The Natural Monopoly Problem

Now that We are Better With Costs

- Show a natural monopoly in action and how it can harm society.
  - This is about welfare.
  - Efficient production and pricing produces negative profits.
- How a natural monopoly can transform to perfect competition with sufficient scale.
- How with small scale that markets could flip flop from monopoly to competition.
- Some highly theoretical solutions
  - Two-part tariff
  - Discrimination
  - Ramsey Pricing
  - Loeb-Magat
  - Franchise Bidding

More Realistic Solutions

- Regulation of some kind: Cost of service, incentive, Yardstick competition, etc.
  - These include elements of the "Highly theoreticcal solutions".
- Public Ownership

Why Realistic?

- Regulation is subject to adverse selection (asymmetric information) and moral hazard (Can change behavior after the fact).
  - Mostly about effort to reduce costs.
- Realized cost, outputs, some quality measures, and price are verifiable but costs are hard to disentangle.
- The firm can exit.
- The regulator may be self-interested or may try to maximize social welfare.

Natural Monopoly

We Will Show with assumption of one price:

- Having a natural monopoly does not guarantee positive profits and production.
- They produce less than the socially optimal output.
- The socially optimal output produces negative profits.
- They reduce consumer surplus and induce deadweight loss

Natural Monopoly

We Will Show with assumption of one price:

- Introduce the idea of minimum efficient scale (MIS)
- Show how with low demand, we can best be served by one firm.
- High demand, multiples of MIS can be competitive and have competition induced low costs.

Costs with Sub and Super additivities

We Will Show with assumption of one price:

- Sometimes one firm and sometimes more can produce at lowest cost.
- Sometimes the low cost solution produces the highest price
- Sometimes the high cost solution produces the lowest price.

A Two-Part Tariff Fix

We Will Show Graphically under the assumption of full information and no adverse selection:

- You can provide a lump-sum subsidy to the firm in exchange for marginal cost pricing and achieve efficent production.
- You can achieve a similar result with a two part tariff, $A + pq$
- Heterogenaity makes this hard. Example industrial and residential consumers.

For Those Interested in the Math

- Gross Surplus: $S(q, \theta)$
- Customer type: $\theta \in [\underline{\theta}, \overline{\theta}]$
- Objective for the just participating type, θ:
  $S(q(p, \theta*), \theta*) - A - pq(p, \theta*) = 0$
- Simplifying assumption that uses price as an addition to constant MC.
- Unshown constraint to collect enough revenue to cover fixed cost.

$$\max_{A,p} \int_{\theta*(A,p)}^{\overline{\theta}} [S(q(p, \theta), \theta) - A - pq(p, \theta)] \, dg(\theta) d\theta$$