Economics 50: Introduction

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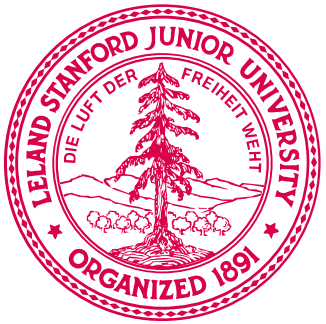

Some questions we'll try to answer

1. How do "actors" decide what to do?
   - How do consumers decide what to buy?
   - How do producers decide what to sell?
2. How do markets work?
   - Perfectly competitive
   - With various "distortions" (e.g., taxes)
   - When they aren't perfectly competitive
3. How do the answers to 1–2 change when the "economic environment" changes?

Course logistics and expectations

1. Course meetings
2. Office hours
3. Assignments and grading
   - Reading
   - Problem sets
   - Writing assignments
   - Examinations
4. Policies
5. Schedule

Course contents

1. Consumer theory
2. Producer theory
3. Markets and equilibrium
   - Competitive
   - Imperfectly competitive

Analyze using different kinds of tools:

- Verbal
- Graphical
- Mathematical

"Economic naturalist" writing assignments

[From Robert H. Frank's *The Economic Naturalist Writing Assignment* (JEE, 2006)]

Explain some pattern of events or behavior that you personally have observed

Use a principle, or principles, discussed in the course

- Simple, verbal reasoning
- *Not* a research paper
- Interesting (whether or not imporant)

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Outline

Outline

Starting points: Incentives and scarce resources

1. People respond to incentives

2. Resources are limited
   - Land, capital
   - Materials
   - Time, money
   - almost everything

Gives rise to issue of choosing wisely and opportunity cost

Describing these problems

Constrained optimization

Optimize some objective function subject to some constraints.

Example

Where should I eat lunch?

1. Optimization: Maximize over restaurants
2. Objective function: Quality of food
3. Constraints: On campus, affordable, ...

Constrained optimization: notation

There are a several mathematical ways to write this problem

$$\begin{aligned}
\text{Where to eat} &= \text{Place with best food s.t. on campus} \\
&= \operatorname{argmax} U(y) \\
&\qquad \text{s.t. } y \in \{\text{Tressider, Thai Cafe, Olives}\} \\
&= \operatorname*{argmax}_{y \in Y} U(y) \\
&= \{y \in Y : U(y) \geq U(y') \text{ for all } y' \in Y\}
\end{aligned}$$

where $Y \equiv \{\text{Tressider, Thai Cafe, Olives}\}$

Question: How can I solve this problem?

The consumer problem

Example

Suppose apples cost p_a each, and bananas cost p_b. If I eat a apples and b bananas, I get utility $U(a, b)$. My wealth is w.

1. Optimization: Maximize over (a, b)
2. Objective function: $U(a, b)$
3. Constraints: $ap_a + bp_b \leq w$

If you don't mind vector notation, can write constraint as $p \cdot x \leq w$

A firm problem

Example

Suppose a firm can produce q pens at total cost $c(q)$, and can sell each pen at price p (which it does not get to choose).

1. Optimization: Maximize over q
2. Objective function: $pq - c(q)$
3. Constraints: $q \geq 0, \ldots$

There are other ways to write this problem too

So how do we solve these things?

Outline

Starting point: Agents interact

- Price consumers pay vs. price firms receive
- Quantity consumers buy vs. quantity firms sell
- ...

In economics, equilibria arise when values "make sense" given "rules" of the economy

Our focus is on market equilibria

(Market) equilibrium analysis

Find prices and quantities that "make sense."

Example

Simple one-good economy: Demand curve $p_d \mapsto q_d$ and supply curve $p_s \mapsto q_s$

- Quantity demanded equals quantity supplied ($q_d = q_s$)
- Price paid equals price received ($p_d = p_s$)

This need not be the only definition of equilibrium; it depends on the "rules" of the economy

"Finding" equilibria

OK, so we establish the rules and an idea of sense-making; there's still work to do

- The economist: calculating equilibria
- The economy: achieving equilibrium

Are there any equilibria? How many? How does the economy "get there"?
These questions are not necessarily trivial

Outline

Exogenous and endogenous variables

Exogenous variables are determined outside the "system" (i.e., optimization or equilibrium)

Endogenous variables are determined inside the "system"

So exogeneity/endogeneity depends on which system we're looking at!

Examples

Example

My demand for apples is given by $q = a - bp$. How many apples do I demand at a given price?

- Endogenous: q
- Exogenous: p_d, a, and b

Example

Market demand for apples is given by $q_d = a_d - b_d p_d$. Market demand for apples is given by $q_s = a_s + b_s p_s$. What is the market equilibrium?

- Endogenous: $q = q_d = q_s$ and $p = p_d = p_s$
- Exogenous: a, b, c, and d

So what happens when we change the exogenous variables?

Comparative statics

The study of how endogenous variables respond to changes in exogenous variables.

For example, how does quantity (e.g., demanded, supplied) change when price changes

Elasticities

How does quantity (e.g., demanded, supplied) change when price changes?

$$\begin{aligned}\varepsilon_{q,p} \approx \frac{\%\Delta q}{\%\Delta p} &= \frac{\Delta q/q}{\Delta p/p} \\ &= \frac{\Delta q}{\Delta p} \cdot \frac{p}{q} \\ &\xrightarrow{\lim} \frac{dq}{dp} \cdot \frac{p}{q}\end{aligned}$$

Often, will normalize an elasticity to be positive by taking its absolute value

Elasticity ranges

Recall that $\varepsilon_{q,p} \equiv \frac{dq}{dp} \cdot \frac{p}{q}$

$\lvert\varepsilon_{q,p}\rvert$	Nature of demand/supply
0	Perfectly inelastic
$(0,1)$	Highly inelastic
1	Unit elastic
> 1	Highly elastic
∞	Perfectly elastic

Several demand curves

Let's consider the elasticity of several demand curves:

- $q = a - bp$
- $q = ap^{-b}$

Elasticities differ

- Across goods
- Across time ranges
- Across individuals

Elasticity: An equivalent definition

It looks crazy, but it's true:

$$\varepsilon_{q,p} = \frac{d[\log q]}{d[\log p]}$$

Proving this uses the fact that $\frac{d[\log x]}{dx} = 1/x$, and the change of variable formula

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$