Intermediate Microeconomics

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Welcome to the course!

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What is Economics?

Dismal Science!

- ▶ Basic topics: <u>production</u>, <u>distribution</u>, and <u>consumption</u> of goods and services
- ▶ Studies how society manages its <u>scarce</u> resources.(Mankiw, Principle of Economics (1998))

Microeconomics (foundation!)

- ▶ Studies how **individuals** make decisions in the world of <u>scarcity</u>.
  Firm – Production – Maximizing profit (<u>rationality</u>))
  Consumer – Consumption – Maximizing <u>utility</u>
  Laissez-faire <u>Market</u> and Government Regulation

Macroeconomics

- ▶ Studies Economic Growth and Economic Cycles (inflation, unemployment, interest rate)

One Sentence to Represent Microeconomics

"The Invisible Hand." (Incentive matters)

Figure 1: Halloween Costumes

*It is not from the benevolence of the **butcher**, the **brewer**, or the **baker** that we expect our dinner, but from their regard to their own interest.*

<u>Adam Smith</u>, The Wealth of Nations (1776)

One Graph to Represent Microeconomics

Economics in about exchange. (Adam Smith, 1776)

- ▶ The division of labor increases mutual dependency.
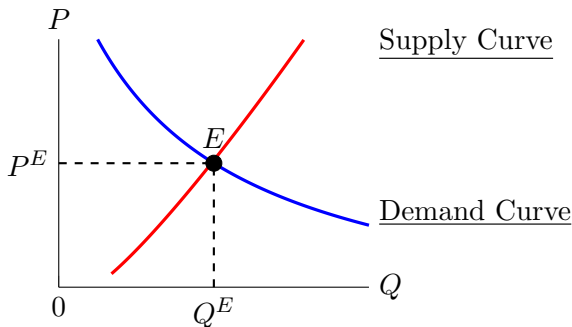- ▶ Competition of buyers/sellers drives price down/up when price is not P^E.

Figure 2: Equilibrium in the Competitive Market

How do we learn Microeconomics?

Learn microeconomics as a game system designer!

*In defining a microeconomic system two distinct component elements will be identified: an **environment** and an **institution**. ... A microeconomy is closed by the **choices of agents** in the intuition. (<u>Vernon Smith</u>, 1982)*

Environment

▶ Resources, technologies, agents' preference

Institution

▶ Decides rules of interaction, collects messages, delivers messages, and governs

Agents' Strategy

▶ Receive messages and make decisions

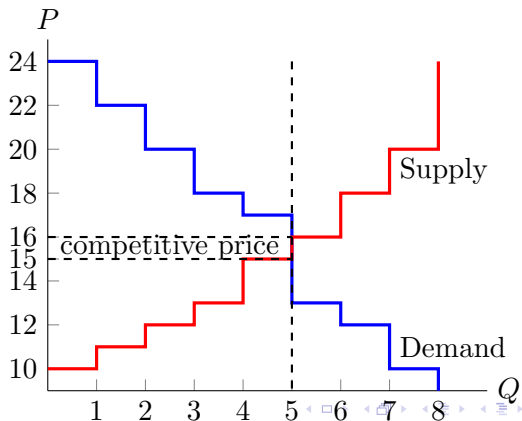Environment + Institution + Strategies ⇒ Economic Outcome

Example of an Exchange System

Consider the simplest setting

▶ Each buyer/seller can buy/sell at most one unit of a homogeneous good.

Environment of Exchange System: <u>Reservation Prices</u>

Buyer	Value	Seller	Cost
1	24	1	10
2	22	2	11
3	20	3	12
4	18	4	13
5	17	5	15
6	14	6	16
7	12	7	18
8	10	8	20

Desirable Outcome of Exchange System

The greatest number of transactions?

| #	Buyer	Seller	Surplus
1	1 (24)	8 (20)	(24-p)+(p-20)=4
2	2 (22)	7 (18)	(22-p)+(p-18)=4
3	3 (20)	6 (16)	4
4	4 (18)	5 (15)	3
5	5 (17)	4 (13)	4
6	6 (14)	3 (12)	2
7	7 (12)	2 (11)	1
8	8 (10)	1 (10)	0
	Total surplus:		22
	Maximum surplus:		40
	Efficiency:		22/40=55%
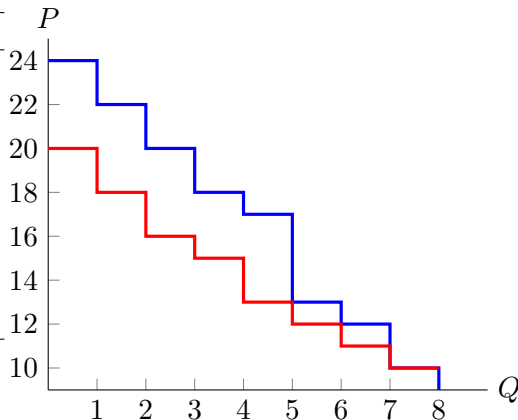
Multi-prices and deadweight loss (18=40-22).

(Pareto) Efficient Allocation as the Desirable Outcome

Competitive price leads to the greatest social surplus.

Buyer	Surplus	Seller	Surplus
1	$24 - p$	1	$10 + p$
2	$22 - p$	2	$11 + p$
3	$20 - p$	3	$12 + p$
4	$18 - p$	4	$13 + p$
5	$17 - p$	5	$15 + p$
6	0	6	0
7	0	7	0
8	0	8	0
	Total Surplus:		40
	Maximum surplus:		40
	Efficiency :		100%
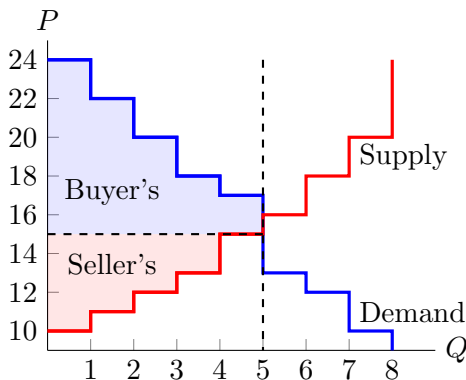
Decentralized Institution and Random Strategy

Decentralized Institution

- ▶ Players are located in different grids.
- ▶ Players start bargaining when at least one buyer and one seller meet.

Zero-Intelligent-Affinity (ZIA)(Gode and Sunder, 1993; McKabe, 2021)

- ▶ Buyer bids randomly between a lower bound and their value.
- ▶ Seller asks randomly between their cost and an upper bound.
- ▶ Both like to stay in the current location than to move a step further.

Computational results (Gui and Mckabe, 2021)

- ▶ transaction prices with variance; efficiency $\approx 58\%$ (50 buyers and 50 sellers)

Decentralized Institution and Rational Strategy

Chamberlin's (1948) classroom experiment

- ▶ Students were given buyer or seller roles and corresponding cards with private dollar values or costs.
- ▶ Walk among desks in the classroom to make deals.
- ▶ Transactions quantities higher than Q^E, prices not converge to P^E.

Perhaps it is the perfect market which is "strange"; at any rate, the nature of the discrepancies between it and reality deserve study.

(Chamberlin, 1948, JPE, p.108)

Centralized Institution and Rational Strategy

Double Auction (DA) (Smith, 1962)

▶ Buyers and sellers submit bids and offers in any order to a centralized
platform that display quotes and transaction prices.

Bid/Ask Sequence	
Bid	**Ask**
5.00	
4.00	
	7.00

Highest Bid = **$5.00**, Lowest Ask = **$7.00**

unit	value	bid	price	earnings
1	$7.00			$0.00
	Total Earnings:			**$0.00**

Round 1 Price Sequence
$6.00

Buyer

Highest Bid = **$5.00**, Lowest Ask = **$7.00**
Please enter or revise ask prices.

unit	cost	ask	price	earnings
1	$2.00	**$7.00**		$0.00
	Total Earnings:			**$0.00**

Round 1 Price Sequence:
$6.00

Seller

Figure 3: Screenshots from VEconLab

The Miracle of the Market

Results: Prices converge to P^E quickly, efficiency $> 85\%$

- ▶ Smith (1962): 6 buyers and 6 sellers, Efficiency $\approx 98.2\%$
- ▶ Martinelli et al (2023): 2 buyers and 2 sellers, Efficiency $\approx 89.1\%$

Why great results? – DA offers a price discovery process

- ▶ Price taker: The standing bid and ask to keep updating current prices.

Thoughts: Do traders play Nash (Friedman and Ostroy, 1995)?

- ▶ Nash equilibrium: given all other active traders bid/ask P^E, no better off from deviation.
- ▶ But in order to play Nash, players need to know P^E to begin with.

Can an Institution Reveal Demand and Supply? (beyond this course)

Demand and Supply is not revealed in DA
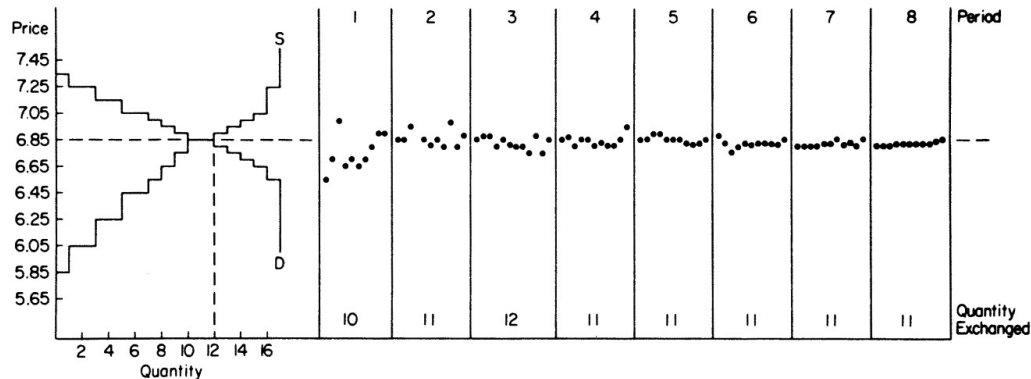
Figure 4: Efficency= 98.2% (Smith et al., 1982)

Take Aways

Microeconomics is Fun!

▶ Economics is linked to everyday life.

▶ See the invisible hand, understand your world, make it a better place.

Microeconomics is Intuitive.

▶ Always use real-world examples to understand concepts.

▶ Always approach every example as if developing a game system.
  ▶ What is the given environment?
  ▶ How to design rules of interaction (institution)?
  ▶ How would (rational) people make decisions?
  ▶ What would be the economic outcome? Is the outcome desirable?

Another Example: The Market for Apartments (Varian Ch1)

The Basic Setting
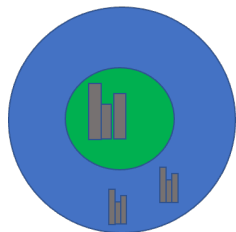
- ▶ Simple city with inner ring and outer ring
- ▶ The rent for an outer-ring apartment is given (p_0)

- ▶ We focus on the market of the inner-ring apartments

Apartment Market as a Microeconomic System

Environment

▶ Reservation Prices for the buyers (Demand) and sellers (Supply)

Institution (How to allocation)

1. Competitive market: one equilibrium price at p^E
2. Discriminating monopolist: multi prices, full information for the seller
3. Ordinary monopolist: one price, only know the demand curve
4. Rent control: one price lower than p^E

Agents' Strategy

▶ Rational strategy: the most profit/utility for the buyer/seller as they can

$\Rightarrow$ Economic Outcome (price? quantity? surplus?)

Environment: Demand Curve

The quantity demanded at each of the possible prices
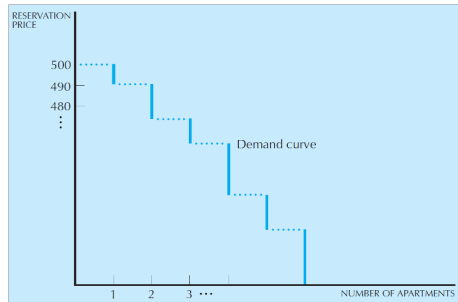
Figure 5: The discrete demand curve

- **Reservation price**: a person's maximum willingness to pay for something.
- Vertical axis: reservation prices.
- Horizontal axis: the number of people who are willing to pay each of these reservation prices.
- The demand curve is not slope up: as the price of apartments decreases, at least not less people will be willing to rent apartments.

Environment: Demand Curve

The Continuous Demand Curve
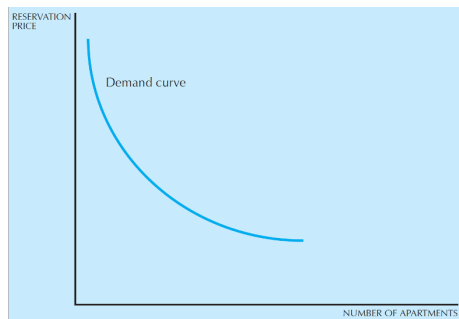
Figure 6: Continuous demand curve

▶ When there are a large number of buyers, the demand curve will take a smooth shape.

▶ The "jumps" shown in the previous figure are now so small relative to the size of the market.

Environment: Supply Curve

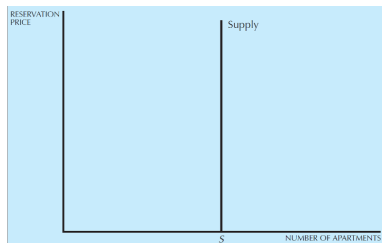### The quantity supplied at each of the possible prices

Figure 7: The supply curve

- ▶ In the short run, the supply of apartments is fixed.
- ▶ The number of apartments is fixed. No destruction or more construction.
- ▶ Any (positive) price earns the seller profits.

Outcome with Institution 1 (Competitive Market)
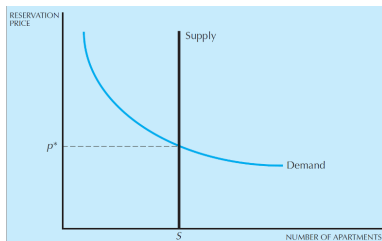
The quantity supplied = quantity demanded

Figure 8: The competitive equilibrium

- ▶ p^*: equilibrium price, the price where the quantity of apartments demanded equals the quantity supplied
- ▶ if $p > p^*$: fewer people who want to rent at p than the number of available apartments. Landlords will lower the price to p^*.
- ▶ if $p < p^*$: more people who want to rent at p than the number of available apartments. Landlords will raise the price to p^*.

Outcome When the environment changes (Comparative Statics)

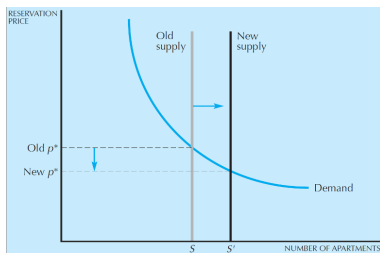### If supply of apartments is increased

Figure 9: Supply increases

- ▶ More quantity supplied at a given price. Supply curve shifts to the right.
- ▶ As the supply of apartments increases, the equilibrium price decreases.
- ▶ Similarly, if the supply of apartments were reduced the equilibrium price would rise.

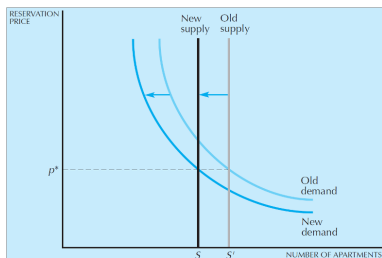### If supply decreases because of demand decreases

Figure 10: Both demand and supply decrease

- ▶ Suppose the outer ring is developing really well, so more construction of apartments in the outer ring, while inner-ring apartments are getting old.
- ▶ The supply of apartments decreases. The supply curve shifts to the left.
- ▶ The demand of apartments decreases more. The demand curve shifts to the left more.
- ▶ Lower equilibrium price, and less quantity traded.

Outcome with Institution 2 (Discriminating monopolist)

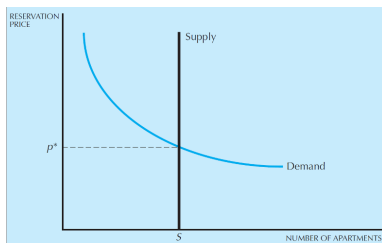Multi prices, the monopolist gets the whole trading surplus.

Figure 11: Discriminating monopolist

▶ The discriminating monopolist knows each person's reservation price.

▶ Exactly the same people, namely, those who value an apartment more than p^*, will get the apartments as in the case of a competitive market. But each will pay the reservation price. The last person who rents an apartment pays p^*.

▶ The amount the people pay is different.

▶ While the monopolist get the whole trading surplus.

Outcome with Institution 3 (Ordinary monopolist)

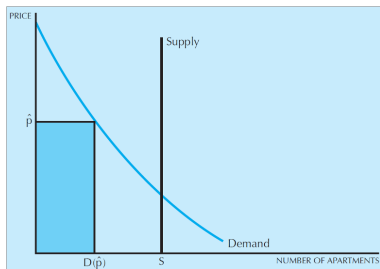One price higher than p^*, the monopolist maximizes the profits.

Figure 12: Ordinary monopolist

- ► The monopolist will want to restrict the output available in order to maximize his profit.
- ► Fewer apartments will be rented, and each apartment will be rented at a higher price than in the competitive market.
- ► Let's use $D(p)$ to represent function – the number of apartment demanded at price p. The monopolist will receive the revenue $pD(p)$.

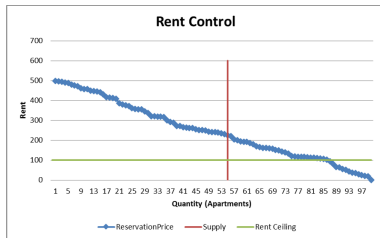# Outcome with Institution 4 (Rent control)

Restrict the price lower than p^*.

Figure 13: Rent Control

► **excess demand**: quantity demanded > quantity supplied.

► The answer to who gets the apartments under rent control depends on who has the most time to spend looking around, who knows the current tenants, and so on. (More assumptions are needed)

Questions: Institution Comparison

Which institution is the best?

- ▶ What is "the best"?
    - ▶ **Pareto improvement**: an allocation change that makes at least one person better off without making anyone worse off
    - ▶ **Pareto efficiency**: an allocation is Pareto efficient if no Pareto improvement can be made (maximum total surplus)
    - ▶ Only the competitive market and the discriminating monopolist can achieve the Pareto efficiency.
- ▶ Alternative standards for "the best"? How about a "fair" market?