

9: Instrumentvariable

Videregående kvantitative metoder i studiet af politisk adfærd

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- 1 Formalia
- 2 Opsamling fra sidst
- 3 Instrumentvariable
- 4 Implementering i R
- 5 Case: Lundborg et al.
- 6 Kig fremad

Fagets opbygning

Blok 1

Gang	Tema	Litteratur	Case
1	Introduktion til R	Leeper (2016)	
2	R workshop + tidy data	Wickham (2014), Zhang (2017)	
3	Regression I: OLS brush-up	AP kap 3	Newman et al. (2015), Solt et al. (2017)
4	Regression II: Paneldata	AGS kap 4	Larsen et al. (2017)

Fagets opbygning

Blok 2

5	Introduktion til kausal inferens	Hariri (2012), Samii (2016)	Eckles & Bakshy (2017)
6	Matching	Justesen & Klemmensen (2014)	Nall (2015)
<i>Efterårsferie</i>			
7	Eksperimenter I	AP kap 1+2, GG kap 1+2	Gerber, Green & Larimer (2008)
8	Eksperimenter II	GG kap 3+4+5	Gerber & Green (2000)
9	Instrumentvariable	AP kap 4	Lundborg et al. (2017)
10	Difference-in-differences	AP kap 5	
11	Regressionsdiskontinuitetsdesigns	AP kap 6	Eggers & Hainmueller (2009)

Fagets opbygning

Blok 3

12	Tekst som data	Grimmer & Stewart (2013), Benoit & Nulty (2016)	Baturo & Mikhaylov (2013)
13	Scraping af data fra online-kilder	MRMN kap 9+14	Hjorth (2016)
14	'Big data' og maskinlæring	Varian (2014), Montgomery & Olivella (2017)	Theocharis et al. (2016)

Opsamling fra sidst

- clustered assignment
- brug af pre-treatment mål
- brug af andre kovariater
- blocking
- noncompliance
- case: Gerber & Green (2000)

Fra holdtime 8: for hvert subjekt i defineres

$$ITT_{i,D} \equiv d_i(1) - d_i(0) \quad (1)$$

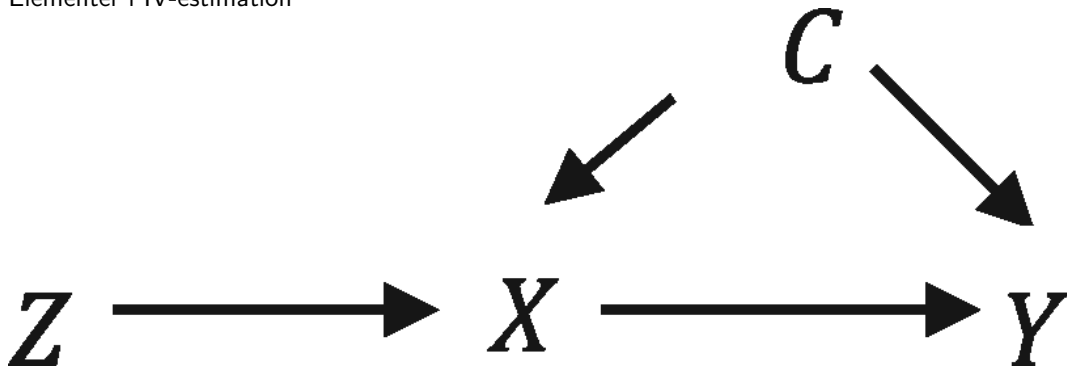
$$ITT_{i,Y} \equiv Y_i(1) - Y_i(0) \quad (2)$$

CACE er forholdet mellem $\overline{ITT_{i,Y}}$ og $\overline{ITT_{i,D}}$:

$$CACE = \frac{ITT}{ITT_D} \quad (3)$$

→ implementering

Elementer i IV-estimation



- Y og X: endogene variable
- X: den endogene regressor
- Z: instrumentet

Motiverende eksempel: fødselskvartal og uddannelse

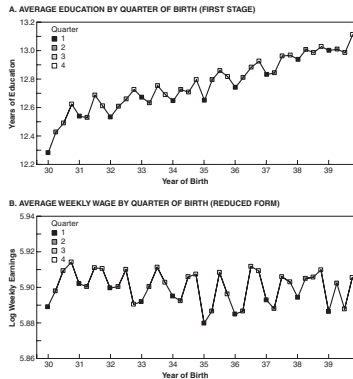


Figure 4.1.1 Graphical depiction of the first stage and reduced form for IV estimates of the economic return to schooling using quarter-of-birth instruments (from Angrist and Krueger, 1991).

From *Mostly Harmless Econometrics: An Empiricist's Companion* © 2009 Princeton University Press.
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Instrumentet opfylder tre kriterier:

- ① first stage effekt: instrumentet påvirker treatment (*relevance criterion*)
- ② instrumentet er ukorreleret med evt. omitted variables (*independence assumption*)
- ③ instrumentet påvirker alene outcome gennem treatment (*exclusion criterion*)

Med kriterierne opfyldt identificerer forholdet ml. reduced form og first stage $\rho =$ effekten af s_i på Y_i

$$\rho = \frac{\text{reduced form}}{\text{first stage}} = \frac{\text{Cov}(Y_i, Z_i)}{\text{Cov}(s_i, Z_i)} \quad (4)$$

Vi estimerer ρ som forholdet ml. koefficienterne i first stage og reduced form-regressionerne:

$$s_i = X_i' \pi_{10} + p_{i11} Z_i + \xi_{1i} \quad (5)$$

$$Y_i = X_i' \pi_{20} + p_{i21} Z_i + \xi_{2i} \quad (6)$$

$$\rho = \frac{\pi_{21}}{\pi_{11}} \quad (7)$$

→ i 2SLS 'instrumenterer' vi s_i ved at prædikere \hat{s}_i vha. (mange) eksogene instrumenter

Under heterogeneous potential outcome, nødvendigt at sondre ml. fire typer compliance:

- ① compliers
- ② never-takers
- ③ always-takers
- ④ defiers

Antagelse om *monotonicitet*, dvs. ingen defiers + independence, exclusion, first stage →

$$\rho = LATE = \frac{E[Y_i|Z_i = 1] - E[Y_i|Z_i = 0]}{E[D_i|Z_i = 1] - E[D_i|Z_i = 0]} = CACE \quad (8)$$

Alternativt effektbegreb: treatment effect on the treated (TOT)

$$TOT = E[Y_1 - Y_0 | D = 1] \quad (9)$$

Gruppen med $D = 1$ omfatter compliers med $Z = 1$ + always-takers
→ i fravær af always-takers er $TOT = LATE$

IV-modeller kan estimeres med funktionen `ivreg()` i pakken AER:

```
ivreg(<yvar> ~ <treatment> , ~ <instrument>, data=<data>)
```


First stage og second stage modeller

(1)

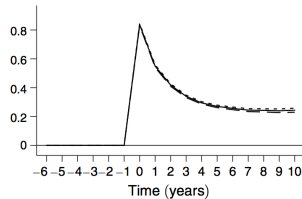
$$F_{it} = \alpha_t X_i + \beta_t Z_i + u_{it},$$

(2)

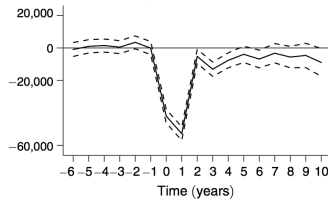
$$Y_{it} = \gamma_t X_i + \delta_t F_{it} + v_{it}.$$

Estimator

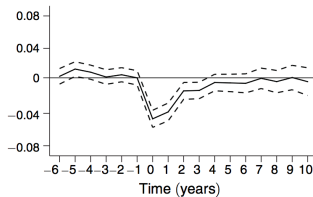
Panel A. Fertility



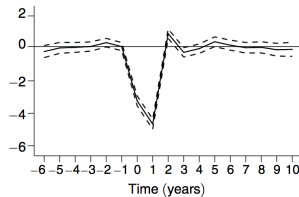
Panel B. Annual earnings



Panel C. Positive earnings



Panel D. Weekly hours worked



Kritik (?)



John B. Holbein @JohnHolbein1 · Jun 2

New paper on how childbearing affects women's labor outcomes.

Landberg, Peter, Erik Plug and Astrid I.
TV Evidence from IV Treatments, June

DOI: 10.1257/aer.2014.01407

Abstract: This paper introduces a new
variation among children's women to test
purpose, we use administrative data on
wages that depend on labor market
for childbearing. Our IV estimates indicate
long-lasting IV driven by fertility effect
much stronger at the extensive margin.

Stefan Thewissen @ThewissenS

Clever paper using IVF treatment finds large, negative
and long-lasting effects of childbearing on female
earnings

1 12 10



Thomas Leeper

@thoslleeper

Following

Replying to @JohnHolbein1

That really, really is not an instrument.

5:57 PM - 2 Jun 2017

4 Likes



1 4

Næste gang: DiD

- AP kap. 5 t.o.m. 5.2
- ingen case-tekst, præsentation af eget datasæt

Tak for i dag!