

Econometrics II

6th Tutorial: Paper Discussion

Regression Discontinuity (RD)

Carpenter, C., Dobkin, C. (2009).

The Effect of Alcohol Consumption on Mortality:
Regression Discontinuity Evidence from the Minimum
Drinking Age

American Economic Journal: Applied Economics, 1, 164-82.

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Summer Semester 2019

Research question

What is the causal impact of the MLDA on alcohol consumption and mortality?

MLDA: Minimum legal drinking age

- age threshold to regulate legal access to alcohol.
- 21st birthday in the US.

Contribution of the paper

Research
question

Contribution

Method

Data

Results

Results II

Results III

Implications

Limitations

- methodological improvement. RD overcomes limitations of existing research on policies that change at the state level (possibly endogenous).
- authors provide a broader picture on a wide range of outcomes including alcohol consumption.
- add to conflicting results.
- present the first direct estimate of the elasticity of mortality with respect to consumption (provided through IV-results).

RD approach

- Baseline regression:

$$y_{ai} = X'_{ai}\beta + \pi D_{ai} + g(\text{age}_i) + v_{ai}$$

- y_{ai} is an outcome measure for individual i at age a .
- Outcomes: alcohol consumption and mortality.
- Treatment: legal access to alcohol at age 21.
- Running variable: age in months or days.
- $g(\text{age}_i)$ flexible polynomial of one's age which can take different forms on either side of the age cutoff.
- π potential jump at the age cutoff (21st birthday).
- further control variables?

Sharp or fuzzy RD-design?

What is the treatment?

- treatment (D_{ai}): legal access to alcohol at age 21.
- D_{ai} is a **deterministic** function of a ,
i.e. once we know a , we know D_{ai} .
- D_{ai} is a **discontinuous** function of a , because no matter how close a gets to the cutoff, D_{ai} remains unchanged until the cutoff is reached.

→ sharp research design. identifying variation: sharp difference in legal alcohol access for young adults above or below 21.

parametric vs non-parametric regression

- authors use both to check the robustness of the results.
- parametrically: $g(\text{age}_i)$ polynomial of order n .
- quadratic, cubic, and quartic polynomials of age fully interacted with treatment.
- non-parametrically: estimation in a narrow window around the cut-off.
- what is the optimal bandwidth?



zooming into the cut-off: less bias but also less precision (efficiency). → sharp research design.

Key identifying assumption

Continuity assumption

- all observed and unobserved determinants of drinking/mortality other than the legal access to alcohol trend smoothly across the 21st birthday.
- Can that be checked?
- Do the authors check for it?

- Consumption data: National Health Interview Survey (NHIS): 1997 – 2005.
- Drinking participation and drinking frequency/intensity (extensive margin and intensive margin).
- Two problems: reference period (last 12 months) and desirability bias. How do the authors deal with it?
- Mortality data: National Center for Health Statistics: 1997 – 2004 (Census of death in the United States).
- In addition, population estimates from the census to convert mortality counts into rates.

→ both data sets include the date of birth and date of death.

→ Baseline sample: young adults aged 19 – 22.

Authors show graphs and regressions outcomes. Why?

Alcohol consumption

- drinking participation in the past year.
 - 11% increase of the drinking participation.
 - 16% increase of heavy drinking participation.
- drinking intensity
 - 21% increase in drinking days.
 - no impact on the average number of drinks consumed on a drinking day.

Mortality

- 9% increase in overall mortality which is driven by deaths due to external causes.
- Primarily due to motor vehicle accidents, alcohol-related deaths, and suicides
- Subsample analysis: increase in mortality driven by white males who are high school graduates or attending college.

IV estimates

What is the challenge here? Which further assumptions have to hold?

- Which type of alcohol consumption drives mortality?
- If the increase in mortality is due to the increase in the number of days on which people drink or drink heavily than the implied elasticity if 0.43.
- How is the IV estimate obtained?

Implications

- Contributes to the policy debate about stricter alcohol control.
- Understanding the causal link between youth alcohol consumption and mortality is especially relevant for public policy given that over half of young adults drink and about one-third drink heavily.
- Policy implications: Results suggest that policies which reduce drinking among young adults can have substantial public health benefits.

Limitations of the paper

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- 21st birthday coincides with legal age.
- access to bars, clubs and weapons.
- Potential data issues discussed earlier.
- External validity?
- Can you draw policy conclusions whether to increase or decrease the MLDA?