Economics 172
Issues in African Economic Development
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• The midterm exam is this Thursday, March 15\textsuperscript{th} in class
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Reader #2 available in Copy Central later this week.
The regression discontinuity (RD) approach

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- One way to get around this is to focus on students “very close to” the winning threshold test score level
Educational attainment 2005-2006 (yrs)

GSP losers

GSP winners

Score*

2001 exam score

Economics 172: Lecture 17
The regression discontinuity (RD) approach

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- One way to get around this is to focus on students “very close to” the winning threshold test score level

- In the limit, comparing the student who just barely won (receiving $Score^*$) to the student who just barely lost ($Score^* - \varepsilon$) should yield a comparison group of losers almost identical to winners along unobservables, too
Educational attainment 2005-2006 (yrs)

RD estimate of the impact of winning

GSP losers (T_i=0)  GSP winners (T_i=1)

Score*  2001 exam score
Treatment effects and omitted variable bias

(1) \[ Y_i = a + bT_i + cX_i + e_i \]

(2) \[ E(Y_i \mid T_i=1) - E(Y_i \mid T_i=0) \]

\[ = \left[ a + b + cE(X_i \mid T_i=1) + E(e_i \mid T_i=1) \right] - \left[ a + 0 + cE(X_i \mid T_i=0) + E(e_i \mid T_i=0) \right] \]

\[ = b + c \left[ E(X_i \mid T_i=1) - E(X_i \mid T_i=0) \right] \]

*True effect*  
“Omitted variable/selection bias” term
Treatment effects and omitted variable bias

\[ (2) \quad E(Y_i \mid T_i=1) - E(Y_i \mid T_i=0) = b + c \left[ E(X_i \mid T_i=1) - E(X_i \mid T_i=0) \right] \]

Assume that any relevant omitted variables vary “smoothly”, so very little, with respect to the test score, and do not “jump” across the winning threshold:
Treatment effects and omitted variable bias

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Assume that any relevant omitted variables vary “smoothly”, so very little, with respect to the test score, and do not “jump” across the winning threshold:

\[
= b + c [ (x^* + \delta) - x^* ] \\
= b + c^* \delta \\
\approx b
\]
Using the RD approach

- More generally RD methods can be used whenever program / treatment assignment has a “sharp discontinuity”, in other words, a very rapid change in the likelihood of assignment with respect to an underlying “smooth” variable (here, the test score)
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• For example, people may only get a loan if their credit score is sufficiently high. If you compare people with, say, a credit score of 750 versus with 749 they are very similar, but only the former group gets a loan
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• RD Limitation: “local” treatment effect at the threshold
Empirical methods so far in the course

- A fundamental econometric concern in empirical economic research: non-random selection into "treatment" / omitted variable bias (OVB)

Potential solutions:
Empirical methods so far in the course

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- Potential solutions:
  1. Control for all relevant factors (challenging!)
  2. Randomized evaluation
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• Potential solutions:
  (1) Control for all relevant factors (challenging!)
  (2) Randomized evaluation
  (3) Difference in differences (DD)
  (4) Regression discontinuity (RD)
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• Potential solutions:
  (1) Control for all relevant factors (challenging!)
  (2) Randomized evaluation
  (3) Difference in differences (DD)
  (4) Regression discontinuity (RD)

• Each of these methods has their own strengths and limitations, although if a randomized experiment is possible, it is usually thought of as the gold standard
Theoretical models so far in the course

• The Solow Growth Model

• Sexual behavior and HIV risk
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• The Solow Growth Model

• Sexual behavior and HIV risk

• Within household allocation under extreme scarcity

• Educational investment, time horizons, and gender
Main substantive topics so far in the course

• Patterns of African economic development

• Theories of economic growth

• Geography, health, and development
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- Patterns of African economic development
- Theories of economic growth
- Geography, health, and development
- The economics of HIV/AIDS
- Economic shocks and rural households
- Human capital
Next topic: environmental and development

• What will happen to Africa as a result of climate change? What if global temperatures keep rising?

• One important issue is water scarcity, if temperatures rise and droughts become more common
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- What will happen to Africa as a result of climate change? What if global temperatures keep rising?

- One important issue is water scarcity, if temperatures rise and droughts become more common

- The case of Chad: Lake Chad, once the world’s 6th largest lake, but it is drying up. It is currently only 10-20% of its former size. Former fishing towns are desert

- Desertification, plus damming of rivers for hydroelectric power, are both to blame
Africa's Disappearing Lake Chad
• For next time: study for the midterm exam!