

ECON 1123 Section 5

Slides at github.com/cjleggett/1123-section

Outline

- Name Circle
- Pset Feedback
- Pset Advice
- Lecture Recap / Questions
- Examples + Practice

Name Circle

Name Circle

- Name
- Favorite pasta shape



Problem Set Feedback

Great Work!

- You did well on two much more difficult psets

Naming Variables

- VLBW
- non-VLBW
- D
- U
- dummy

Showing Work

- For math questions, show your work so we can give partial credit
- For non-math questions, say less!

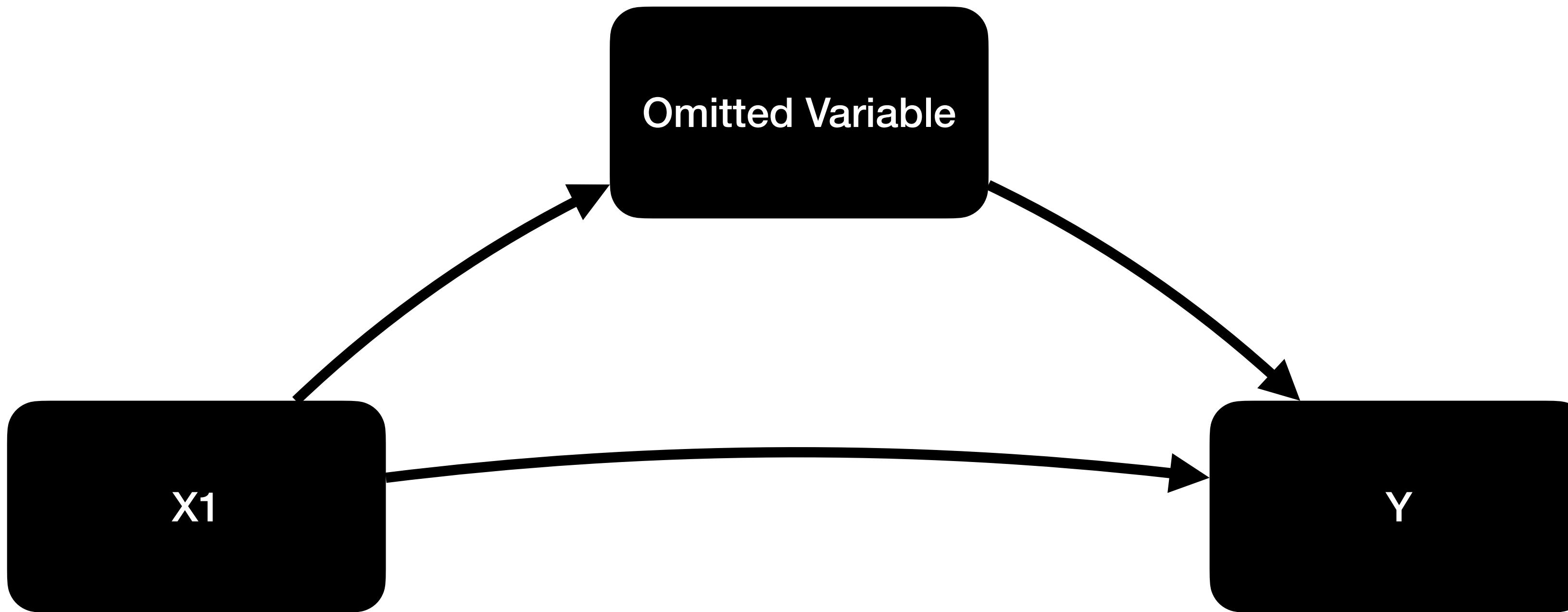
Tables

- Do not spend time stressing about tables
- out2reg + stargazer are supposed to make life easier
- If they are making life harder, use excel or anything else!

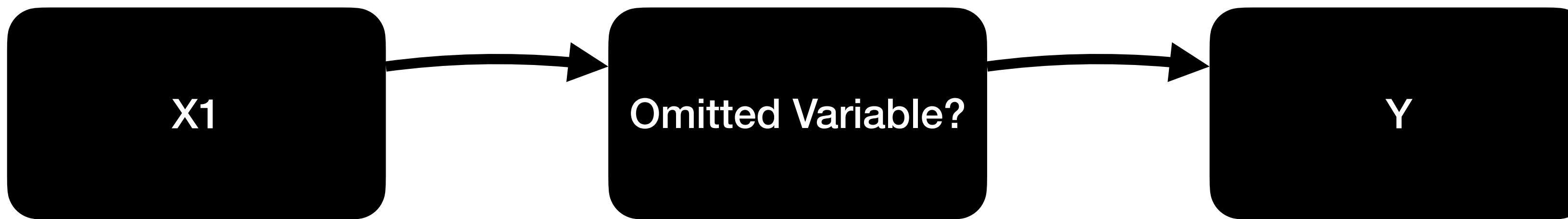
OVB Problems

- **Think of variables that mean our causal inference is limited**
- Remember to follow specific OVB steps!!!
- Always state whether we are under- or over-stating the causal effect

Choosing an Omitted Variable



Choosing an Omitted Variable



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OVB Problems

- Think of variables that mean our causal inference is limited
- **Remember to follow specific OVB steps!!!**
- Always state whether we are under- or over-stating the causal effect

Steps in OVB Problem

1. Choose an omitted variable
2. Sign β_2 : correlation between omitted variable and outcome. Provide economic or real-world intuition for this sign.
3. Sign γ_1 : correlation between omitted variable and variable of interest. Provide economic or real-world intuition for this sign.
4. Based on the above two, say the bias is positive or negative.
5. Conclude whether we have overstated or understated the causal effect. (Is α_1 too big or too small?)
6. (Optional) Draw a number line.

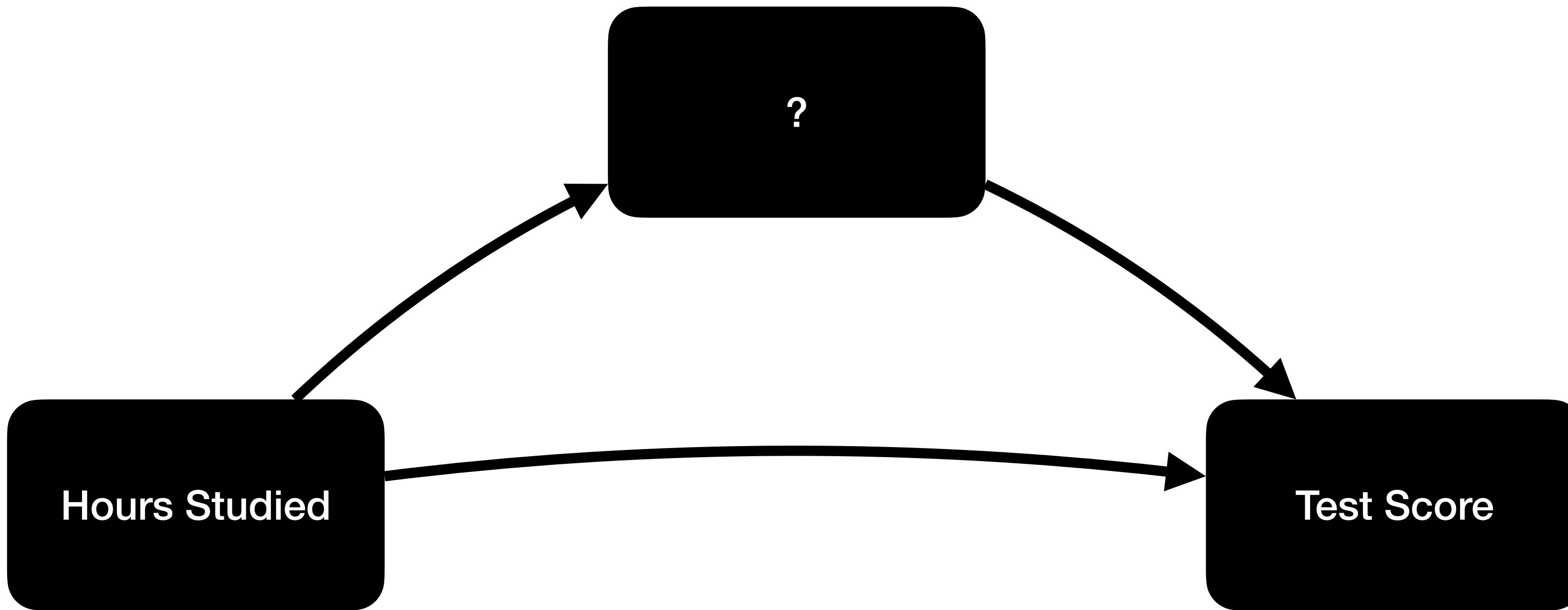
OVB Problems

- Think of variables that mean our causal inference is limited
- Remember to follow specific OVB steps!!!
- **Always state whether we are under- or over-stating the causal effect**

Over or Under-stating?

- If α_1 and *bias* are both positive or both negative, we are **overstating** the causal effect
- If α_1 and *bias* have opposite signs, we are **understating** the causal effect
- Let's draw this on the board.

OVB Practice!



Pset Advice

Problem Set 5

- This week's pset is much more open-ended than the last one.
- Will include some panel data stuff and some R.D. stuff
- Don't let this bog you down!
- You could spend hours thinking of the best control variables and reading research if you want
- Or you can use the example code (almost) as is and focus on the problems
- Start now if you haven't already!

Lecture Recap

Big Idea: Panel Data

- Often we have data across time for some of the same entities
- We can't treat these as independent data points (my height last year is correlated with my height this year)
- This brings up OVB problems!
- We can control for time period and/or entity (include “fixed effects”) to get a better idea of causality.

What is Panel Data?

- **Cross-sectional data:** independent observations from 1 point in time
- **Panel Data:** Have observations for a sample of entities at different times.
- X_{it} represents the variable X for entity i at time t (most of the time)

Extended Example: School Spending + Test Scores

- Dataset includes standardized test scores and state spending levels for schools across the country for last 20 years.
- We want to estimate the causal effect of spending on test scores.

Initial Regression

- $testscore = \alpha_0 + \alpha_1 spending$
- OVB?

Entity-Fixed Effects

- $testscore = \alpha_0 + \alpha_1 spending$
- Omitted Variable of rural vs. Urban
- Let's practice here

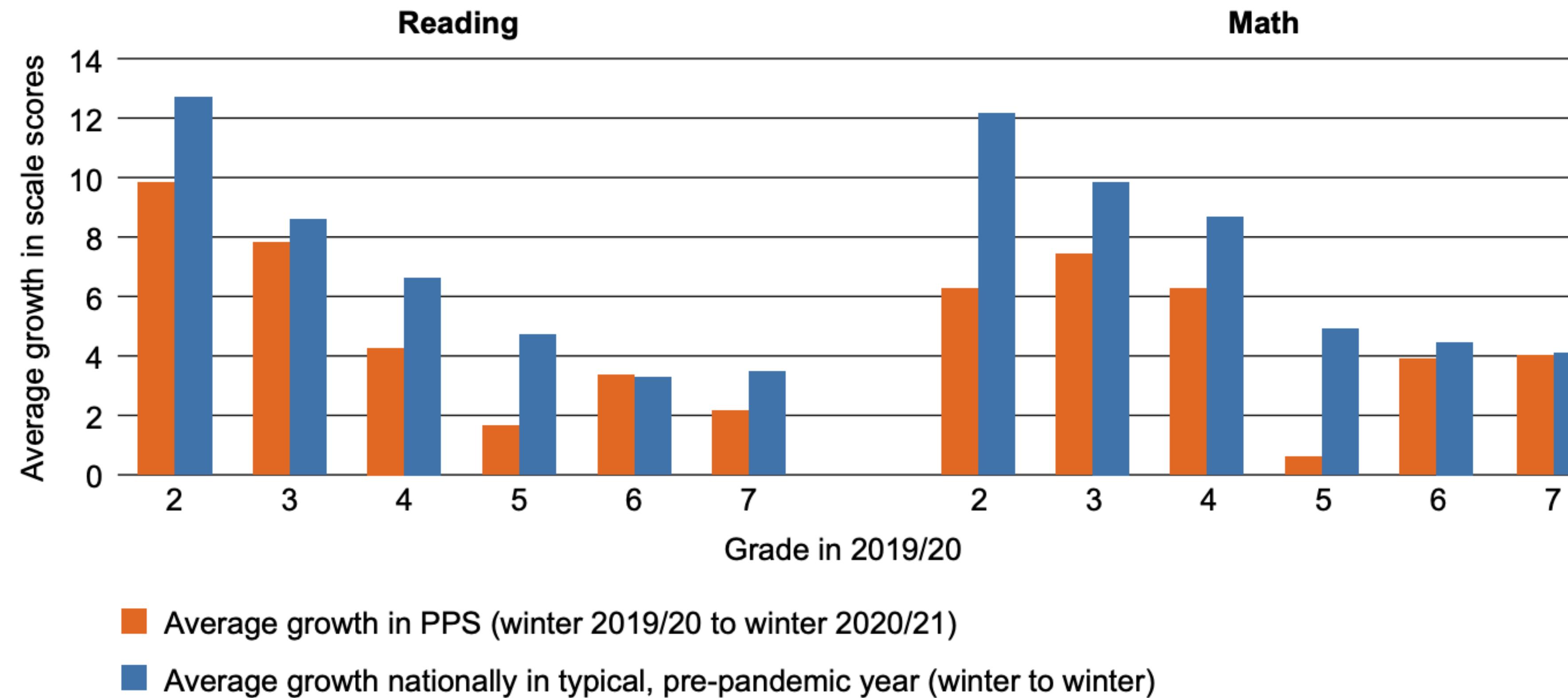
Entity-Fixed Effects

- $testscore = \alpha_0 + \alpha_1 spending$
- Omitted Variable of rural vs. Urban
- Let's practice here
- New Regression: $testscore = \alpha_0 + \alpha_1 spending + \alpha_2 MA + \alpha_3 NH \dots$
- New Regression:
 $testscore = \alpha_0 + \alpha_1 spending + \alpha_2 Gilford + \alpha_3 Belmont \dots$

Time-Fixed Effects

- Omitted Variable: Year
- Think 2020

Time-Fixed Effects (β_2)



Time-Fixed Effects (γ_1)

How Much Will Congress Spend to Shore Up Schools?

The Covid-19 relief plans before Congress all dedicate billions to stabilizing education budgets amid deep losses in state revenue. But the amounts vary from bill to bill.

FutureEd GEORGETOWN UNIVERSITY	CARES Act Signed into Law March 2020	Covid Relief Package Signed into Law December 2020	American Rescue Plan Signed into Law March 2021
Education Total	\$30.7 billion	\$82 billion	\$168 billion
K-12	\$13.2	\$54	\$122
Higher Ed	\$14	\$22	\$40
Governors	\$3	\$4	\$2.7

Time-Fixed Effects

- Omitted Variable: Year
- We can include indicators for each year!
- $testscore = \alpha_0 + \alpha_1 spending + \alpha_2 year2003 + \alpha_3 year2004\dots$

Time and Entity-Fixed Effects

- We can include both of these sets of indicators in our regression!
- Does this mean we've eliminated all OVB?
- No! But they have to:
 - Vary over time with respect to Y within each entity
 - Correlate with X_{it}

Adding Interaction Terms

- We can even interact the time/entity dummy variables with each other and with other variables.
- This eliminates OVB we talked about in the last slide.

Exercises!