

AAE 635

Applied Microeconomic Theory

Fall 2009

9/21/2009

Class 6

Previous classes

- Mathematical tools and unconstrained optimizations (lecture note 3)
- Theory of the Firm (lecture note 4, chapter 2&4)
 - Single input/N-inputs/M-outputs N-inputs

Today

- Theory of the Firm (lecture note 4, chapter 2&4)
 - General case profit maximization problem
- Applications of optimization (lecture note 5)
 - Monopolist's problem

Next class

- Homework 2 out, due Oct. 6th
- Constrained optimization (lecture note 6)

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General case: m outputs, n inputs

- Netput vector $\mathbf{y} = (\underbrace{y_1, \dots, y_m}_{m \text{ output (non-negative)}}, \underbrace{y_{m+1}, \dots, y_{m+n}}_{n \text{ input (non-positive)}}) \in \mathbf{R}^{m+n}$

- Firm's profits are

$$\pi(\mathbf{y}, \mathbf{p}) = R - C = \sum_{i \leq m} p_i \cdot y_i - \sum_{i \geq m+1} p_i \cdot (-y_i) = \sum p_i \cdot y_i = \mathbf{p} \cdot \mathbf{y}$$

- Weak axiom of profit maximization (WAPM)
 - Netput functions $\mathbf{y}^*(\mathbf{p})$ tend to be upward sloping
 - Input functions tend to be downward sloping
 - $\partial \mathbf{y}^* / \partial \mathbf{p} = \text{symmetric, positive semi-definite matrix}$

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Roadmap_math 1 (see class website)

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The LeChatelier Principle

- Firms are constrained to choose only part of netputs
 - E.g. short term decisions vs. long term decisions
 - Conditional rule $\mathbf{y}_a^c(\mathbf{p}_a, \mathbf{y}_b)$ vs. unconditional rule $\mathbf{y}_a^*(\mathbf{p}_a, \mathbf{p}_b)$
- *The unconditional price effects $[\partial \mathbf{y}_a^* / \partial \mathbf{p}_a]$ exceed the conditional price effects $[\partial \mathbf{y}_a^c / \partial \mathbf{p}_a]$ by a positive semi-definite matrix*
- Unconditional price effects are larger than conditional price effects
 - Long-term decisions are more price responsive than short-term decisions

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More Applications

- Marginal function and average function
- Monopolist's problem
- Dynamic choice
 - Optimal timing
 - Optimal replacement

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