# 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:

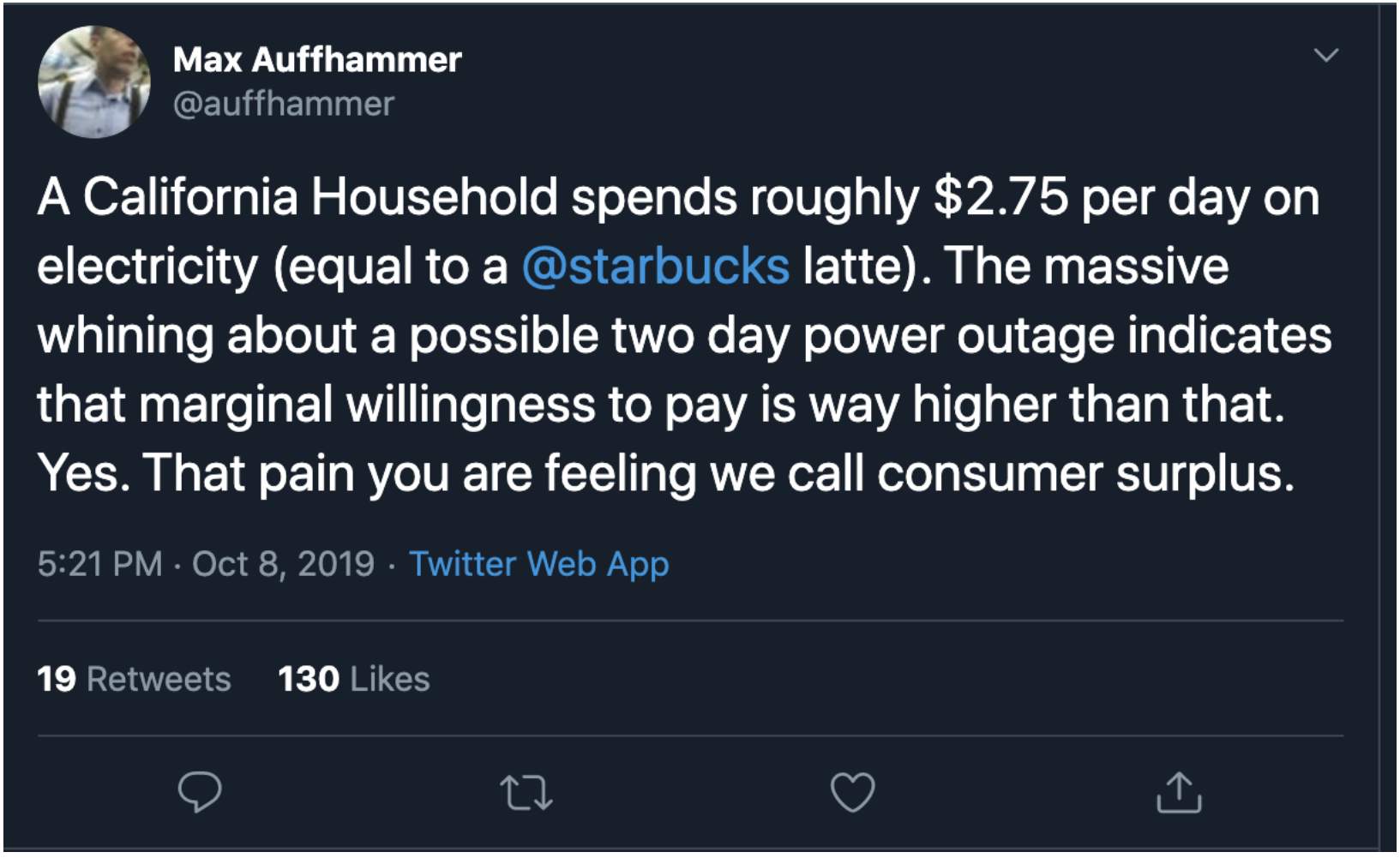
- **firms** (generating supply)
- **consumers** (generating demand)

**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**

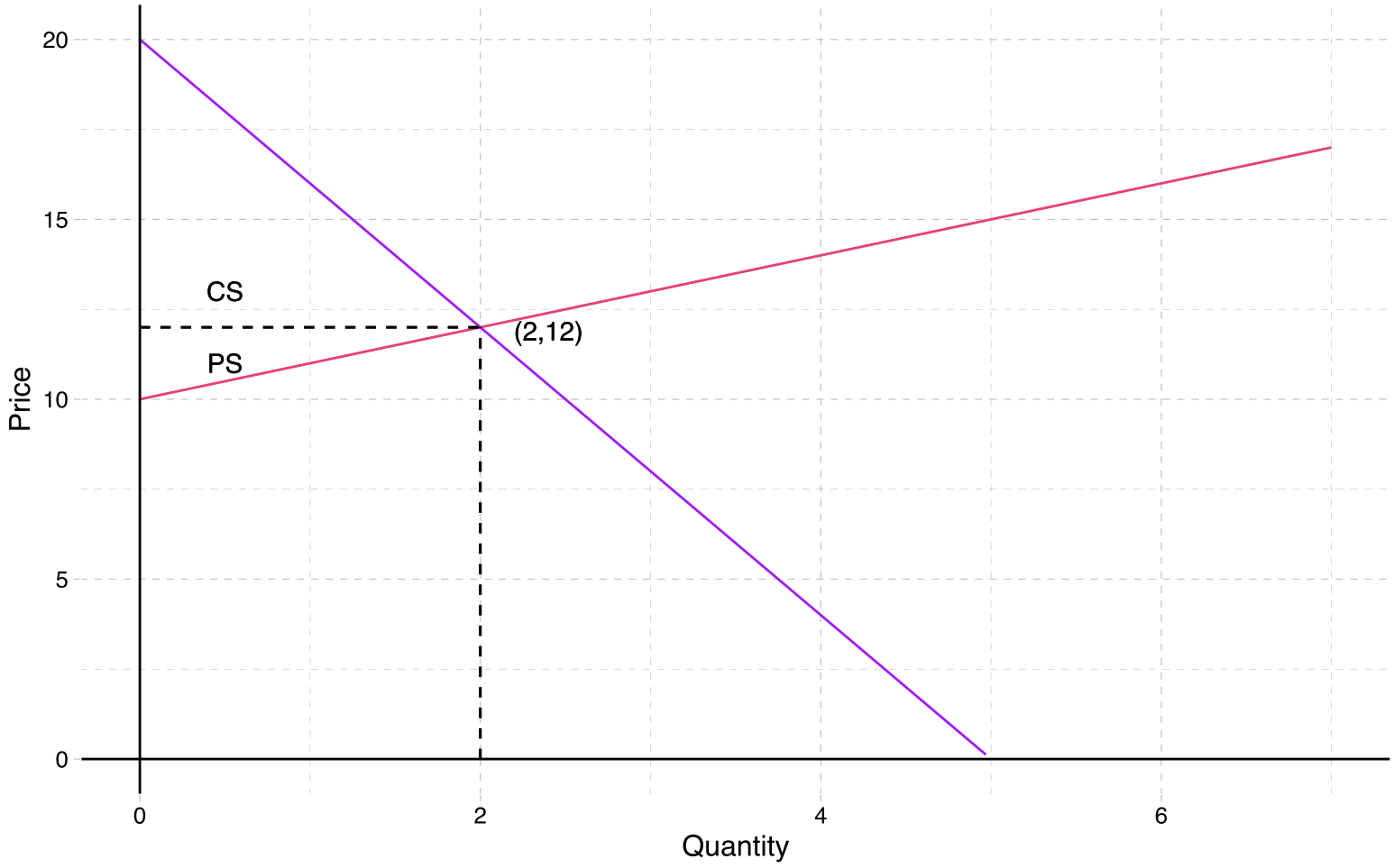
Suppose we are given the following:

- 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 $\pi$): $\pi = TR - TC$

# 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:

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