What is Econometrics?

EC 320: Introduction to Econometrics

Tami Ren

Summer 2022

Prologue

Who am I?

Tamara Ren (or Tami)

- Doctoral student in economics
- Applied micro and econometrics
- I study the economics of education and labor. Currently developing a methods paper to use panel Google Trends data

Where can you find me?

- Office: Zoom
- Office hours: Monday and Wednesday 2:00-3:00 PM, Friday 10:00-12:00 PM, or by appointment
- Email: tren@uoregon.edu **(use EC 320 in the subject line)**

How will we interact?

- We are all on Zoom, so please be courteous to everyone
    - Mute your microphone if you are not speaking
    - Be professional when your camera is on
- Use your hand option or type in chat if you have a question. You can unmute yourself to ask your question
- Cameras are not required to be on---however, it does help improve the classroom environment. I highly encourage you keep your cameras on.
- I will post recordings on Canvas

Course Material

Required:

- R and RStudio (Both are free)
- You will need access to a computer

Recommended:

- Introduction to Econometrics, 5th Ed. by C. Dougherty (or older editions)

Grade Distribution

- 30% Homework
- 35% Midterm
- 35% Final

Your grade is a **merit** based grade --- there are no other ways to earn a higher grade besides your work. I do not give extra points for attendance or for asking questions. Your grade is how well you complete your assignments.

Grading Policy

Your final score will be curved. I follow the department's grading policy

> "In particular, the department's general rule for percent A's and B's (excluding grades of P, NP, I, X, Y, and W) for undergraduate courses will be 55% for lower-division courses (i.e., EC 101, 201, and 202), and 65% for 300-level and 400-level upper-division courses"

- What this means is that I will have a general idea of how you are doing in the class, but I will not know your final score **UNTIL** the final. I will do my best to answer your questions, but please do not demand definitive answers.

Important Dates

- Homework 1 due Saturday, June 25
- Homework 2 due Saturday, July 2
- Midterm: Thursday, June 30
- Homework due Saturday, July 9
- Homework due Thursday, July 14
- *Final Friday July 15, 12:00*

Homework and tests will be available on **Canvas**. You must submit your finished work on Canvas.

Class material will be available on GitHub and Canvas. Any handwritten notes or examples will be posted on Canvas.

Labs

Learning R

Develop practical skills based on the material we cover

Lab sessions will be held on Mondays during lecture time from 1-1:50 (except for the first lab). I will cover material that you will need to complete your homework.

Motivation

Why study econometrics?

1. Develop **skills that employers value**.
2. Cultivate **healthy skepticism**.
3. Learn about the world using **data**.

Why study econometrics?

Provide answers to important questions

- Do minimum wage policies **reduce poverty**?
- Does the death penalty **deter violent crime**?
- Are recessions **good for your health**?
- How will global warming **affect the economy**?
- What **explains the gender pay gap**?

- Many, many, many more!

Econometrics

Most econometric inquiry concerns one of two distinct goals:

1. Prediction: Accurately predict or forecast an outcome given a set of predictors. Given what we know about x, what values do we expect y to take?

2. Causal identification: Estimate the effect of an intervention on an outcome. How does y change when we change x?

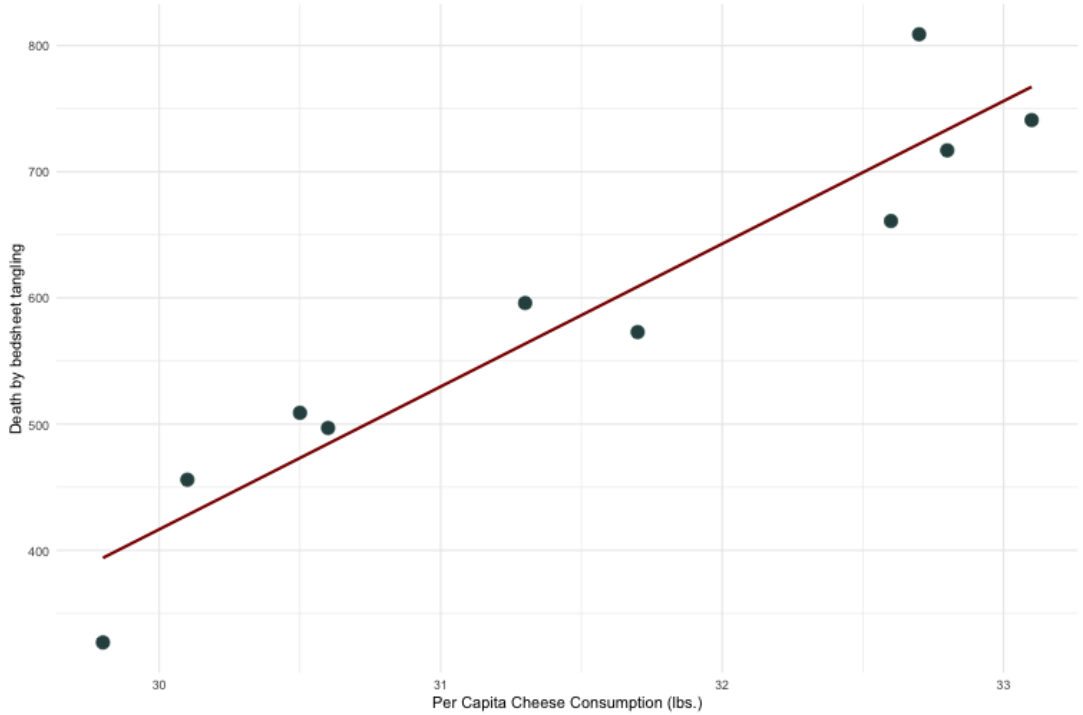
The main focus of EC 320 and EC 421 is causal identification.

- But...both rely on a common set of statistical techniques.

- For those interested, Professor Tim Duy teaches forecasting (EC 422) this Winter.

Econometrics

Not all relationships are causal



Correlation vs. Causation

Common refrain: *"Correlation doesn't necessarily imply causation!"*

- **Q:** Why might correlation fail to describe a causal relationship?
- **A:** Omitted-variables bias, selection bias, simultaneity, reverse causality.

Correlation can imply causation.

- Requires strong assumptions.
- **Real life often violates these assumptions!**
- **Solutions:** Conduct an experiment or find a natural experiment.

Example: *Blue Paradox*

Recent study by UO economist Grant McDermott and coauthors.

Question: Do commercial fishers preempt fishing bans by increasing their fishing effort before the bans go into effect?

Motivation

- Recent conservation efforts seek to preserve aquatic habitat and increase fish stocks.
- Policy lever: Restrict fishing activity in marine protected areas.
- Concern: Preemptive behavior could *decrease* fish stocks.

Data

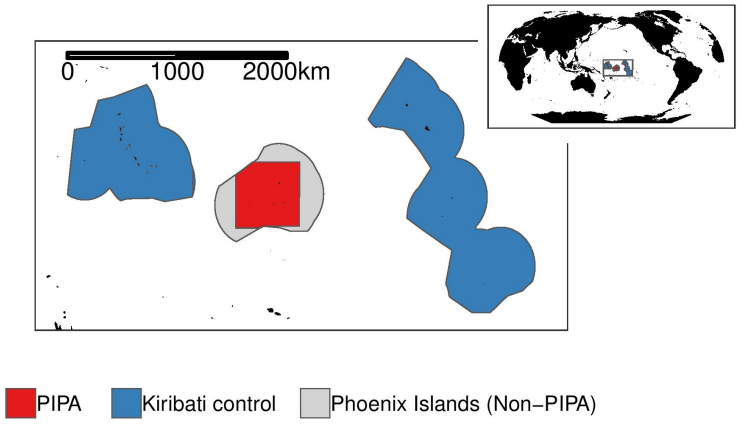
- Vessel-level data on fishing effort/intensity.

Example: *Blue Paradox*

Natural Experiment

Phoenix Islands Protected Area (PIPA)

- First mentioned on 1 September 2014; implemented 1 January 2015.
- *Treatment group:* PIPA.
- *Control group:* Outlying Kiribati islands.



Example: *Blue Paradox*

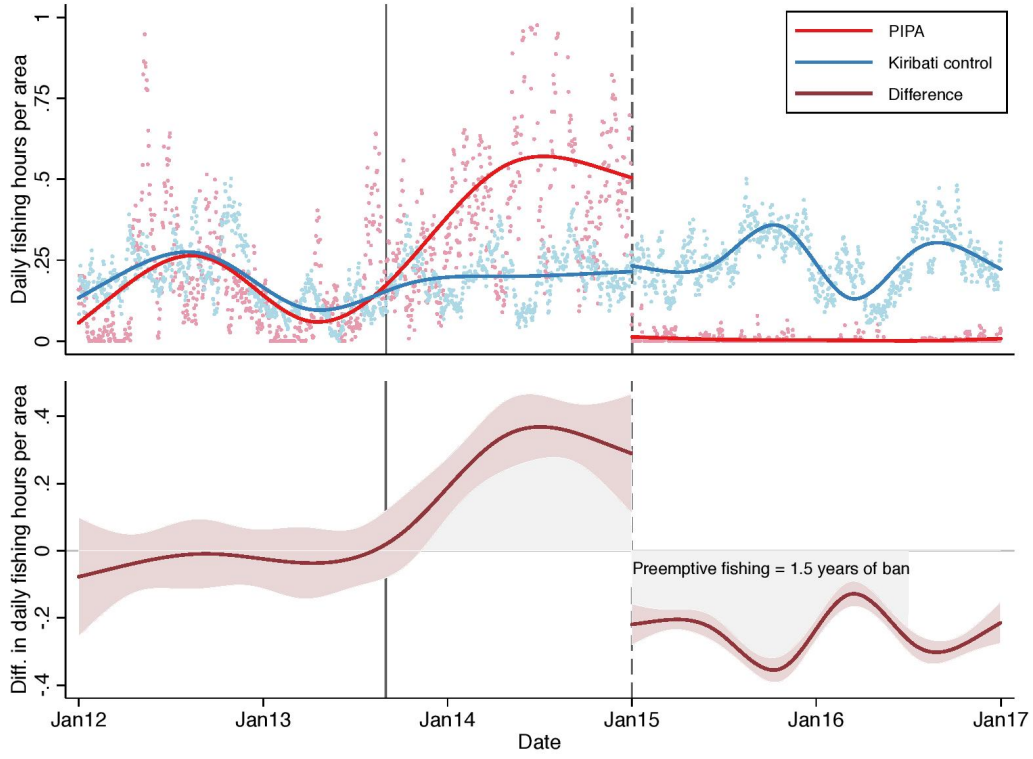
Natural Experiment

Measure the causal effect of the fishing ban by comparing fishing effort in treatment and control regions, before-and-after PIPA.

- A *difference-in-differences* comparison.
- Assumption: Parallel trends. If we believe this assumption, then the observed change supports a causal interpretation. If not, then the change could reflect other factors and thus fail to isolate the causal effect of the ban.

Example: *Blue Paradox*

Results



Example: *Blue Paradox*

Discussion

Results provide causal evidence that commercial fishers engage in preemptive behavior in response to conservation policy changes.

Results are *consistent* with economic theory, but *cannot prove* that the theory is correct.

- **Science cannot prove anything.**
- Science can falsify or reject existing hypotheses or corroborate existing evidence.

Also...the causal statement rests on a critical assumption.

- Cannot prove that the assumption is true, but can falsify it.
- Failure to falsify $\neq$ assumption is true.

R

R

What is R?

According to the R project website,

> R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS.

What does that mean?

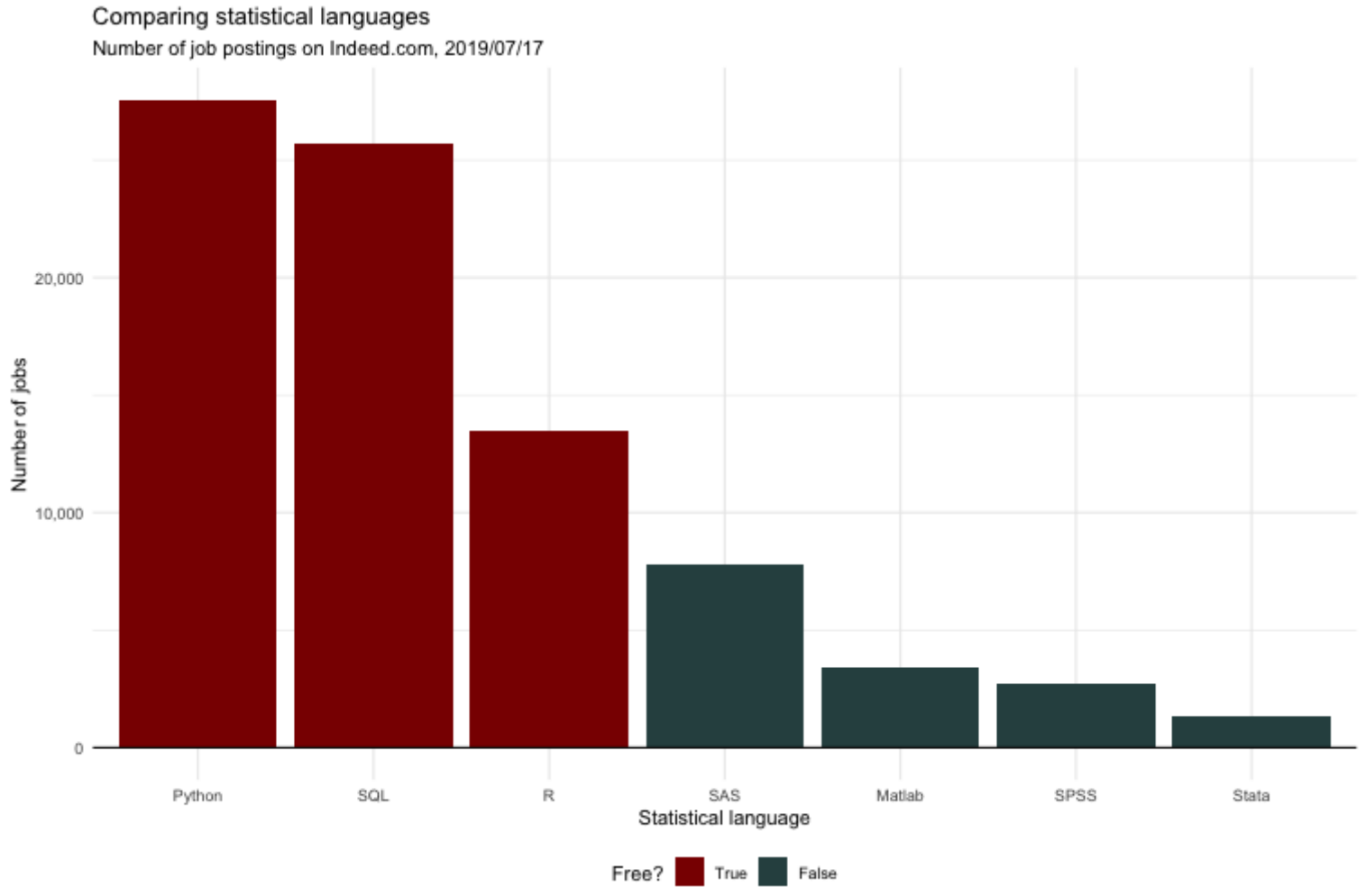
- R is **free** and **open source**.
- R executes a variety of statistical techniques and produces beautiful graphs.
- R has a vibrant, thriving online community (see stack overflow).

R

Why are we using R?

1. R is **free**.
2. **R is popular** among economists, political scientists, psychologists, sociologists, geographers, anthropologists, biologists, data scientists, and statisticians.
3. **Employers prefer R** over most competing software environments.
4. R can **adapt to nearly any task**: 'metrics, spatial data analysis, machine learning, web scraping, data cleaning, website building, teaching.

R


Comparing statistical languages
Number of job postings on Indeed.com, 2019/07/17
Number of jobs
20,000
10,000
0
Python
SQL
R
SAS
Matlab
SPSS
Stata
Statistical language
Free?
True
False