

Comments on Jesse Rothstein's Student Sorting and Bias in Value-Added Estimation

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National Conference on Value-Added Modeling 2008

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Student
Sorting and
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Value-Added
Estimation

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Overview

Motivation

"Causal"
Effects

- **Research question:** Can teacher fixed effects recovered from value-added models be interpreted as a causal effect of teachers in observational data?
 - Resounding no!
 - Why? Falsification test shows that future teacher dummies almost have as much an “effect” on current gains as current teacher dummy.
 - Problem? Non-random assignment of students to teachers.
- How much does non-random assignment bias the estimates of teacher effects?

Overview (2)

- To quantify the bias from non-random assignment, models the assignment process in two contexts:
 - 1 Selection on observables
 - 2 Selection on unobservables (principal takes factors that we do not observe into account when assigning students to classrooms)
- Controlling for the history of student achievement (observable to principal) helps reduce bias
- Bias increases with the magnitude of unobserved information used in the assignment process

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Why do we care?

Policy Implications

- To what extent can test scores be used to evaluate teachers?
 - Hiring and retention
 - Merit pay
 - Accountability systems
- We could be rewarding/punishing teachers incorrectly
- Important qualification for policy: The results here focus on identifying *within*-school variation in teacher quality

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Policy Implications (2)

- Another underlying rationale for using test scores as evaluation criteria:
 - Worried about teacher shirking?
 - Want to motivate teachers to try harder
 - Even if flawed measures of teacher causal effect, if have a higher probability of being rewarded if try harder, maybe the system using value-added isn't so bad after all?
- For some policies it may be sufficient to rank teachers?
 - If positive assortative matching between students and teachers, could potentially recover ranking under weaker conditions

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Causal Effect of Teachers

- What do we mean by a *causal* effect of teachers?
 - Teacher dummy attributes all classroom level inputs to the teacher
 - This includes peer effects
- What do we mean by “better” teachers?
 - Use better methods to teach curriculum
 - Maintain better control of the classroom, engaging students
 - Motivate students to work harder
- Can we distinguish these effects from peer effects?
- Is it useful to do so?

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Causal Effects (2)

- What are peer effects?
 - Spillovers from more able peers
 - Less disruptive peers means better classroom learning environment
 - Conformity effects: Okay to be a nerd if you're in a class full of nerds
- If teacher affects student motivation or learning environment, the causal effect varies directly depending on composition of peer group!
- A “good” teacher would likely even adjust teacher to peer composition

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Defining Causal Effect

- Working definition of causality:
 - If we were to randomly assign students in a school to teachers, what would be the relative value-added of the different teachers
- What if peers matter?
- Difficult to disentangle a teacher effect from a peer effect.
- Would random assignment of students to teachers be sufficient?
- Alternative definition:
 - How does teacher perform given different student classroom compositions?
- Teacher-student matching complicates this even further!

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Conclusion

- Convincing evidence that value-added models are not capturing unbiased estimates of causal effect of peers
- More investigation on whether it is driven by non-random assignment would be interesting.
 - For instance, students in similar peer groups across years and peer groups randomly assigned to teachers, future teacher may have an “effect” on achievement simply as a proxy for type of peer group
- What do the estimates look like in “apparent random assignment” schools? (Vigdor and Nechyba)
- How about when students were “randomly” reassigned to schools through redrawing of district boundaries? (Hoxby and Weingarth, Vigdor and Nechyba)
- When is it necessary to know the *true* causal effect of teachers?
- Is a noisy signal “good enough” for policy?

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