11: Instrumentvariable

Videregående kvantitative metoder i studiet af politisk adfærd

Frederik Hjorth
fh@ifs.ku.dk
fghjorth.github.io
@fghjorth

Institut for Statskundskab
Københavns Universitet

22. november 2018

1 Formalia

2 Opsamling fra sidst

3 Instrumentvariable
- Grundantagelser
- Noncompliance
- TOT
- Resultater

4 Implementering i R

5 Case: Colantone & Stanig

6 Kig fremad

- VKM-opgave ctr. PA-opgave
  - fri opgave
  - frist 9. januar
  - fokus på metode ctr. teori
  - samfundsvidenskabeligt relevant (ctr. politologisk)
  - gerne analyser fra >1 undervisningsgang
  - demonstrer begrebsbrug fra flere dele af faget
  - god oversigt over datakilder: `https://github.com/erikgahner/PolData`

Opsamling fra sidst

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

Fra sidste gang: for hvert subjekt i defineres

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

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

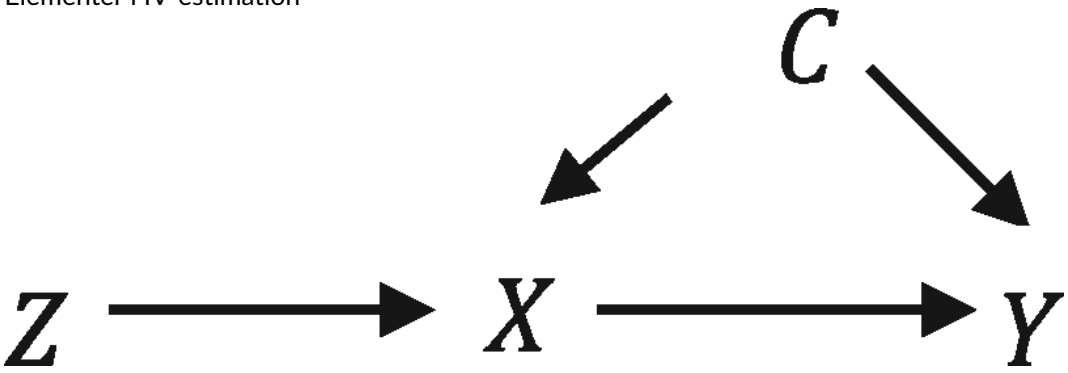
CACE er forholdet mellem $\overline{ITT_{i,Y}}$ og $\overline{ITT_{i,D}}$:

$$CACE = \frac{ITT}{ITT_D} \tag{3}$$

$\rightarrow$ implementering

https://youtu.be/g7hcbIQnq-g

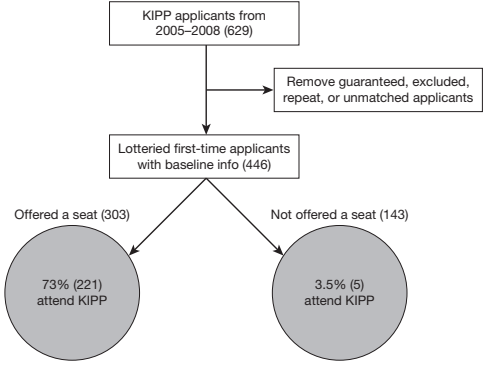
Elementer i IV-estimation



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

Motiverende eksempel: KIPP-lotteriet

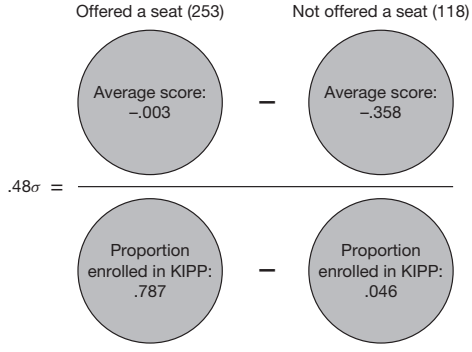
FIGURE 3.1
Application and enrollment data from KIPP Lynn lotteries



Note: Numbers of Knowledge Is Power Program (KIPP) applicants are shown in parentheses.

Reduced form (ρ) og first stage (ϕ)

FIGURE 3.2
IV in school: the effect of KIPP attendance on math scores



Note: The effect of Knowledge Is Power Program (KIPP) enrollment described by this figure is $.48\sigma = .355\sigma/.741$.

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*)

Grupper under tosidet noncompliance

TABLE 3.2
The four types of children

		Lottery losers $Z_i = 0$	
		Doesn't attend KIPP $D_i = 0$	Attends KIPP $D_i = 1$
Lottery winners $Z_i = 1$	Doesn't attend KIPP $D_i = 0$	Never-takers (*Normando*)	Defiers
	Attends KIPP $D_i = 1$	Compliers (*Camila*)	Always-takers (*Alvaro*)

Note: KIPP = Knowledge Is Power Program.

Under heterogene potential outcomes, nødvendigt at sondre ml. fire typer:

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

Hvilke typer finder man i gruppen af treatede?

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

Med kriterierne opfyldt identificerer forholdet ml. reduced form og first stage LATE

$$LATE = \frac{reduced\ form}{first\ stage} = \frac{E[Y_i|Z_i = 1] - E[Y_i|Z_i = 0]}{E[D_i|Z_i = 1] - E[D_i|Z_i = 0]} = \lambda = \frac{\rho}{\phi} \tag{4}$$

Alternativt effektbegreb: treatment effect on the treated (TOT)

$$TOT = E[Y_1 - Y_0|D = 1] \tag{5}$$

Gruppen med $D = 1$ omfatter compliers med $Z = 1$ + always-takers

$\rightarrow$ i fravær af always-takers er TOT = LATE

Resultater fra IV-analyse af KIPP

TABLE 3.1
Analysis of KIPP lotteries

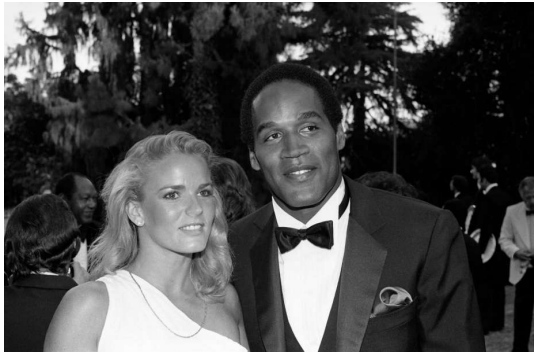
		KIPP applicants			
	Lynn public fifth graders (1)	KIPP Lynn lottery winners (2)	Winners vs. losers (3)	Attended KIPP (4)	Attended KIPP vs. others (5)
Panel A. Baseline characteristics					
Hispanic	.418	.510	−.058 (.058)	.539	.012 (.054)
Black	.173	.257	.026 (.047)	.240	−.001 (.043)
Female	.480	.494	−.008 (.059)	.495	−.009 (.055)
Free/Reduced price lunch	.770	.814	−.032 (.046)	.828	.011 (.042)
Baseline (4th grade) math score	−.307	−.290	.102 (.120)	−.289	.069 (.109)
Baseline (4th grade) verbal score	−.356	−.386	.063 (.125)	−.368	.088 (.114)
Panel B. Outcomes					
Attended KIPP	.000	.787	.741 (.037)	1.000	1.000 —
Math score	−.363	−.003	.355 (.115)	.095	.467 (.103)
Verbal score	−.417	−.262	.113	−.211	.211

Ekstra eksempel: the Minneapolis Domestic Violence Experiment (MDVE)

TABLE 3.3
Assigned and delivered treatments in the MDVE

Assigned treatment	Delivered treatment: Arrest	Delivered treatment: Coddled — Advise	Delivered treatment: Coddled — Separate	Total
Arrest	98.9 (91)	0.0 (0)	1.1 (1)	29.3 (92)
Advise	17.6 (19)	77.8 (84)	4.6 (5)	34.4 (108)
Separate	22.8 (26)	4.4 (5)	72.8 (83)	36.3 (114)
Total	43.4 (136)	28.3 (89)	28.3 (89)	100.0 (314)

Notes: This table shows percentages and counts for the distribution of assigned and delivered treatments in the Minneapolis Domestic Violence Experiment (MDVE). The first three columns show row percentages. The last column reports column percentages. The number of cases appears in parentheses.



... men senere evidens for uintenderede konsekvenser

Does the certainty of arrest reduce domestic violence? Evidence from mandatory and recommended arrest laws☆

Radha Iyengar*

Harvard University, United States

ARTICLE INFO

Article history:
Received 23 November 2006
Revised 28 August 2008
Accepted 16 September 2008
Available online 30 September 2008

JEL classification:
D1
I1
J1
K14

Keywords:
Domestic violence
Mandatory arrest
Spousal homicide
Crime policy

ABSTRACT

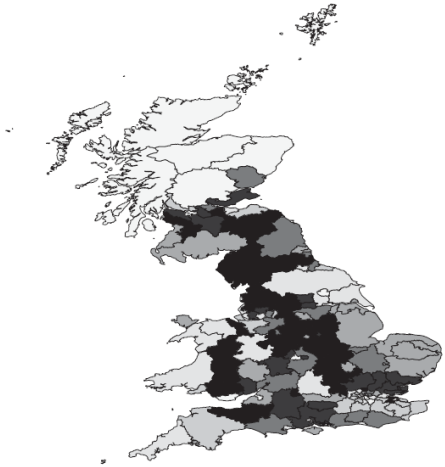
Domestic violence remains a major public policy concern despite two decades of policy intervention. To eliminate police inaction in response to domestic violence, many states have passed mandatory arrest laws, which require the police to arrest abusers when a domestic violence incident is reported. Using the FBI Supplementary Homicide Reports, I find that mandatory arrest laws actually increased intimate partner homicides. I discuss two potential mechanisms for this increase in homicides: decreased reporting by victims and increased reprisal by abusers. I investigate validity of these hypotheses by examining the effect of mandatory arrest laws on different sub-groups and by analyzing family homicides where the victim is less often responsible for reporting. There appears to be consistent evidence for the reporting mechanisms. For family homicides, mandatory arrest laws appear to reduce the number of homicides. This study therefore provides evidence that these laws may have perverse effects on intimate partner violence, harming the very people they seek to help.

IV-modeller kan estimeres med funktionen `iv_robust()` i pakken `estimatr`:

```
iv_robust(y ~ x | z, data=df)
```

Eks. på det britiske 'China shock': Leicester

FIGURE 2. Strength of the Import Shock Across NUTS-3 Regions



Note: Darker shades correspond to stronger import shock.

»It is important to spend a few words on the potential sources of endogeneity. In particular, the import shock in a given region might be endogenous to Brexit votes—due to omitted variable bias—if imports to the United Kingdom at the industry level were correlated with the political leanings of regions. This might emerge if political leaders protect from foreign competition the industries that are important for their key constituencies, while allowing for more imports in industries that are more concentrated in less relevant constituencies.«

TABLE 1. Regional-level Results

VARIABLES	(1) Leave Share	(2) Leave Share	(3) Leave Share	(4) Leave Share	(5) Leave Share	(6) Leave Share
Import Shock	12.233**	12.225***	12.965***	12.085***	11.073***	12.299***
	[4.763]	[4.091]	[4.543]	[3.890]	[3.861]	[3.726]
Immigrant Share				−0.490***	−0.513***	−0.491***
				[0.165]	[0.155]	[0.154]
Immigrant Arrivals				−0.066	0.496	−0.058
				[0.741]	[0.801]	[0.691]
NUTS-1 Fixed Effects	Y	Y	Y	Y	Y	Y
NUTS-2 Random Intercepts	N	Y	N	N	Y	N
Observations	167	167	167	167	167	167
R-Squared	0.57		0.57	0.65		0.65
Kleibergen-Paap F Statistic			662.7			614
Number of Groups		39			39	
Model	Linear	Hierarchical	IV	Linear	Hierarchical	IV

Standard errors clustered by NUTS-2 area in all columns except 2 and 5.
***p < 0.01, **p < 0.05, *p < 0.1


immigration
sovereignty
country
borders
control
laws
back
money
britain
brussels
getting
democracy
people
independence
decisions
make
economy
freedom
british
government
europe
making
facts
border
regaining
european
immigrants
information
leave
rights
vote
best
right
much
future
taking
want
stop
cost
truth
security
ability
unelected
lack
national
affairs
interference
rules

Næste gang: DiD

- AP kap. 5 t.o.m. s. 201
- ingen case-tekst, præsentation af eget datasæt
- øvelse: estimer Colantone & Stanigs model 4 og 6

Tak for i dag!