ESD 126

Approaches to the Economics of Regulation

Background to Regulation

- *Why Regulate? (Why not competitive Market? ...)*
- *Market Failure*
  - Public Goods
  - Incomplete Information
  - Externalities
  - Natural Monopolies

"Natural Monopolies"

- *Scale and Scope Economies*
  - Vertical Integration (Scope)
  - Horizontal Integration (Scale)
- *Fixed and Nonliquid Investments*
  - Scale
  - Unused assets
- *Unitary Functions (Wires)*
  - Transmission
  - Distribution
- *No Substitutes for Product*
- *Price Discrimination*
  - Inverse Elasticity Rules for Pricing

Neo-classical Economics

- *Efficient Allocation of Resources given preferences, techniques and resource availability*
- *Knowledge is a "given"*
- *Question asked: Does the market provide the correct incentives? If not, there is a need for governmental entry.*

Austrian Economics

- *The issue is the discovery of knowledge about preferences, techniques and resource availability in the market*
- *Assumption is the discovery is the critical element which occurs to work toward equilibrium which is never achieved*
- *Governmental actions impede rather than assist in the process of discovery*
- *Private property rights are key element*

Cost Based Regulation: I

- *Characteristics of Cost*
  - Undepreciated embedded cost of capital
  - Operating costs
    - Fuel
    - Administration
  - Allowances for (i.e. included as capital)
    - Fuel Stocks including nuclear
    - Financial Buffers

Cost Based Regulation: II

- *Risk Allocation*
  - Spread across players
- *Input Inefficiency*
  - Averch-Johnson Effects
  - "Gold Plated Systems"
- *Output Inefficiency*
  - Output mix may not be efficient
  - Based on differential elasticity of demand
- *Technological Change*
  - Monopolies do not need to innovate to survive
  - No incentive for technological innovation

Cost Based Regulation: The Calculation Process

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- *Iterative*
  - Final answer is a function of costs which are a function of allowances and rate of return ...
- *Negotiated (rate of return)*
  - Regulator is King
- *Adjudicative*
  - Disallowances -- Lunch at the Ritz, !/2 of a nuclear power plant
- *? Punitive*
  - Poor decision (ex post)
  - Insufficient environmental or DSM actions
- *Timing of Review...*
  - Dependent on the rate of change of cost

Revenue Requirements

- $R = O + D + T + kB$

- Where R = total revenue requirement
- O = total operating expenses
- D = annual depreciation charges
- T = income taxes
- k = allowed rate of return
- B = rate base

- $\text{Price} = \frac{\text{Revenue Requirements}}{\text{Quantity Demanded}} = R/Q$

Criteria for a Fair Return in the Setting of Utility Rates *ESD 126*

- *Capital-attraction*
- *Management-efficiency*
- *Consumer-rationing*
  - Balancing of criteria between consumer and investor
- *Rate-level Stability and Predictability*
  - Equity vs. Efficiency
    - Fixed revenues place risk at rate payer, fixed rates shift risk to the shareholder
  - Flexibility
    - Required because of inconsistent application of rules
- *Fairness to Investors*

Setting the Rate of Return

- *Utility investors are entitled to a rate of return that is equivalent to what could be earned by similar investments in a non regulated industry accounting for both risk and uncertainty. The rate should be sufficient to assure confidence in the soundness of utility and be sufficient to maintain a credit rating that will allow the utility to raise capital (Bluefield Water)*

Incentive Based Regulation: I

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- *Separate regulatory return from cost of operations*
  - RPI-x
  - Incentives are to minimize costs against required minimal performance
- *Earnings based on Performance Criteria*
  - Against others in industry
  - Against other industries
- *Timing -- Relatively long duration*
  - Agreed to in advance -- a contract

Incentive Based Regulation: II

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- **Risk Allocation**
  - Held by the regulated entity -- fixed (maximum) price to the consumers of the product or service
- **Input Inefficiency**
  - Unlikely
- **Output Inefficiency**
  - Output mix may not be efficient for the consumer though may be very efficient for the producer
  - Based on differential elasticity of demand
- **Technological Change**
  - Strong incentive if it is cost saving
  - Question of timing of results of change -- short term favored over any long term (beyond end of review period)

Incentive Based Regulation: III

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Regulators must determine

- *What prices will be regulated*
- *How an average price should be defined*
  - KW or kWh, for instance
- *Other restrictions on relative prices*
- *Quantity of other cost pass through*
- *How to deal with regulatory quality and investment*
- *Length of time between regulatory reviews*

Incentive Based Regulation: ESD 126 The Calculation Process

- *Initiation of process is difficult*
  - Source of initial price upon which to apply RPI-x
- *Negotiated against a given criteria*
  - Allowable price is function of level of profitability in previous time period plus estimate of efficiency gains possible during the next time period
  - In RPI-x, determination of x is issue
  - Regulator has only single degree of control -- x.

Relationship between ROR and RPI-x based regulation

- *At the extreme, RPI-x degenerates into ROR since it is not possible to lower the revenues below the point of minimum return on investment.*
- *The key is that it may not be possible to arrive at the same point when starting with ROR base entirely on the process by which ROR is determined and the incentives within ROR for inefficiencies in operation and investment*

Responses to Regulation

Littlechild (UK) Description / Choice

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- *"Rate of return control, whatever variant, suffers from two major defects. First it is burdensome and costly to operate, reduces the incentive to efficiency and innovation, and distorts the pattern of investment. Second, it covers the whole business, or a large part of it , and it does not focus explicitly on the particular services where monopoly power and public concern are greatest."* *(Littlechild, 1984 report on British Telecom)*

Types of Regulation

- Price (Monopoly)
- *Environmental*
  - Economic --Tax
  - Physical
    - Emissions Trading (1990 US Clean Air Act Amendments)
- *Health and Safety*
  - Physical -- primarily
- *Standards*
  - Based in economics??
  - Primarily physical through characteristics of a product or a process
    - anti competitive

Regulatory Response: Rate of Return (RoR)

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- *Capital Expenditures*
  - If Averch Johnson, then maximize if ROR > cost of capital
- *Operating Costs*
  - Pass through ==\> little incentive for efficiency except as provided by regulatory disallowances after the fact
- *Timing of / to regulatory review*
  - If costs are declining (1900 to 1973) then utility wants to delay review for as long as possible.
  - If costs are increasing, utility wants frequent reviews or automatic adjustment clauses
- *Consumer behavior*
  - If costs are increasing, challenge all aspects of utility costs
- *Regulator behavior*
  - Provide check on expenses, incentives for efficient operation and investment

Regulatory Response: RPI – x

(RPI = Retail Price Index and x = productivity index / estimator)

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- *Capital Expenditures*
  - Incentive as trade-off to operating costs
- *Operating Costs*
  - Effort to minimize
- *Timing of / to regulatory review*
  - Stretch out as function of expectation of change in x
  - Oscillatory behavior in savings to “game” regulator
- *Consumer behavior*
  - Push for high x
- *Regulator behavior*
  - Evaluates cost structure and, significantly, the potential for technological change in the evaluation of x