

11: Difference-in-differences

Videregående kvantitative metoder i studiet af politisk adfærd

Frederik Hjorth
fh@ifs.ku.dk
fghjorth.github.io
[@fghjorth](https://twitter.com/fghjorth)

Institut for Statskundskab
Københavns Universitet

21. november 2016

1 Formalia

2 Opsamling fra sidst

3 Difference-in-differences designs

4 Implementering i R

- Omkodning
- Lang vs. bred form
- Piping

5 Cases

- Case I: Effekter af flygtningestrømme
- Case II: Enos (2016)

6 Kig fremad

Uge	Dato	Tema	Litteratur	Case
1	5/9	Introduktion til R	Imai kap 1	
2	12/9	Regression I: OLS	GH kap 3, MM kap 2	Gilens & Page (2014)
3	26/9	Regression II: Paneldata	GH kap 11	Larsen et al. (2016)
4	29/9	Regression III: Multileveldata, interaktioner	GH kap 12	Berkman & Plutzer
5	3/10	Introduktion til kausal inferens	Hariri (2012), Samii (2016)	
6	10/10	Matching	Justesen & Klemmensen (2014)	Ladd & Lenz (2009)
	17/10	*Efterårsferie*		

Uge	Dato	Tema	Litteratur	Case
	17/10	*Efterårsferie*		
7	24/10	Eksperimenter I	MM kap 1, GG kap 1+2	Gerber et al. (2008)
8	31/10	Eksperimenter II	GG kap 3+4+5	Gerber & Green (2000)
9	14/11	Instrumentvariable	MM kap 3	Arunachalam & Watson
10	14/11	Regressionsdiskontinuitetsdesigns	MM kap 4	Eggers & Hainmueller
11	21/11	Difference-in-difference designs	MM kap 5	Enos (2016)
12	28/11	'Big data' og maskinlæring	Grimmer (2015), Varian (2014)	
13	5/12	Scraping af data fra online-kilder	MRMN kap 9	
14	12/12	Tekst som data	Grimmer & Stewart (2013), Imai kap 5	

- RDD: cutoff og running variable
- modellering af RDD med OLS
- fastsættelse af bandwidth
- sorting
- case: Eggers & Hainmueller

Formalia
oo

Opsamling
oo●

DiD
oooooooo

Implementering
oooooo

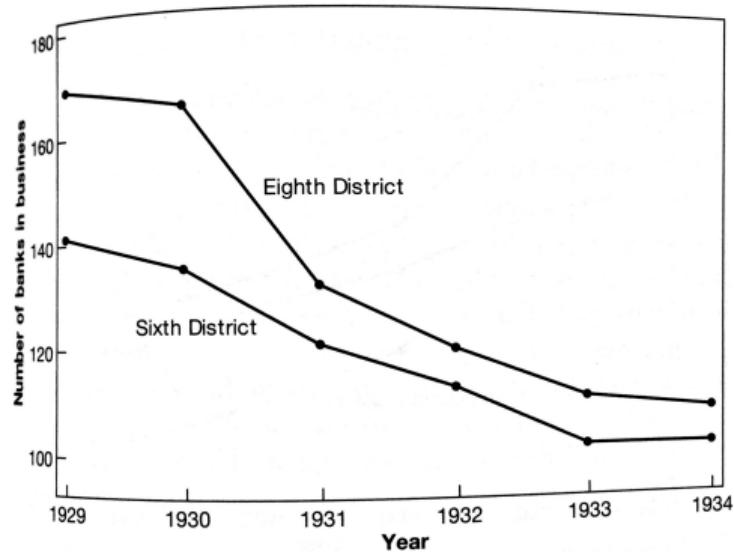
Cases
oooooo

Kig fremad
oo

Spørgsmål?

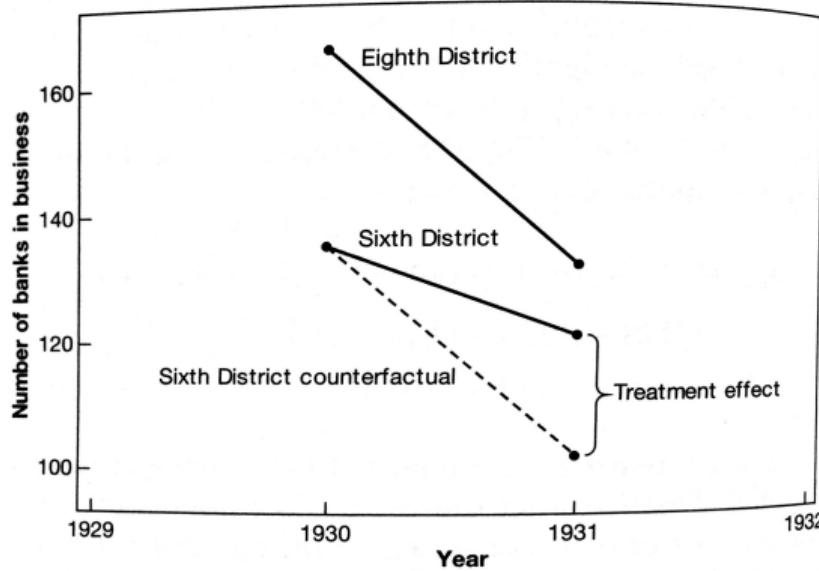
Motiverende eksempel: pengepolitik og bankkrak

FIGURE 5.2
Trends in bank failures in the Sixth and Eighth Federal Reserve Districts



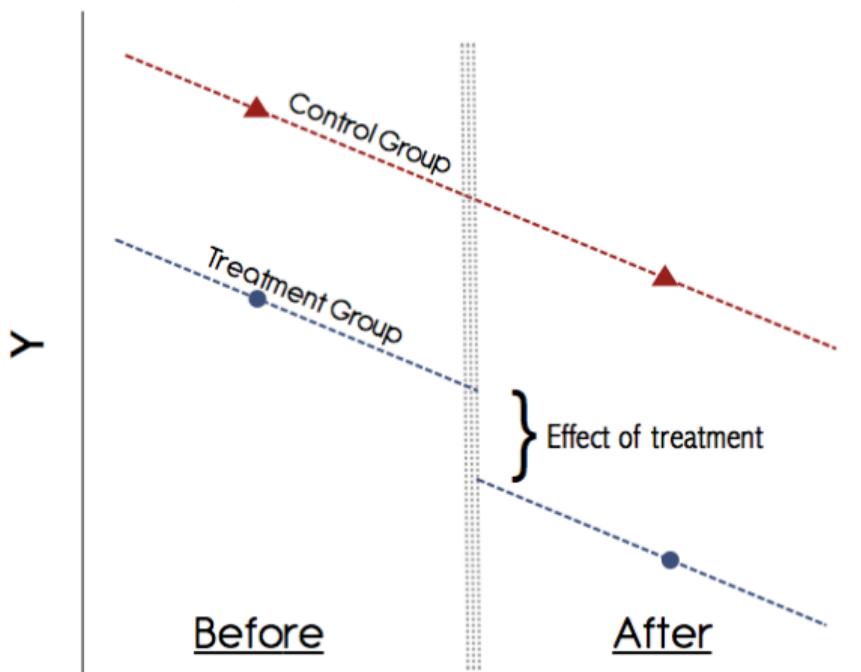
Motiverende eksempel: pengepolitik og bankkrak

FIGURE 5.1
Bank failures in the Sixth and Eighth Federal Reserve Districts

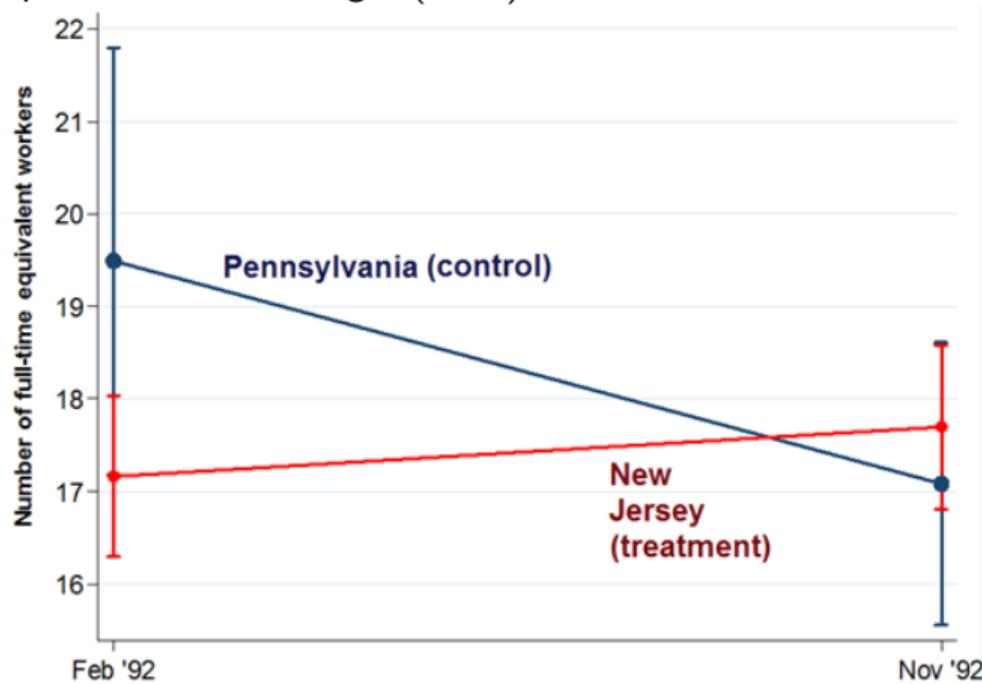


→ afgørende kilde til counterfactual: *parallel trends assumption*

Illustration af parallel trends assumption:



Motiverende eksempel II: Card & Krueger (1992)



Lad $p \in \{0, 1\}$ angive om observationen er efter treatment, og $t \in \{0, 1\}$ angive om observationen tilhører treated eller non-treated

$$\delta_{DD} = (\overline{Y_{p=1,t=1}} - \overline{Y_{p=0,t=1}}) - (\overline{Y_{p=1,t=0}} - \overline{Y_{p=0,t=0}}) \quad (1)$$

DiD i regressionsform med treatede og non-treatede data ‘stakket’:

$$Y_{dt} = \alpha + \beta TREAT_d + \gamma POST_t + \delta_{rDD}(TREAT_d \times POST_t) + \epsilon_{dt} \quad (2)$$

En treatment-indikator i paneldata med tids- og enheds-FE har også en DiD-fortolkning:

$$Y_{st} = \alpha + \delta_{rDD} TREAT + \sum_i^N \beta_i UNIT + \sum_j^T \gamma_j TIME + \epsilon_{ij} \quad (3)$$

→ modellen kan inkludere tidsvarierende potentielle kilder til OVB

Formalia
oo

Opsamling
oo

DiD
oooooooo●

Implementering
oooooo

Cases
oooooo

Kig fremad
oo

Spørgsmål?

Nyttig funktion til omkodning (fx. bestemte værdier til NA): `ifelse()`

```
ifelse(<logisk betingelse>, <hvis TRUE>, <hvis FALSE>)
```

Data på bred form kan konverteres til lang form vha. `gather()` i dplyr-pakken

```
gather(<data>, <key>, <value>, <...>)
```

hvor

- key: navn på variabel der angiver variabelnavne fra bredt format
- value: navn på variabel der angiver værdier fra bredt format
- ... : intervallet af variable der skal 'stakkes', fx. `obs1992:obs1998`

Eks.: bredt data med enhederne a, b og c og outcome y observeret i t1 og t2

unit	yt1	yt2
a	1	2
b	3	6
c	6	7

→ hvordan skal data se ud på lang form?

'Piping' fører et objekt gennem sekventielle funktioner forbundet med operatoren `%>%`



`%>%`
magrittr

Ceci n'est pas un pipe.

→ implementeret i dplyr-pakken, kan bruges generelt vha. magrittr-pakken

Eks.: antag håbløst formateret variabel var

```
var<-c("1","3","2","4","1","99","3")
```

→ hvordan udfører vi mest effektivt flg. sekvens?

- ① konverter til numerisk
- ② konverter 99 til NA
- ③ tag logaritmen

Formalia
OO
Piping

Opsamling
OO

DiD
OOOOOOOO

Implementering
OOOO●●

Cases
OOOOOO

Kig fremad
OO

Spørgsmål?

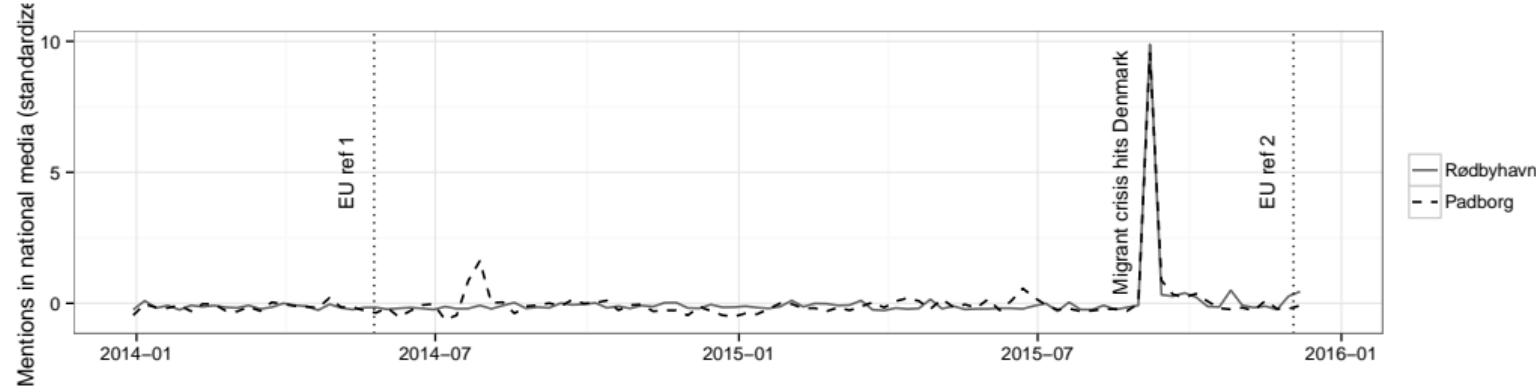


Figure: Standardized weekly counts of media mentions of Rødbyhavn and Padborg in Danish national media, 2014-2015.

Case I: Effekter af flygtningestrømme

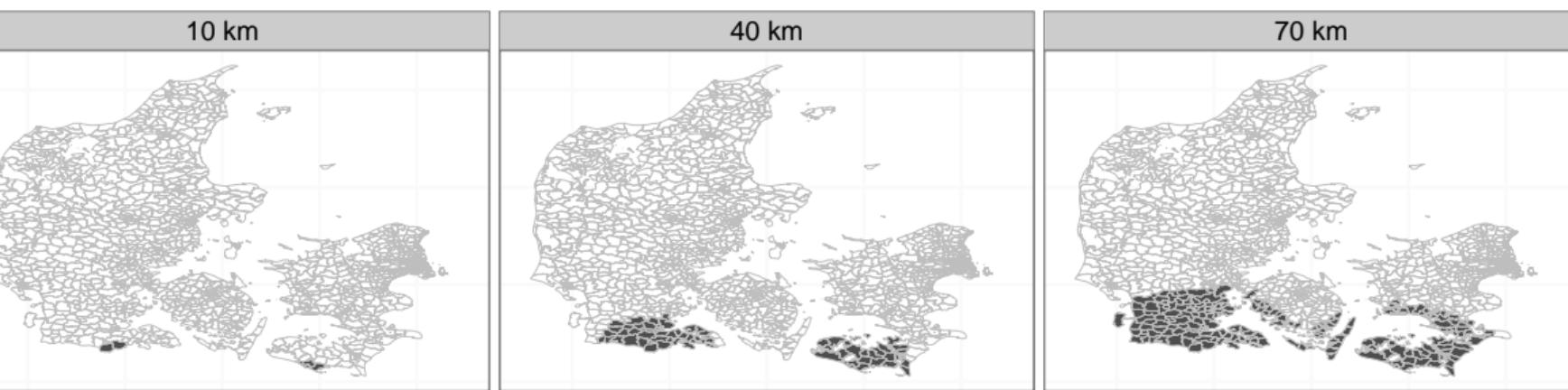


Figure: Voting districts included under distance cutoffs of respectively 10, 40, and 70 kilometers. Under each cutoff, a voting district is included if the distance from its centroid to either Rødby train station or Padborg train station is less than the cutoff.

Case I: Effekter af flygtningestrømme

$$Y_{it} = \beta_0 + \beta_1 \times Post_t + \beta_2 \times Close_i + \beta_3 \times Post_t \times Close_i + \epsilon_{it} \quad (4)$$

Case I: Effekter af flygtningestrømme

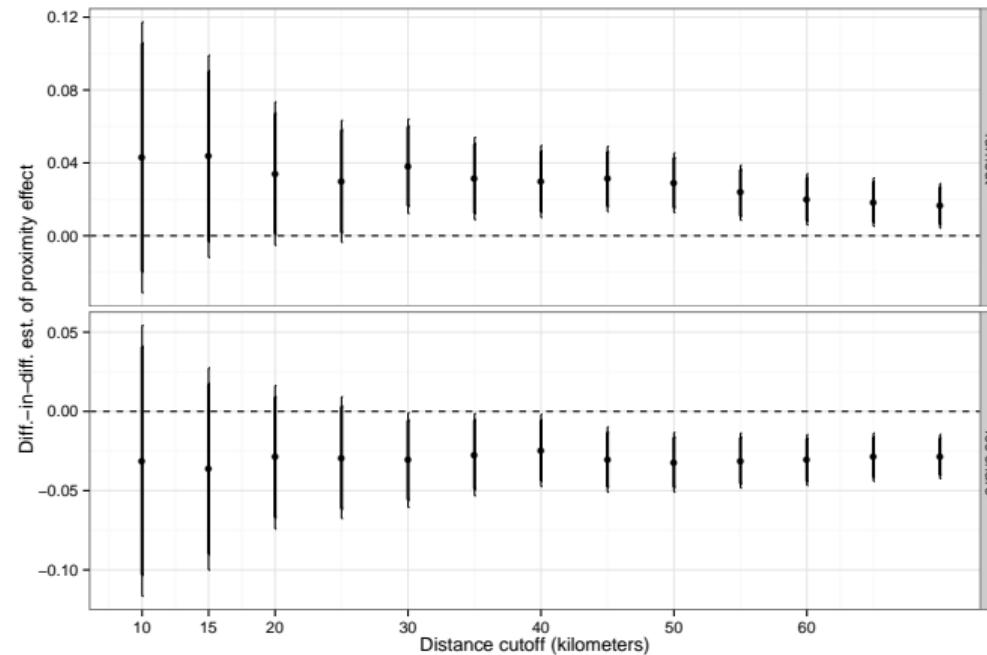


Figure: Difference-in-difference estimates of the effect of entry proximity on turnout and support for referendum support for the EU. Vertical bars show 90 pct. (thick lines) and 95 pct. (thin lines) confidence intervals.

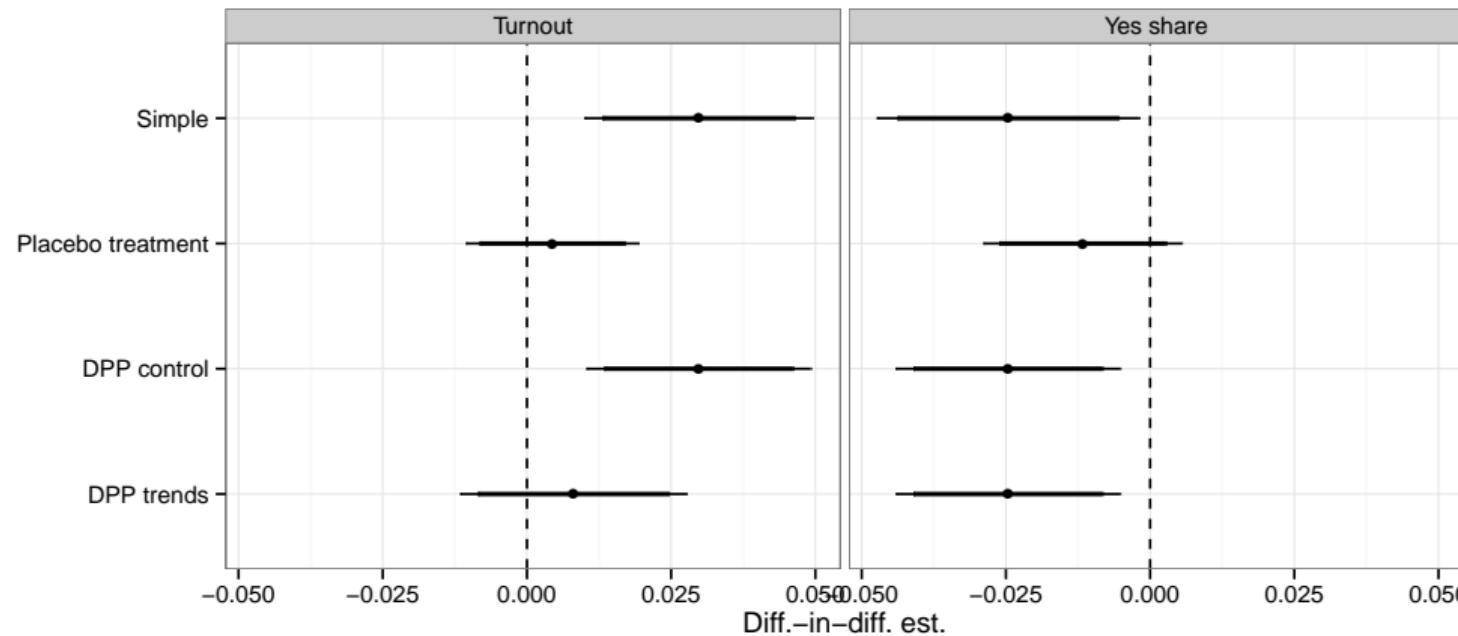
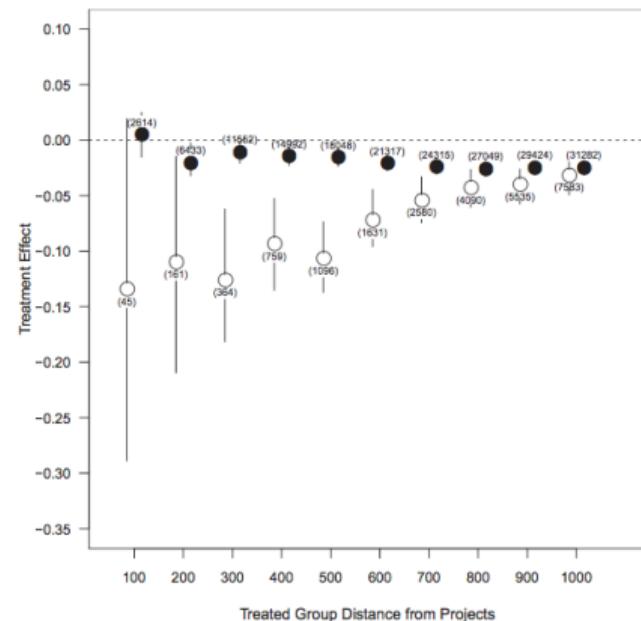


Figure: Difference-in-difference estimates of the effect of entry proximity on turnout and support for referendum support for the EU from four model specifications: (1) a simple model, (2) with a placebo treatment, (3) adding a control for DPP vote share in the preceding election, and (4) allowing the time



FIGURE 1 Treatment Effects



Næste gang:

- 'big data' og maskinlæring
- pensum: Harford + Grimmer + Varian + Athey & Imbens
- ingen case-tekst

Formalia
oo

Opsamling
oo

DiD
oooooooo

Implementering
oooooo

Cases
oooooo

Kig fremad
oo●

Tak for i dag!