


Pricing the Net: What Economists Do



- Today's Agenda:
- Industry Structure and Pricing
 - Defining the Question
 - Likely Outcomes
- Subsidy-Free Prices
 - What Are They?
 - Why Does It Matter?
- Models for Thinking About the Net

Pricing and Market Structure


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- Structure Shapes How We Think About Pricing
 - Do You Know What the Structure of the NII Market Will Be?
 - *Me Neither!*
 - Possible Outcomes:
 - Regulated Monopoly (*As Always!*)
 - Oligopoly? Different Markets, Different *Infobahns*
 - Quasi-Competitive
 - Content vs. Conduit (*Bell System, Microsoft,....*)

Pricing and Market Structure




- Most Economic Pricing Work in the context of Regulated Monopoly
 - Ramsey Pricing, nonuniform pricing, cross-subsidy, congestion pricing, peak-load pricing, sustainable prices, price caps,...
- Some Work in Oligopoly/Competitive Fringe
 - Access Pricing, “Efficient Component Pricing”
 - Intermodal Competition(*Transportation*)

Pricing and Market Structure

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- Surprisingly, Almost No Work in Product-Differentiated Competitive Markets
 - E.g., no application or analysis of peak-load pricing models in competitive industries where they are actually used: hotels, rental cars, etc.
 - E.g., economic analysis of airlines pre-deregulation missed post-deregulation pricing structures.
 - Pre-1980 spatial competition models
 - ∴ Market Structure Shapes the Questions

Subsidy-Free Prices



- *Not* Efficiency-based; “Fairness:” Is One Group of Consumers Paying Too Much, While Others Pay Too Little? *Regulation-based*

- Assume Cheaper for Single Supplier:


for any set of quantity vectors $\mathbf{Q}^1, \dots, \mathbf{Q}^k$,

$$C(\sum \mathbf{Q}^j) < \sum C(\mathbf{Q}^j).$$

- Assume Zero Economic Profit(*not essential*):

$$\mathbf{p} \cdot \mathbf{Q}(\mathbf{p}) = C(\mathbf{Q})$$

Subsidy-Free Prices

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- Do Prices Ensure that All Products Gain From Having a Single Network? Only If Revenues Less Than a “Stand-Alone” Network

Let $N = \{1, \dots, n\}$ be the product set, with $\mathbf{Q}(\mathbf{p}) = (Q_1(\mathbf{p}), \dots, Q_n(\mathbf{p}))$ the market output vector.

$$\mathbf{p}_S \cdot \mathbf{Q}_S(\mathbf{p}) \leq C(\mathbf{Q}_S), \quad \text{for all subsets } S \subseteq N = \{1, \dots, n\}$$

or equivalently,

$$\mathbf{p}_T \cdot \mathbf{Q}_T(\mathbf{p}) \geq C(\mathbf{Q}) - C(\mathbf{Q}_{N-T}), \quad \text{for all subsets } T \subseteq N$$

Subsidy-Free Prices



- If Revenues Less Than Stand-Alone Costs, then Product (Group) Not Subsidizing
- If Revenues Greater Than Incremental Costs, the Product (Group) Not Being Subsidized.
- If No Product (Group) Violates Above, Then Prices Are Subsidy-Free

Subsidy-Free Prices

■ Properties:

- subsidy-free prices are not unique
- for some cost functions, there may be no subsidy-free prices.
- to determine which prices are subsidy-free, it is necessary to examine all subsets of products, not just each product singly
- efficient (Ramsey prices) need not be subsidy-free

Subsidy-Free Prices

- But Fairness Is About Consumers , Not Products. How to Extend the Logic?

Let $M = \{1, \dots, m\}$ be the consumer set, with $\mathbf{Q}^j(\mathbf{p})$ individual demand functions; for any subset $V \subseteq M$, define $\mathbf{Q}^V = \sum_{j \in V} \mathbf{Q}^j(\mathbf{p})$.

Prices are *consumer subsidy – free* iff

$$\mathbf{p} \cdot \mathbf{Q}^V(\mathbf{p}) \leq C(\mathbf{Q}^V(\mathbf{p})), \quad \text{for all } V \subseteq M$$

- or equivalently,

$$\mathbf{p} \cdot \mathbf{Q}^W(\mathbf{p}) \leq C(\mathbf{Q}(\mathbf{p})) - C(\mathbf{Q}^W(\mathbf{p})), \quad \text{for all } W \subseteq M$$


Subsidy-Free Prices

■ Properties:

- If consumer demand vectors are proportional, then *all* prices are consumer subsidy-free
- If costs are affine ($C(\mathbf{Q}) = F + \mathbf{c} \cdot \mathbf{q}$) and each product has at least one “exclusive consumer,” then subsidy-free \Leftrightarrow consumer subsidy-free.
- Not all subsidy-free prices need be consumer subsidy-free

■ ...But Requires HUGE Amounts of Info!

Subsidy-Free Prices

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- Another Approach: *Anonymous Equity*
 - Consumer Subsidy-Free for all possible consumer partial demand vectors:

$$\mathbf{p} \cdot \mathbf{q} \leq C(\mathbf{q}), \text{ for all vectors } \mathbf{q} \leq \mathbf{Q}(\mathbf{p}),$$

or equivalently,

$$\mathbf{p} \cdot \mathbf{q}' \geq C(\mathbf{Q}) - C(\mathbf{Q} - \mathbf{q}'), \text{ for all vectors } \mathbf{q}' \leq \mathbf{Q}(\mathbf{p}).$$

Subsidy-Free Prices



■ Why Does This Matter?

- If Network a Regulated Monopoly/Oligopoly, Any Cross-Subsidy Leads to Demands for Regulatory Redress from Customers and Competitors.
- If Unregulated, May Lead to Demand for Regulation, to Obtain Redress from Customers and Competitors.
- If Competitive/Low Barriers to Entry, Will Surely Lead to Competitive Entry!

■ Cross-Subsidy \Rightarrow Something Will Happen That You Don't Want to Have Happen!


Thinking About Prices



- How Do We Think About the NII?
 - As a Telephone Network
 - As Broadcast/Cable TV
 - As a Academic/Library

- ... How About a Distribution Channel of Goods and Services? *Network as Shopping Mall*

Thinking About Prices

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- For Consumers, Price = Zero
 - Producers Pay, Recover Costs from Consumers (*Telephone: Carrier Access Charges. Malls: Store Rent. Retailers: 800 Service*)
 - Whose Research Will Guide Price Setters?
Neither Economists or Engineers;
MARKETEERS!