Econ 330: Urban Economics

Lecture 2

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Lecture II: Review & The 5 Axioms of Urban Economics

Schedule

Today

1) **EC201 Review**

2) **5 Axioms of Urban Economics**

Upcoming

- **EC201 Review Quiz on Canvas**
- **Letter of Intro on Canvas**
- **Reading** (intro & chapter I of *ToTC*)

EC201 Quiz

- The quiz will open **tonight at 8PM** and is due **Monday the 13th** @ Midnight
- **90 Minute** Time limit, and **one** attempt. It should take you *well* under 90 minutes
- Worth 4% of your final grade

EC201 Quiz

Format

- **5 Questions** worth **4 points each**
  - 2 Multiple Choice
  - 3 Calculations

Topics:

- Graph Supply and Demand. Compute Equilibrium
- Compute Consumer and Producer Surplus
- Elasticities (interpretation)
- Profit, cost, revenue

Supply & Demand

We will start with **supply** & **demand**:

- **Supply curves** are constructed from **firms** making the best production decisions they can
- **Demand curves** are constructed from **consumers** making optimal purchase decisions

The key players in *the* market are:

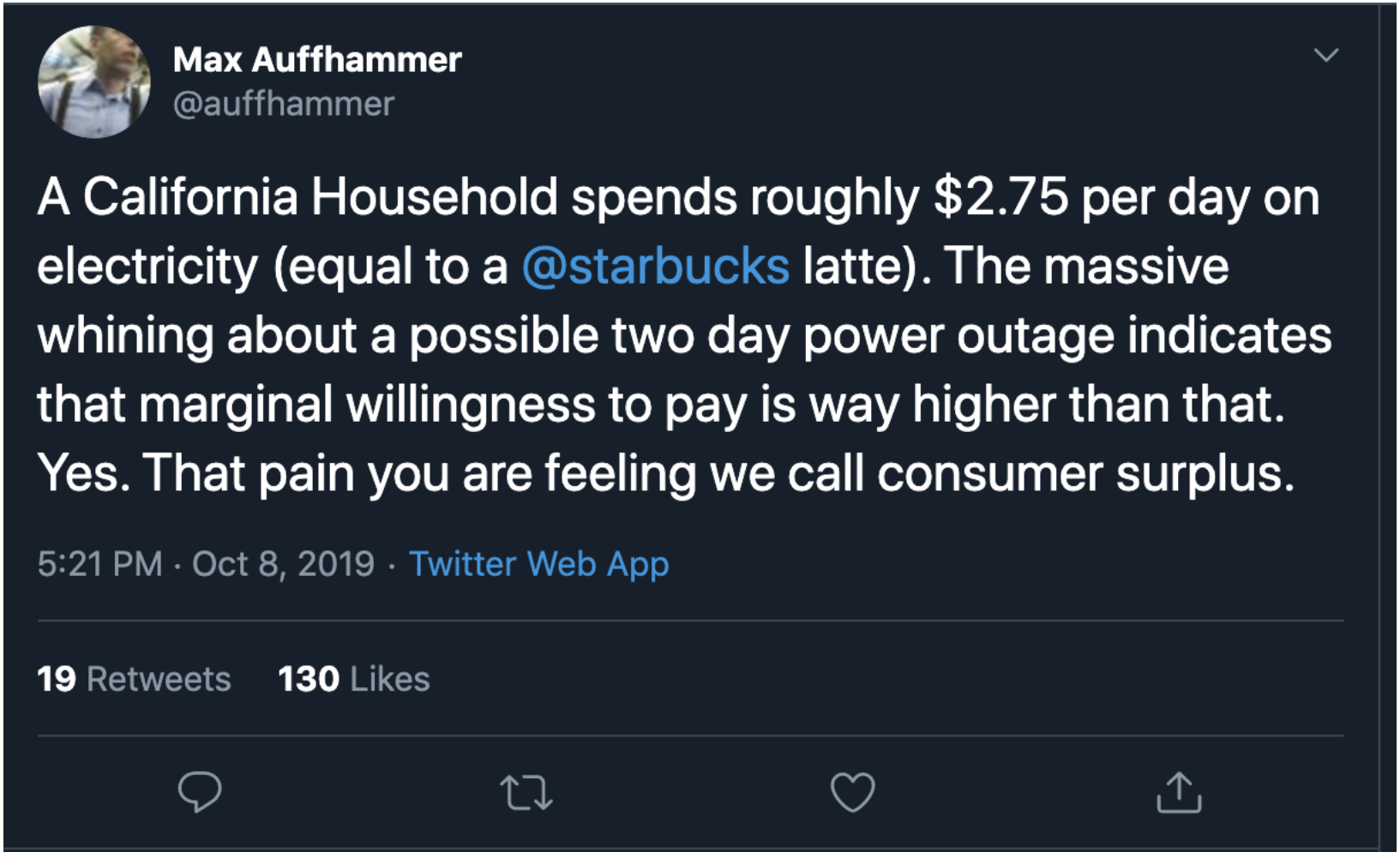
- **firms** (generating supply)
- **consumers** (generating demand)

Fundamental Assumptions: Marginal value (utility) is decreasing and marginal cost is increasing

Related Definitions

- **Equilibrium**: A pair of points $(Q^\star, P^\star)$ such that there is no excess supply or demand
    - In other words, equilibrium is when Supply = Demand
- **Consumer Surplus**: The **difference** between the price consumers *actually* pay and their **maximum** willingness to pay (WTP)
- **Producer Surplus**: The **difference** between the price producers *actually* sell their good for and their **minimum** willingness to sell

An Example



Source: @auffhammer

EC201: Market Equilibrium Computation

Example

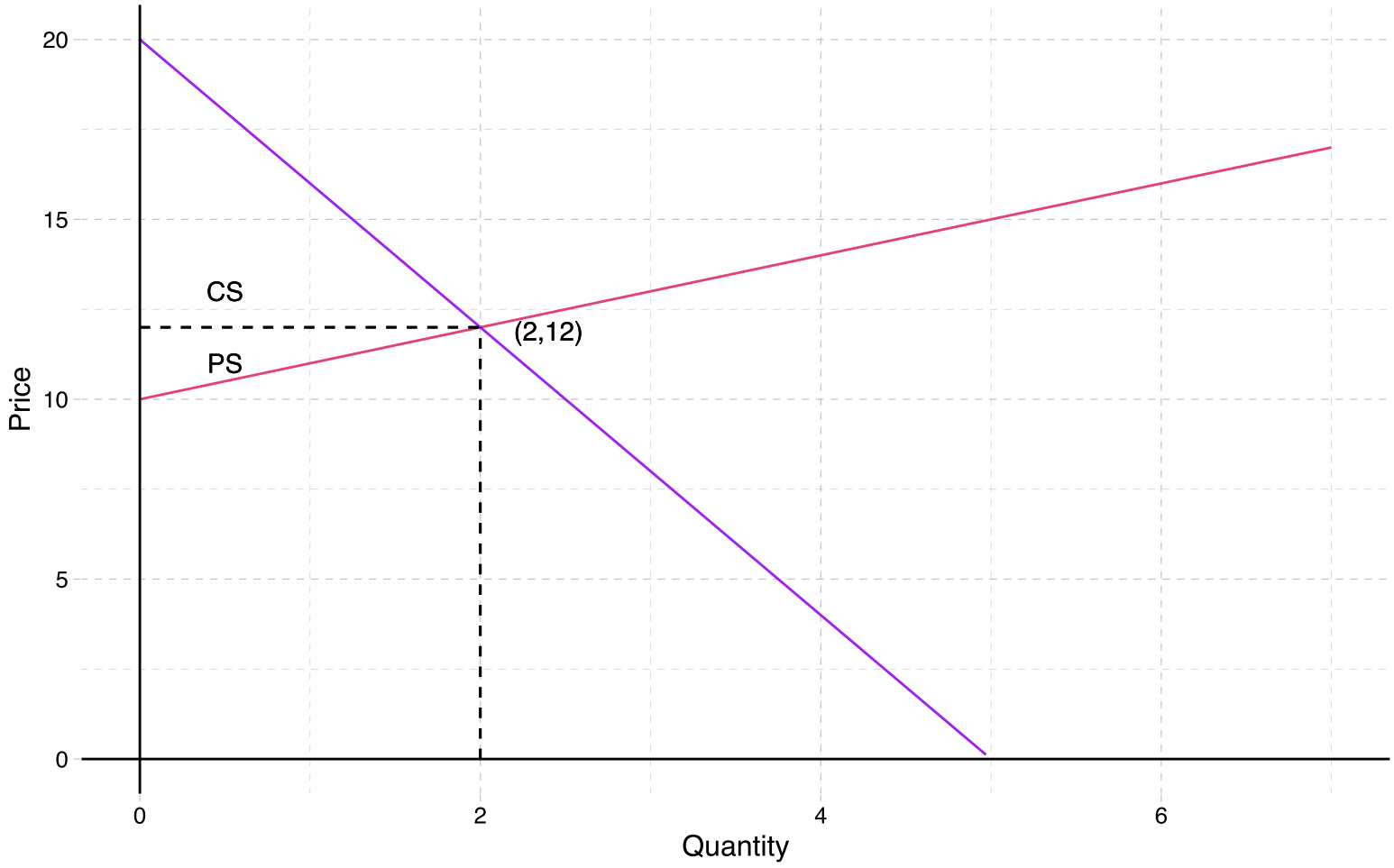
Suppose we are given the following:

- Supply: $P(Q_s) = 10 + Q_s$
- Demand: $P(Q_d) = 20 - 4 * Q_d$

Tasks

1. Carefully graph and label both curves
2. Compute the Equilibrium
3. Compute Consumer and Producer Surplus

EC201: Example



Calculation

- **Equilibrium**:

$$\begin{aligned} 10 + Q^\star &= 20 - 4 * Q^\star \\ 5Q^\star &= 10 \\ Q^\star &= 2 \end{aligned}$$

Plug this into either supply or demand equation to get:

$$P^\star = 10 + 2 = 12$$

- **Consumer Surplus**:
  - $CS = \frac{1}{2} * (20 - 12) * (2 - 0) = 8$
- **Producer Surplus**:
  - $PS = \frac{1}{2} * (12 - 2)(2 - 0) = 2$

EC201: Elasticities

In general, elasticities measure responsiveness of one variable to another, **in percentage terms**

Common elasticities

- **Own Price Elasticity (good x)**: Measures how much quantity demanded for **x** will respond to a one percent change in the price of good **x**
  - Formula: $\varepsilon_{x,P_x} = \frac{\%\Delta Q_x}{\%\Delta P_x}$
- **Cross Price Elasticity (goods x,y)**: Measures how much quantity demanded for **x** will respond to a one percent change in the price of **y**
  - Formula: $\varepsilon_{x,P_y} = \frac{\%\Delta Q_x}{\%\Delta P_y}$

Elasticities: Interpretations

Suppose $\varepsilon_{x,P_x} = -0.5$. What does this mean in words? **Discuss**

A 1% change in the **price of good x** will lead to a .5% change in the *opposite* direction in the **quantity demanded for good x**

The equation can be helpful. If $\varepsilon_{x,P_x} = -0.5$, then:

$$\frac{\%\Delta Q_x}{\%\Delta P_x} = -0.5$$

$$\%\Delta Q_x = -0.5 * \%\Delta P_x$$

Definitions

- **Total Revenue (TR)**: Amount of money firm brings in from selling Q units.
  - $TR = P * Q$
- **Total Cost (TC)**: The cost of producing Q units units
- **Average Cost (AC)** = $\frac{TC}{Q}$
- **Profit** (often denoted as π): $\pi = TR - TC$

EC201: Cost & Production Ex

Suppose the price of the output good is 3 dollars per unit. Suppose a firm's cost function is $TC(Q) = 1 + Q$. If the firm produces 8 units of the good, calculate:

- TR
- TC
- AC
- Profit

EC201: Cost & Production Ex

Suppose the price of the output good is 3 dollars per unit. Suppose a firm's cost function is $TC(Q) = 1 + Q$. If the firm produces 8 units of the good, calculate:

- $TR = 3 * 8 = 24$
- $TC = 1 + 8 = 9$
- $AC = \frac{9}{3} = 3$
- Profit $= 24 - 9 = 15$

Checklist

EC201 Revi : ✅

- Supply & Demand
- Elasticities
- Production & Cost

5 Axioms of Urban Economics

Foundations

As discussed in lecture 1, we are after some big questions in this course

- It is useful to agree upon a few basics before moving onto more complicated problems

The 5 Axioms

- 5 **assumptions** that we will *take as given* throughout the class
    - Some lectures will be focused on refining our understanding of these axioms
- Almost everything we learn here ties back to one or multiple of the 5 axioms

Axiom 1

Axiom 1: *Prices adjust to acheive* ***locational equilibrium*** [†]

- **Locational Equilibrium**: The balance that exists when there is no incentive for firms or households to move

Examples

- Rents **near** campus > rents **far** from campus
- Home prices **near** good schools > home prices **near** bad schools
- Wages (and or) Amenities in **high** cost cities > Wages (and or) Amenities in **low** cost cities

†: We will refine this definition later in the term

Axiom 2

Axiom 2: ***Self-reinforcing effects*** *generate extreme outcomes*

Self-reinforcing effect: A pattern that leads to changes in the same direction

- Also called a *positive feedback loop*

Examples

- Tech firms in the Silicon Valley
- Artists in Santa Fe, NM

Useful for explaining why it is common to have clustering of people and firms of similar types

Axiom 3

Axiom 3 ***Externalities*** *are Inefficient*

Externality: A **cost** or **benefit** of a transaction experienced by somebody who is not involved in the transaction

Negative Externalities (costs)

- Pollution
- Noise
- Dilapidated housing

Positive Externalities (benefits)

- Vaccines
- Education

Externalities part II

What do these have to do with **efficiency**?†

- With any externality, private incentives are not aligned with social costs or benefits
- **Example**: In the absence of quotas do people fish too much or too little?
  - Too much. This harms future fisheries
- Negative externalities are **overprovided** and positive externalities are **underprovided**
  - So a market with an externality is **inefficient**

†: Highest total surplus

Axiom 4

Axiom 4: *Production is subject to* ***economies of scale***

- **Economies of Scale**: When the average cost of production decreases as quantity produced increases

Examples

- **Transportation** of good & people
  - Trains shipping to small towns **vs** big cities
- **Education**
  - 20 person class **vs** 80 person class

Axiom 5

Axiom 5: *Competition generates zero* ***economic profit***

- Degree of competition dictates **number of firms** in the market
- Firms enter (drives price down) until **economic profit** is zero. That is, enough firms earn enough to stay in business but no more
- **Economic Profit**: inclusive of **oppurtunity cost**

List of the 5 Axioms

1. Prices adjust to acheive **locational equilibrium**
2. **Self-reinforcing effects** generate extreme outcomes
3. **Externalities** are Inefficient
4. Production is subject to **economies of scale**
5. Competition generates zero **economic profit**

Checklist

- **EC201 Revi** : ✅
  - Supply & Demand
  - Elasticities
  - Production & Cost
- **5 Axioms of Urban Economi** : ✅

Planning

Next Class:

- City Size

Due Soon:

- Review Quiz (**Monday the 13th** @ Midnight)
- Letter of Intro (**Tuesday the 14th** @ Midnight)

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Econ 201 Review

1. Supply & Demand
2. Elasticities
3. Profit, Revenue, & Cost

5 Axioms of Urban Economics

1. Axiom 1: Prices adjust to acheive locational equilibrium
2. Axiom 2: Self-reinforcing effects generate extreme outcomes
3. Axiom 3: Externalities are Inefficient
4. Axiom 4: Production is subject to economies of scale
5. Axiom 5: Competition generates zero economic profit