Econ 330: Urban Economics

Lecture 15

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Lecture XV: Highways Pt 1

Schedule

Today

1) **US Auto Use**

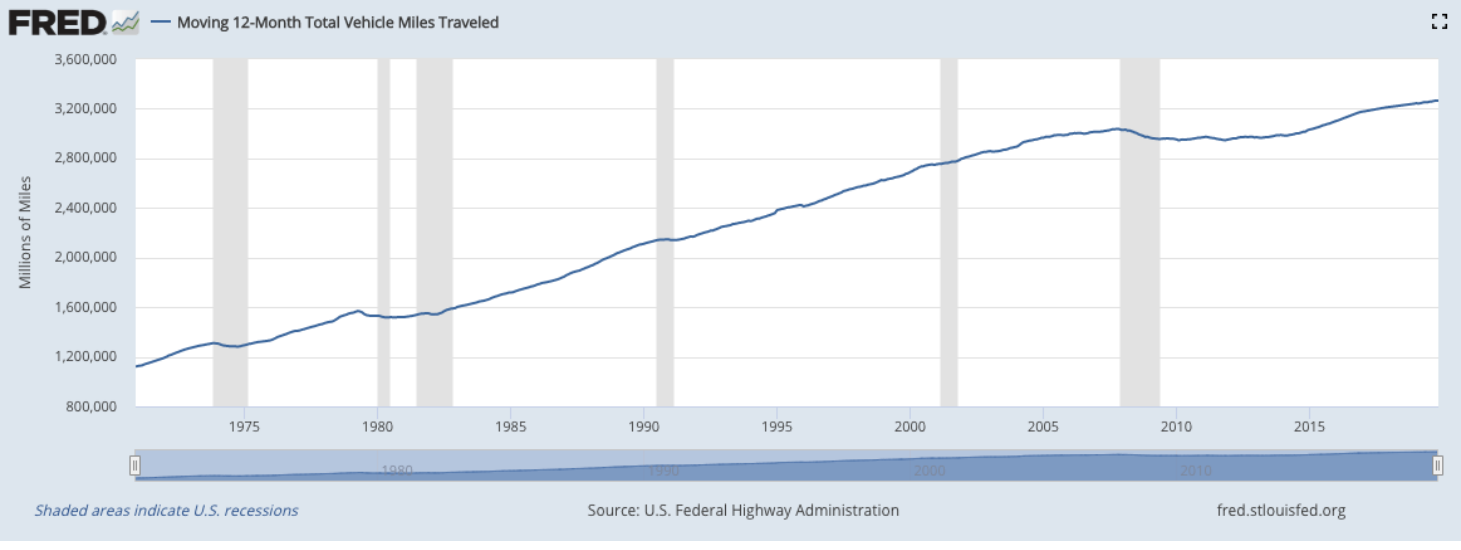
2) **Externalities**

3) **Congestion Pricing**

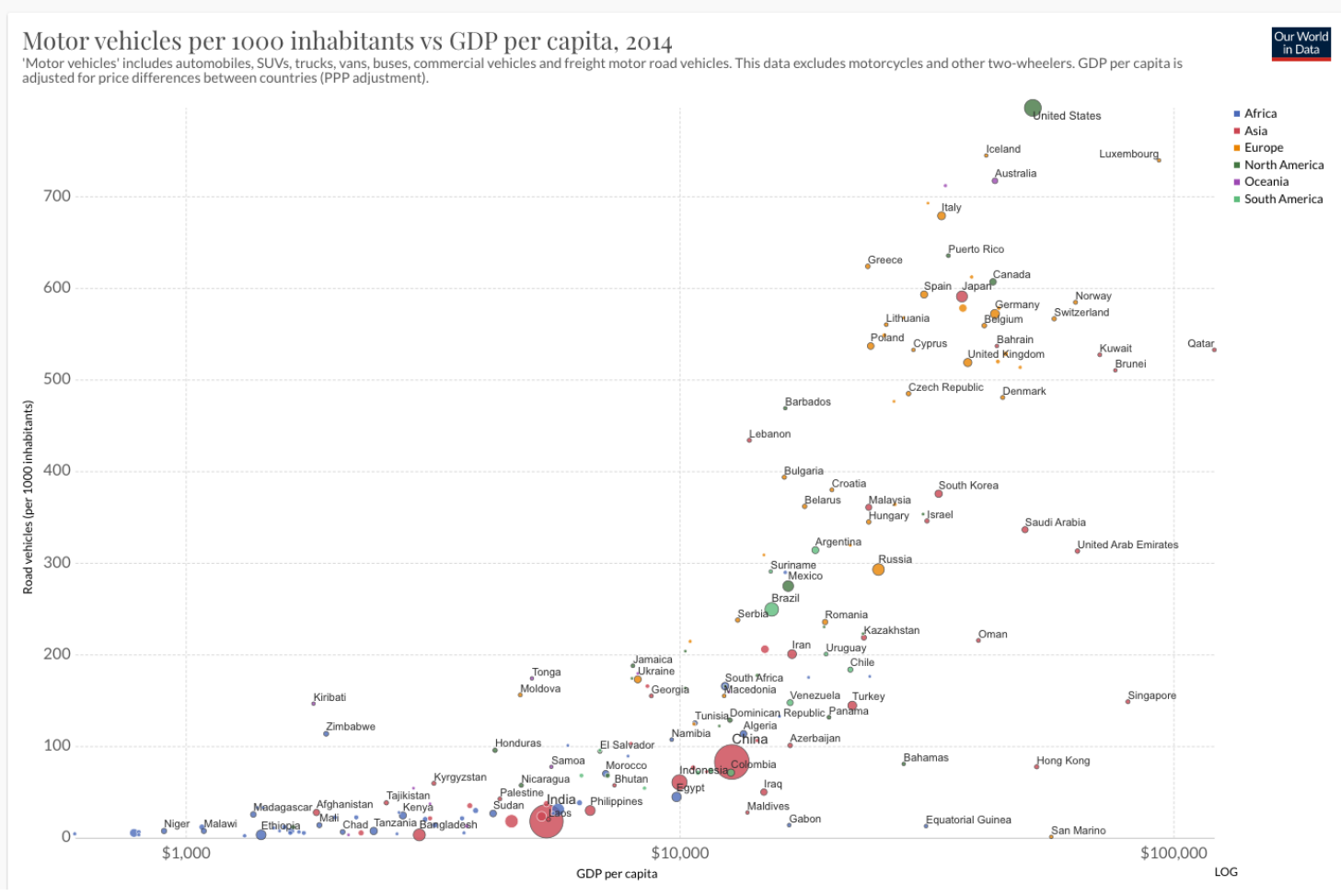
Upcoming

- **Book Report Due March 11th**

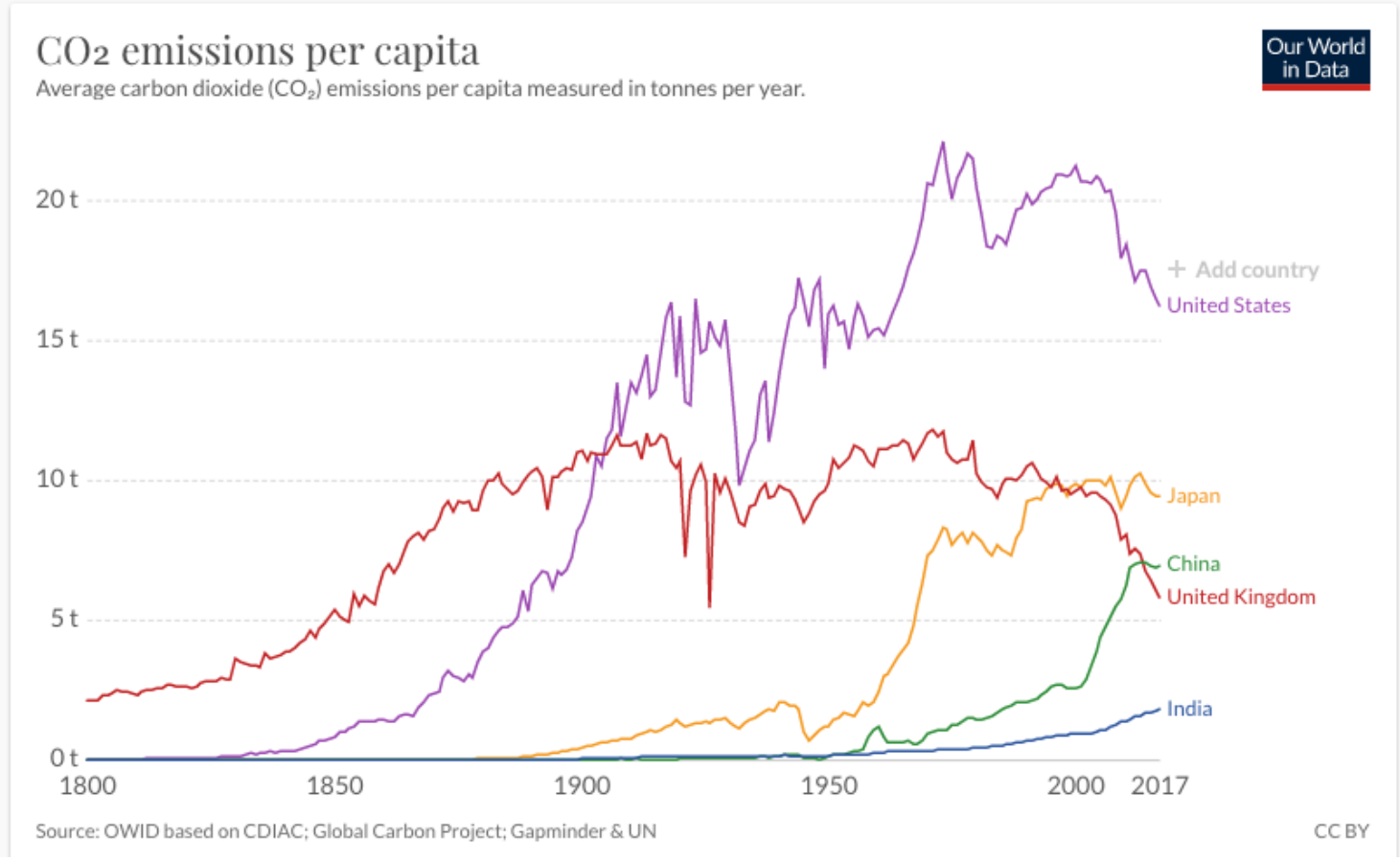
Vehicle Miles Traveled



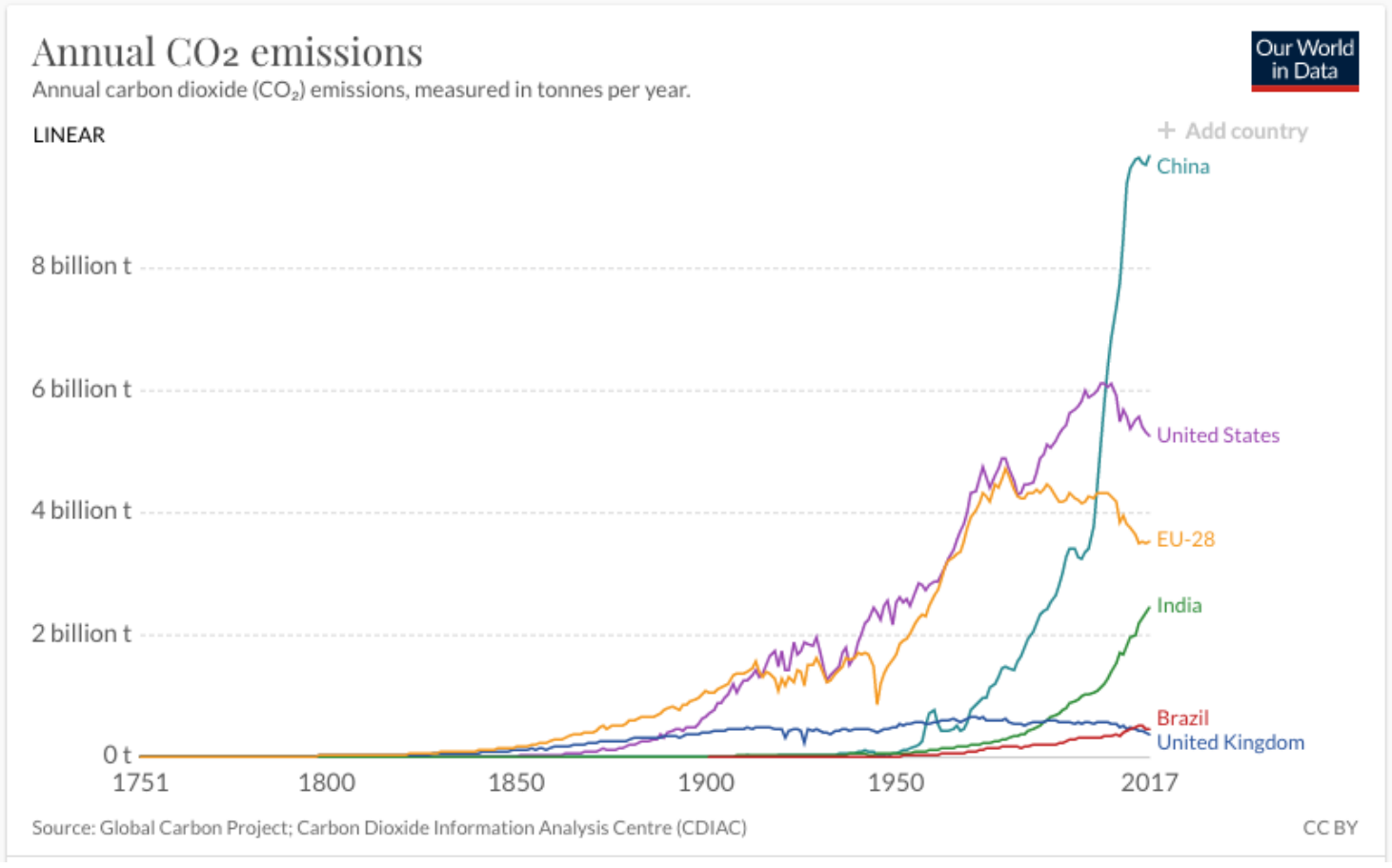
US: People like Cars



Carbon Emissions



Carbon Emissions



A Question

Important Policy Questions:

- How do we reduce CO_2 per capita emissions in the US?
- How do we keep per capita CO_2 emissions in China from exploding?

Future of global carbon emissions depends heavily on how car ownership rates evolve in China.

Checklist

1) **US Auto Use** ✅

2) **Externalities**

3) **Congestion Pricing**

Externalities

Question:

- Are the costs of driving entirely internalized by the driver?
- **Axiom 3**: Externalities cause inefficiency

Externalities

What are some externalities from driving?

1. Congestion
2. Environmental Damage
3. Collisions
4. Blight (parking lots instead of parks)
5. Noise Pollution

Today: we will focus on congestion externalities

Externalities

How costly is congestion?

- Typical commuter spends **47 hours per year** in traffic
  - **Very high** in some metro areas (LA: 93, SF: 72, Atlanta: 67)
  - Estimated gasoline cost due to congestion delays: **5 billion per year**
  - Time + Gas cost estimate: **63 billion per year**

Modeling Externalities

Let's start by assuming the only externality from driving is congestion

- **Marginal Social Cost** (MSC): Added cost to *society* from one extra unit of production
    - **Note**: $MSC \neq MC$
- MSC is the marginal cost (private) plus the marginal external cost (social)

Congestion Externalities

- MEC from congestion = $m \cdot v \cdot c$ where
  - m is the additional time in traffic from an extra vehicle on the road
  - v is the number of other road users
  - c is the oppurtunity cost of time

Note: When there are few cares on the road, m and v are relatively small

- As the number of cars increases, MEC increases (it is nonlinear)
- Also: the above formula makes a strong assumption, what is it?

Another Graph

Checklist

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So what?

Okay, congestion is an issue, how do we fix it?

Popular Answer: Build more roads

- Thought: if we build more roads, then congestion will decrease since there will be more space on the road
- Q: What is the *crucial* assumption we make when stating: "building roads will reduce congestion"
    - A: The number of drivers will remain the same before and after the road is built

LA Traffic

A Predictable Response

More people driving when a new road is built is easy to understand

1. People avoid driving because it is costly
2. Building a new road makes it less costly
3. Some people were *on the margin* of driving, and the new road pushes them over

So what?

Roads: Not a great solution. Better idea?

Pigouvian Taxes:

- **Main insight**: social cost of driving exceeds private
- Inidividuals do not bear full cost of action, so they engage in it too often
- Raise individual price until social cost = private cost $\implies$ people drive less
- Done via a tax (in this case: congestion)

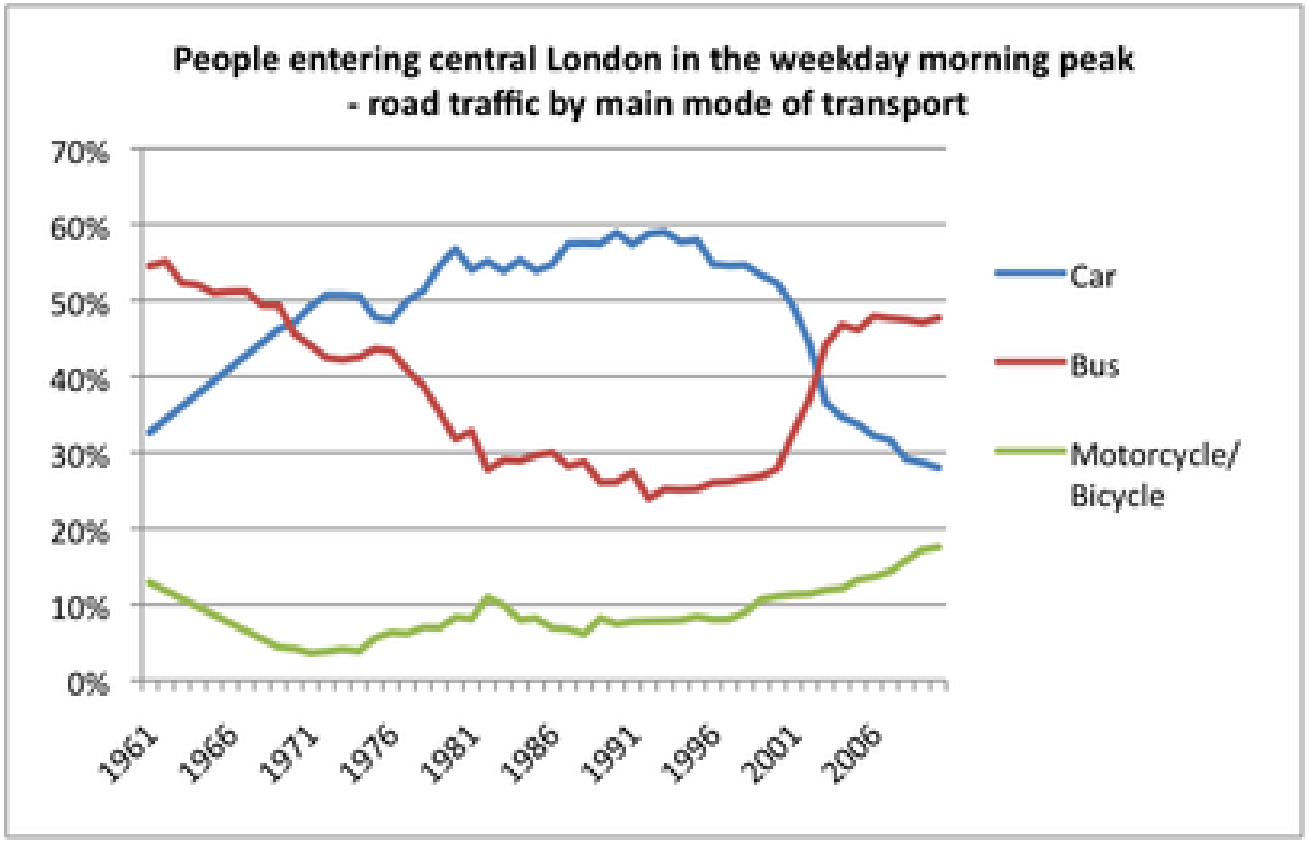
Where is it?


Transport for London
Congestion charging
Central ZONE
Mon - Fri
7 am - 6 pm
Controlled ZONE
20
TAXI
Alamy

Where is it?


$0.75
12:00NN-5:30PM
$0.50
ERP
1:23 PM
R
R
4.5m
WORKS ACCESS
50M
SLOW
REDUCE SPEED NOW
CAUTION
HEAVY VEHICLES TURNING AHEAD

What Happened ?



Model with Pigouvian Taxes

Peak vs. Off Period Taxes

Mechanisms

Model demonstrated congestion taxes reduce traffic volume. How?

1. Modal substition: switch to carpool, public transit
2. Switch to off-peak travel
3. Switch route
4. Location decisions: change residence or workplace, cutting travel distance

Discussion

Congestion taxes sound like a good idea, right? What are the problems?

Discuss

- Roads aren't always congested. So tax needs to be time-varying. Gets very complicated
- Are all autos charged the same amount (semis and prius?)

Checklist

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