries continue to face economic challenges
 - Infrastructure development to meet growing consumer demand
 - Regulatory uncertainty and restricted access to capital markets
 - Market power and high market barriers
- State-level efforts to reregulate the electric industry are likely to do more harm than good



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Jonathan A. Lesser, Ph.D., is a Partner with Bates White, LLC. Dr. Lesser has more than 20 years of experience working for electric utilities, government, academia, and as an economic consultant. He has addressed and testified on major economic and regulatory policy issues affecting electric and natural gas utilities, including their structure and operations, cost allocation and rate design, capital investment decision strategies in the presence of market and regulatory risk, cost of capital, risk management, incentive regulation, and general regulatory policy. Dr. Lesser is the coauthor of *Fundamentals of Energy Regulation*, which will be published in 2007 by Public Utilities Reports, Inc.