Regression Discontinuity Design in Practice

Elghafiky Bimardhika

3 December 2024

elghafiky.bimardhika@alumni.anu.edu.au

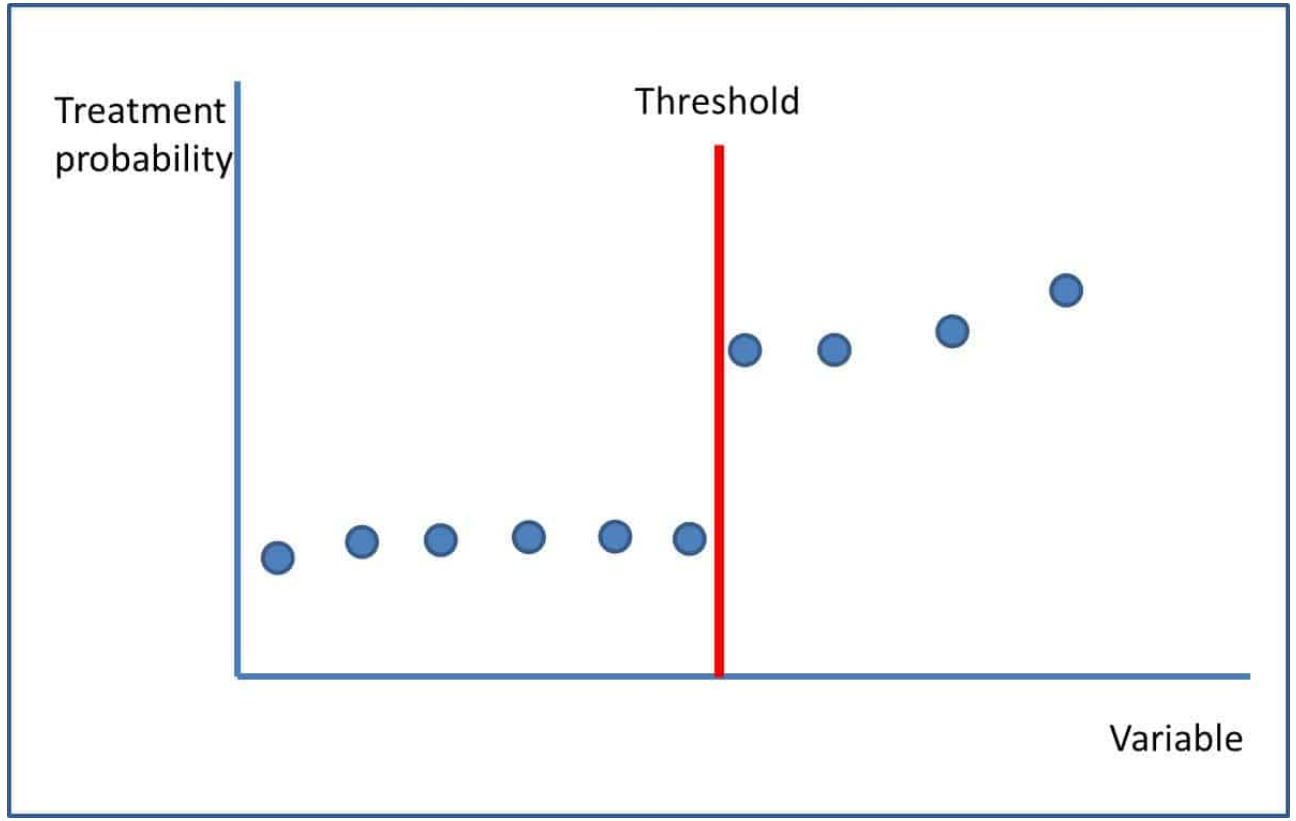
Dua topik bahasan utama

Konteks evaluasi seperti apa yang bisa menggunakan RDD?

Berlatih bersama Stata

Konteks evaluasi seperti apa yang bisa menggunakan RDD?

RDD mengharuskan adanya ***threshold (cutoff)*** berdasarkan sebuah variabel numerik ***(running variable)*** yang memisahkan kelompok perlakuan dan kontrol



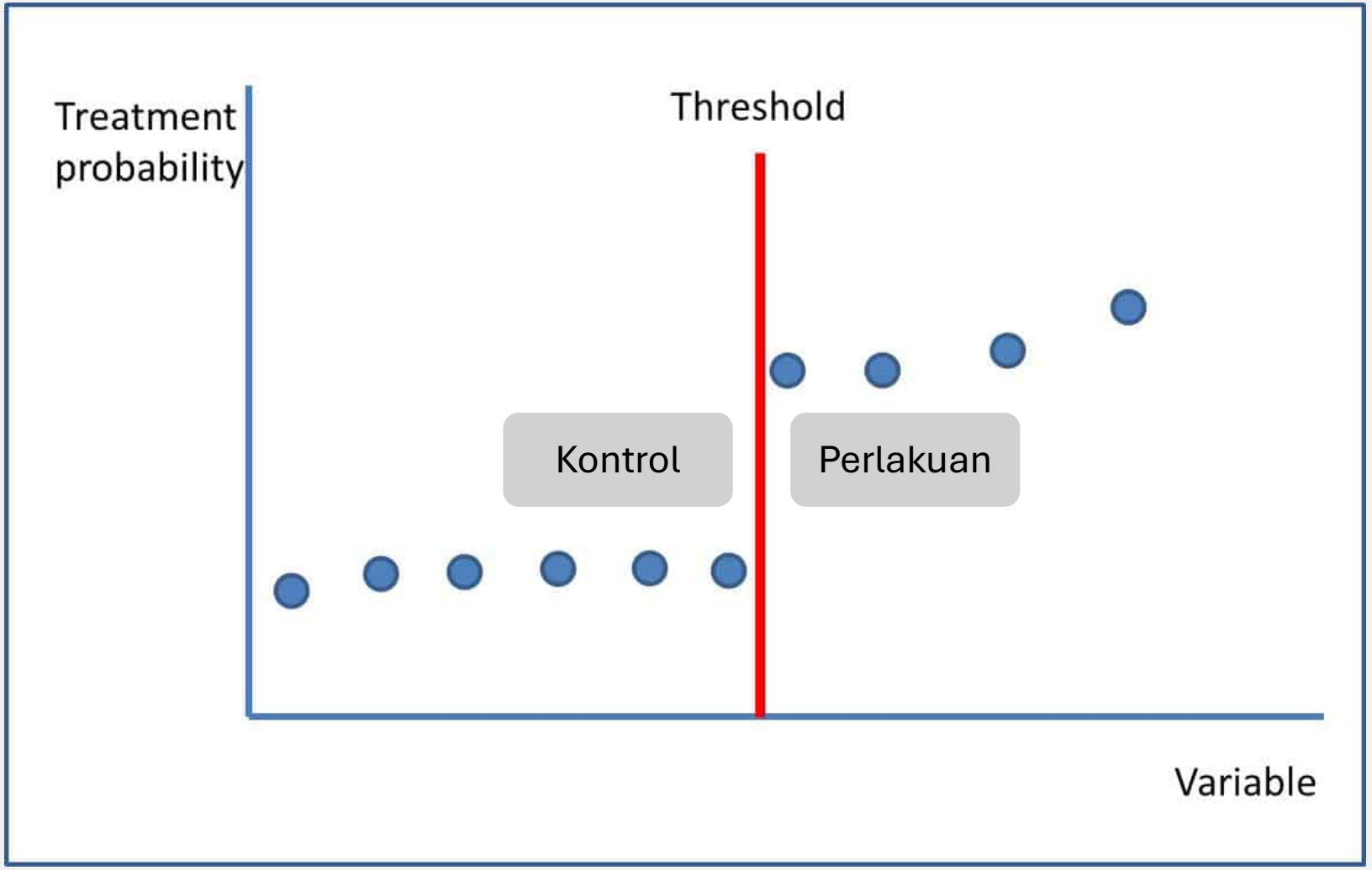
RDD in practice

Journal of Agricultural Economics
doi: 10.1111/1477-9552.12299

The Impact of Credit Policy on Rice Production in Myanmar

Nilar Aung, Hoa-Thi-Minh Nguyen and Robert Sparrow[1]

Apa *running variable* dan *cutoff*-nya?



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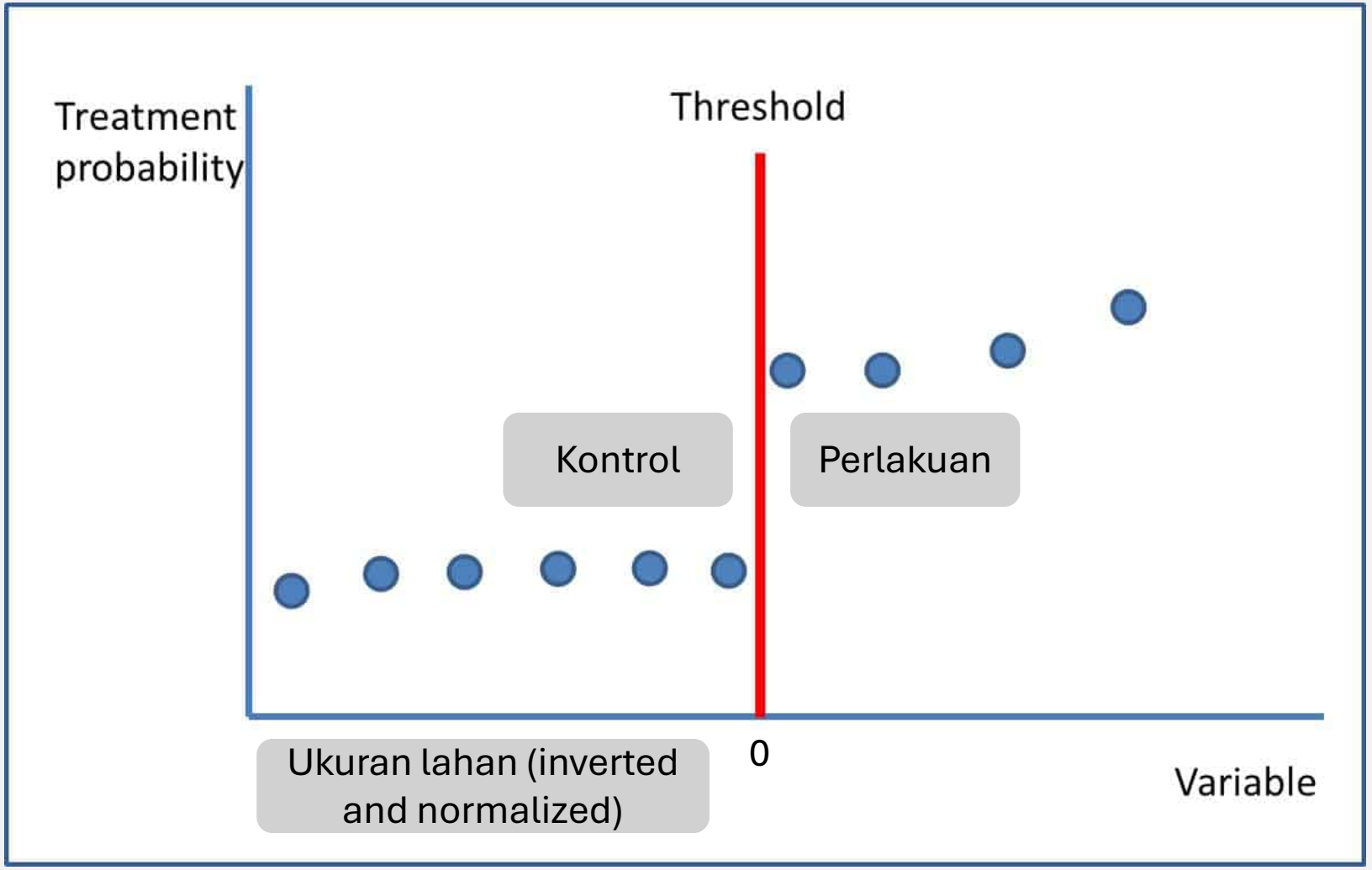

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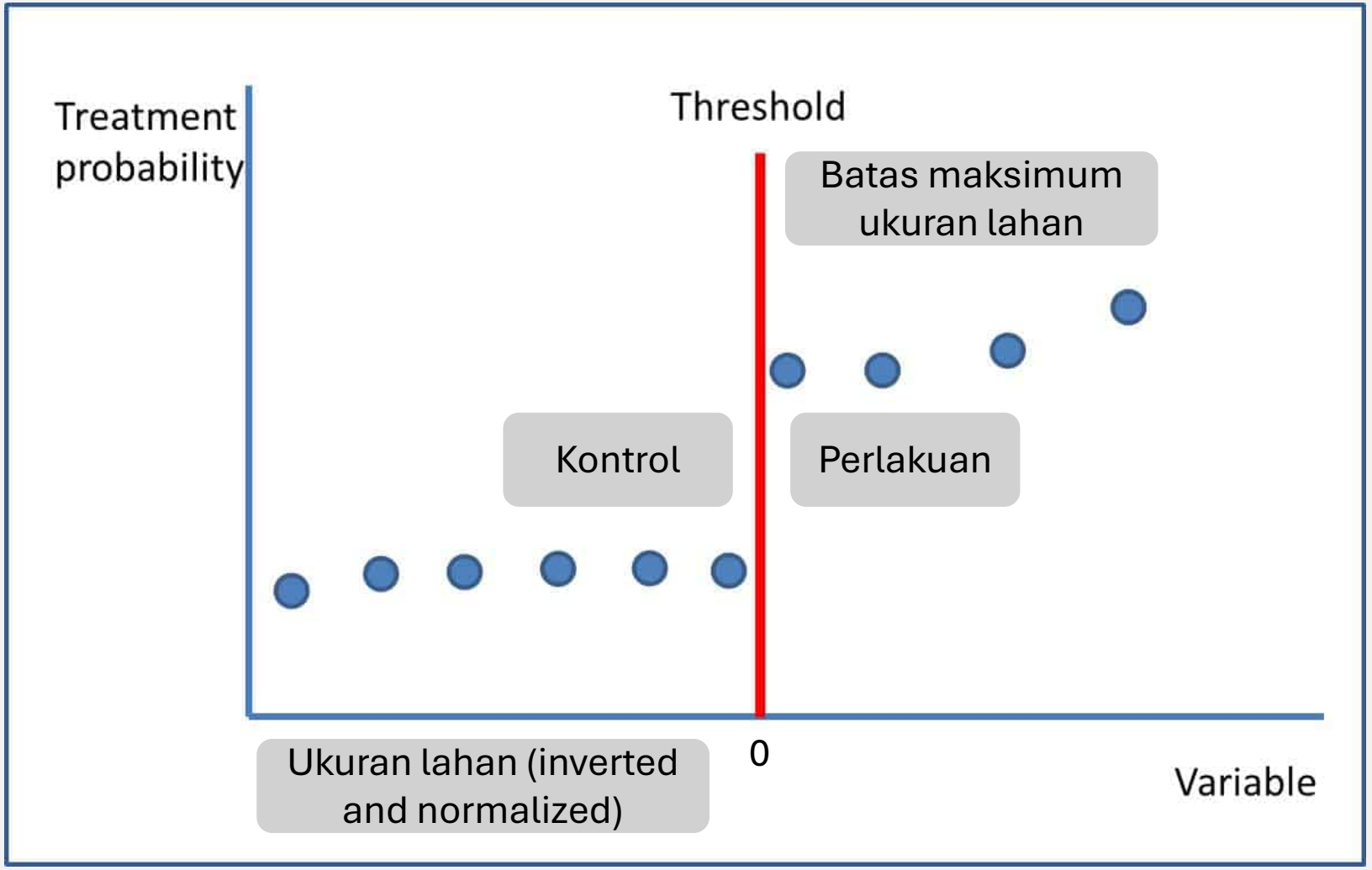
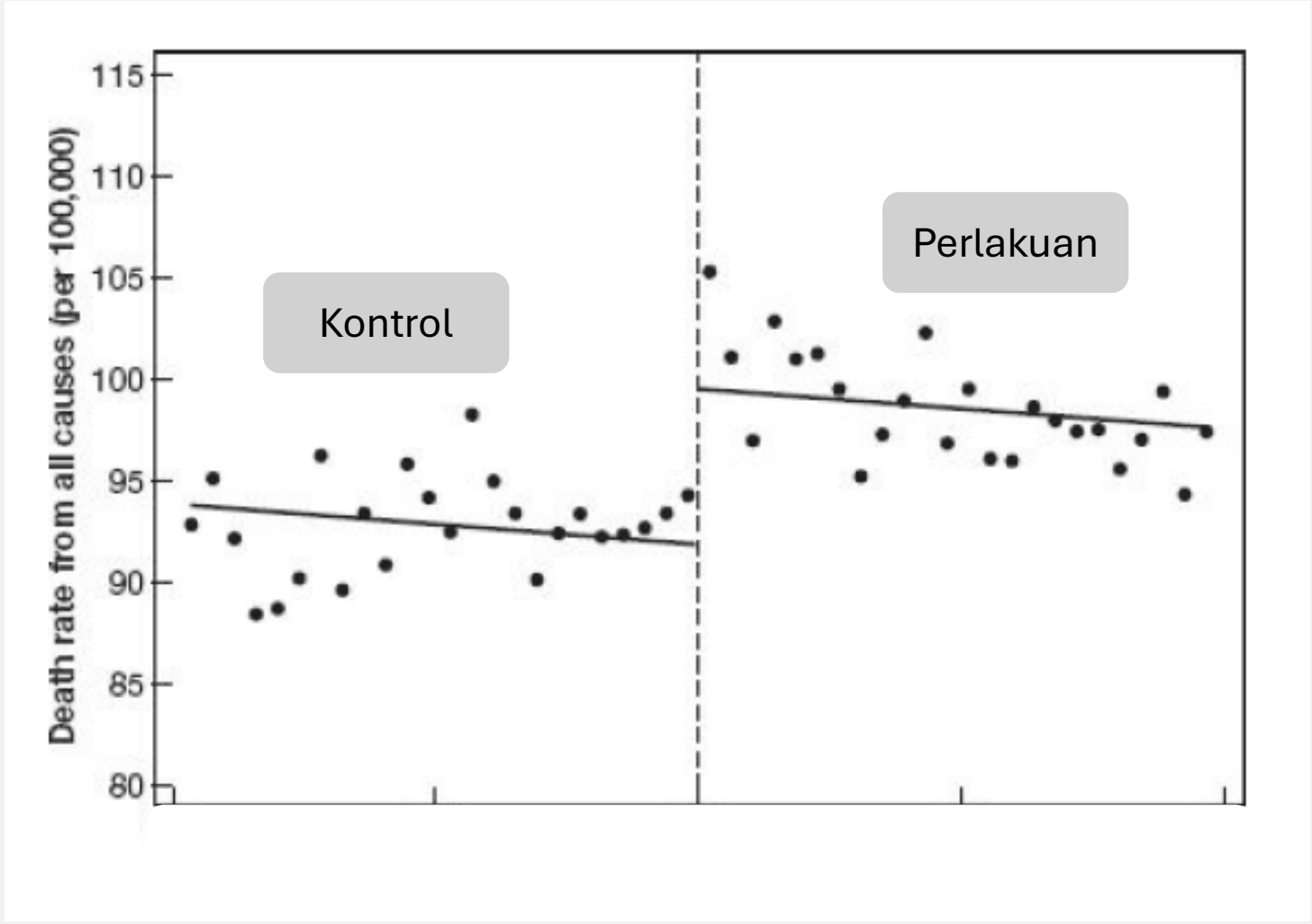


American Economic Journal: Applied Economics 2009, 1:1, 164–182
http://www.aeaweb.org/articles.php?doi=10.1257/app.1.1.164

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

By CHRISTOPHER CARPENTER AND CARLOS DOBKIN[*]

Apa *running variable* dan *cutoff*-nya?



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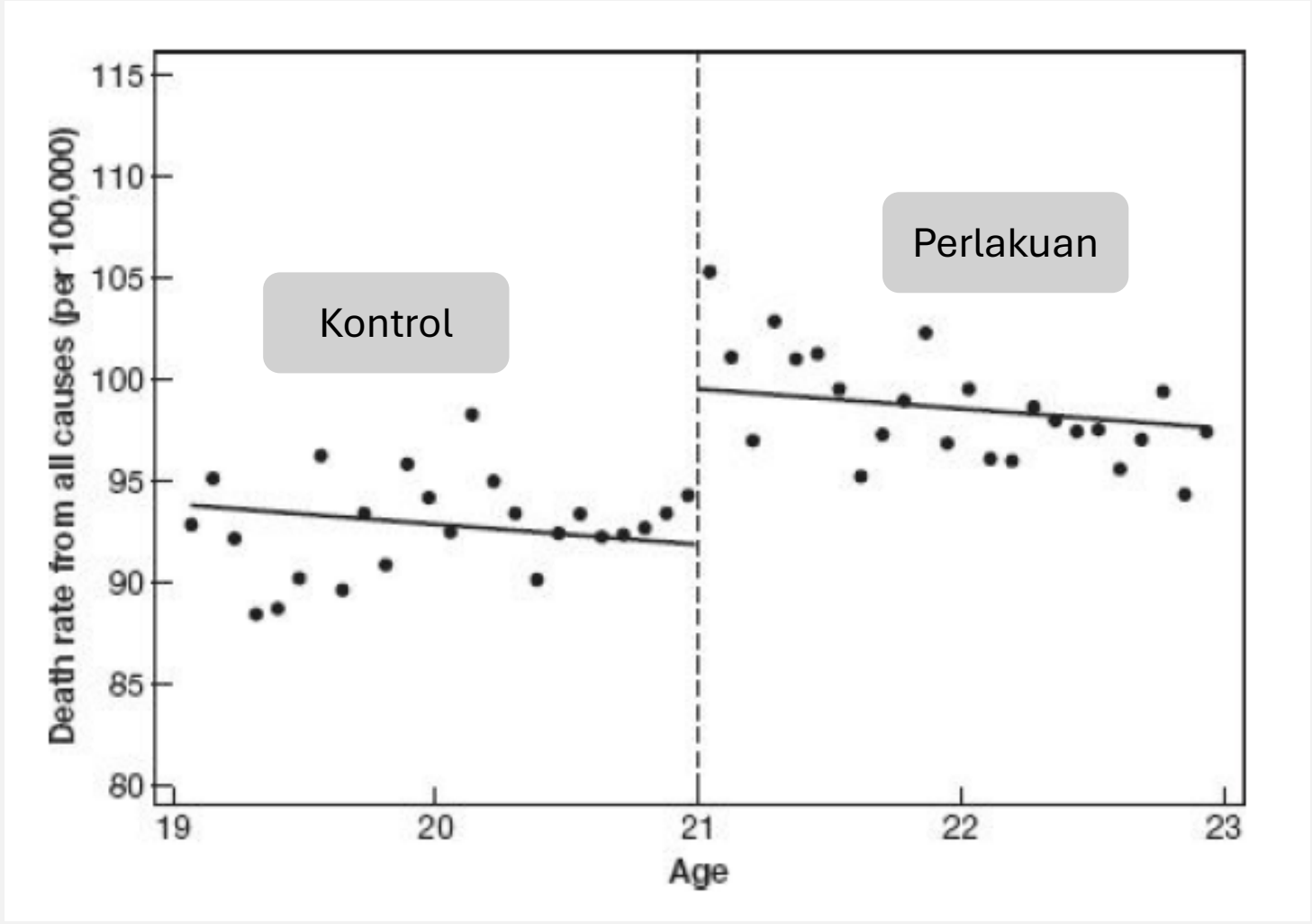

Evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River policy

Yuyu Chen[a,1], Avraham Ebenstein[b,1], Michael Greenstone[c,d,1,2], and Hongbin Li[e,1]

[a]Applied Economics Department, Guanghua School of Management, Peking University, Beijing 100871, China; [b]Department of Economics, Hebrew University of Jerusalem, Mount Scopus 91905, Israel; [c]Department of Economics, Massachusetts Institute of Technology, Cambridge, MA 02142; [d]National Bureau of Economic Research, Cambridge, MA 02138; and [e]China Data Center and Department of Economics, School of Economics and Management, Tsinghua University, Beijing 100084, China

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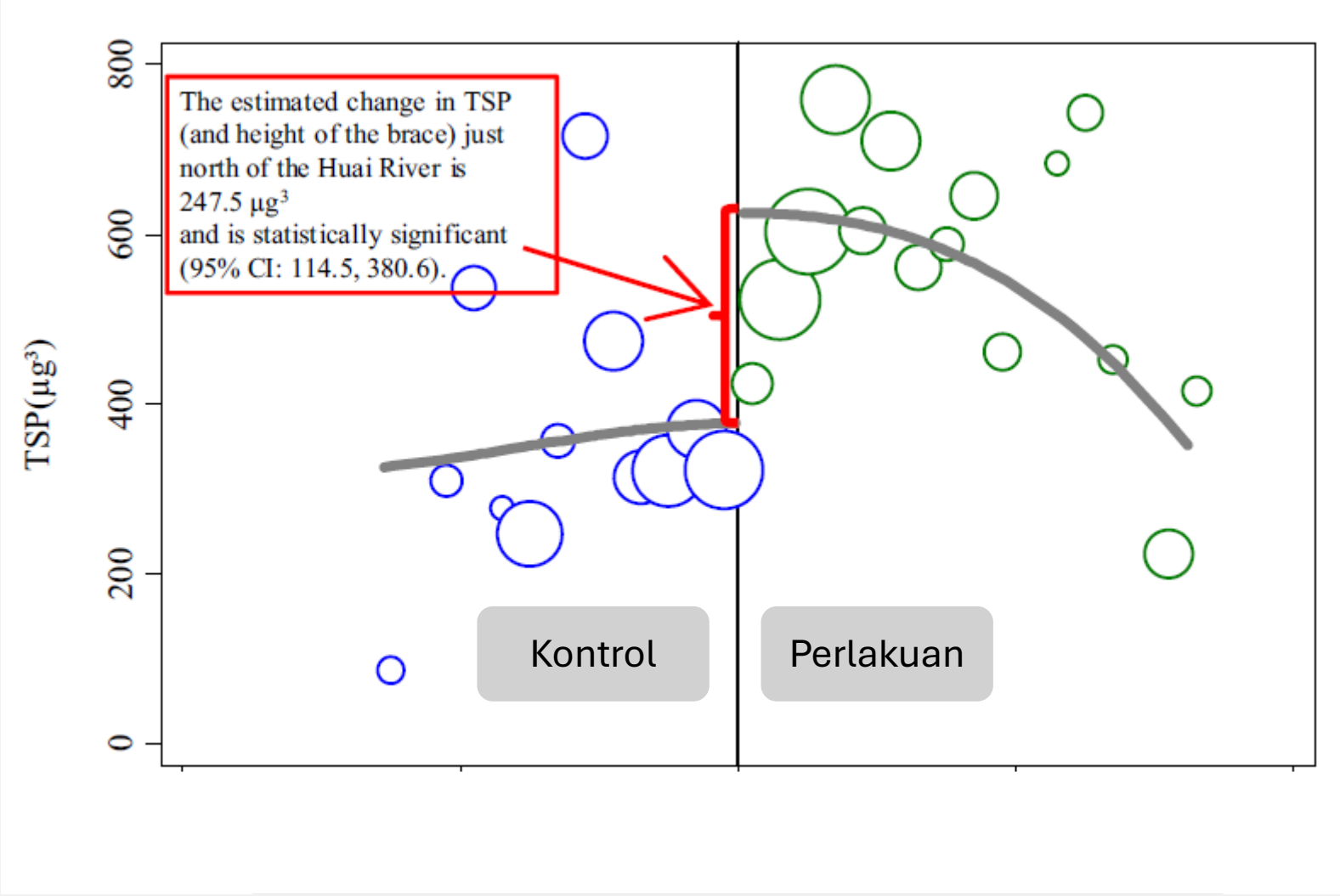

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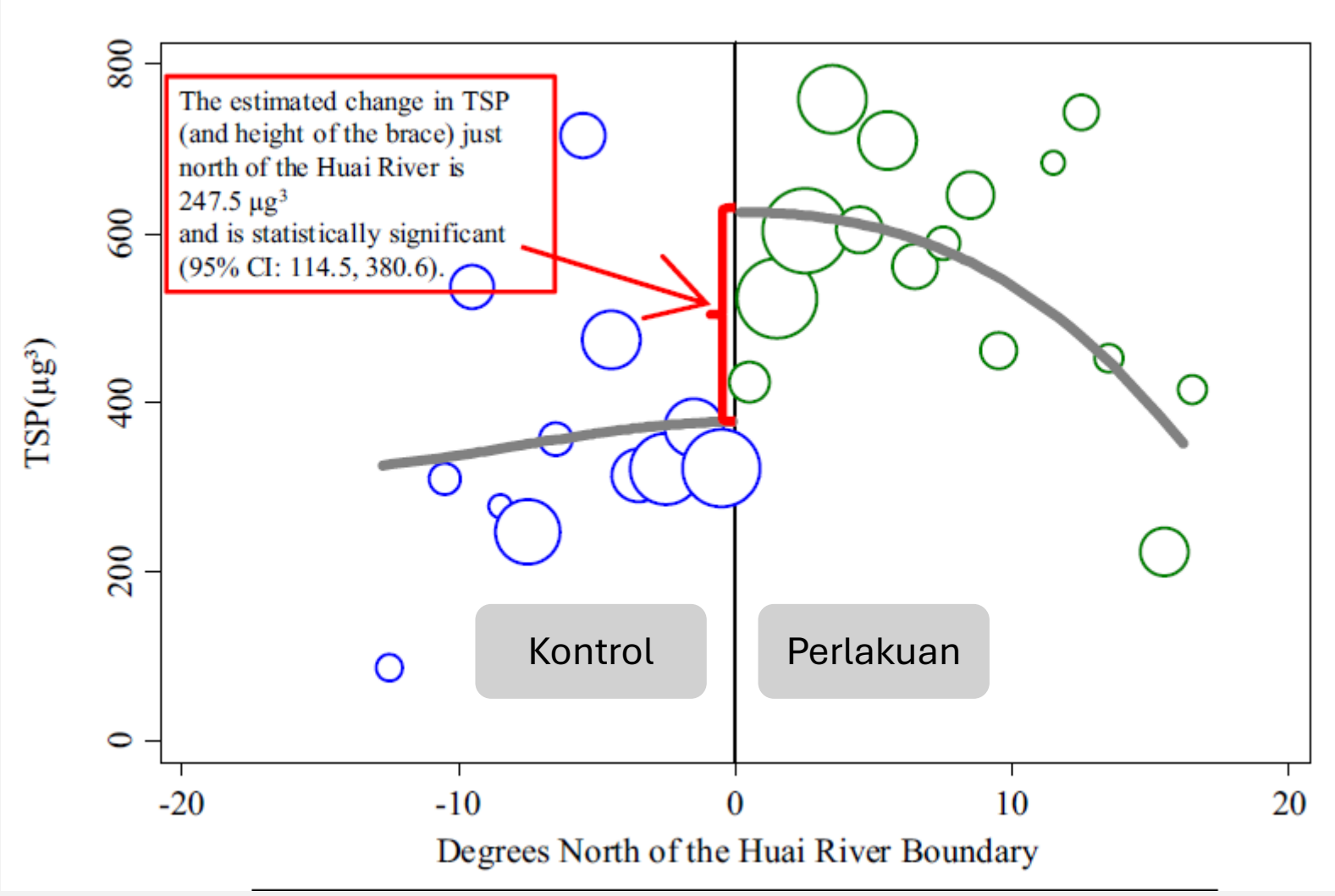

Berbagai contoh lain

LOCAL GOVERNMENT STUDIES
2020, VOL. 46, NO. 3, 394–413
https://doi.org/10.1080/03003930.2019.1627334

Routledge
Taylor & Francis Group

RESEARCH ARTICLE

Check for updates

How do mayors get elected? The causal effects of pre-electoral coalitions on mayoral election outcomes in Indonesia

Blane D. Lewis

Arndt-Corden Department of Economics, Crawford School of Public Policy, Australian National University, Canberra, Australia

The Electoral Advantage to Incumbency and Voters' Valuation of Politicians' Experience: A Regression Discontinuity Analysis of Close Elections*

David S. Lee

UC Berkeley and NBER

April 2001

International Journal of Educational Research 104 (2020) 101693

Contents lists available at ScienceDirect

International Journal of Educational Research

journal homepage: www.elsevier.com/locate/ijedures

ELSEVIER

Check for updates

Assessing the causal impact of compulsory schooling policy in Indonesia

Blane D. Lewis *, Hieu T.M. Nguyen

Arndt-Corden Department of Economics, HC Coombs Building, Room 7132, Crawford School of Public Policy, The Australian National University, Canberra, ACT, 2601, Australia

Econometrica, Vol. 78, No. 6 (November, 2010), 1863–1903

THE PERSISTENT EFFECTS OF PERU'S MINING *MITA*

BY MELISSA DELL[1]

Published on **Development Impact**

Regression Discontinuity Porn

DAVID EVANS | NOVEMBER 16, 2013

Jadi konteks seperti apa yang memungkinkan evaluasi dengan RDD?

Program/kebijakan yang mana penerima manfaatnya harus memiliki nilai tertentu agar berhak mendapatkan program

- Bantuan sosial, beasiswa, bantuan kredit, dsb.

Program/kebijakan/kejadian yang hanya berlaku untuk usia tertentu

- Batas usia minum alkohol, batas usia pernikahan, program wajib sekolah, program ketenagakerjaan yang bersifat wajib, dsb.

Program/kebijakan/kejadian yang hanya berlaku untuk daerah tertentu

- Kasus subsidi penghangat di Cina, kasus kerja paksa (*mita*) di Peru, dsb.

Program/kebijakan/kejadian yang mana ada pihak yang menang dan kalah berdasarkan skor tertentu

- Konteks pemungutan suara, konteks kompetisi, bidding, dsb.

Berlatih bersama Stata

Dua studi kasus

Sharp RDD

Can child labor reform affect adulthood? Evidence from Indonesia's 2003 Manpower Act*

Elghafiky Bimardhika† Firman Witoelar‡

November 21, 2024

Fuzzy RDD


International Journal of Educational Research 104 (2020) 101693

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Anticipating unintended consequences of policy: Learnings from Indonesia's child labor reform

Elghafiky Bimardhika

Crawford School of Public Policy

elghafiky.bimardhika@alumni.anu.edu.au

Firman Witoelar

Arndt-Corden Department of Economics

Crawford School of Public Policy

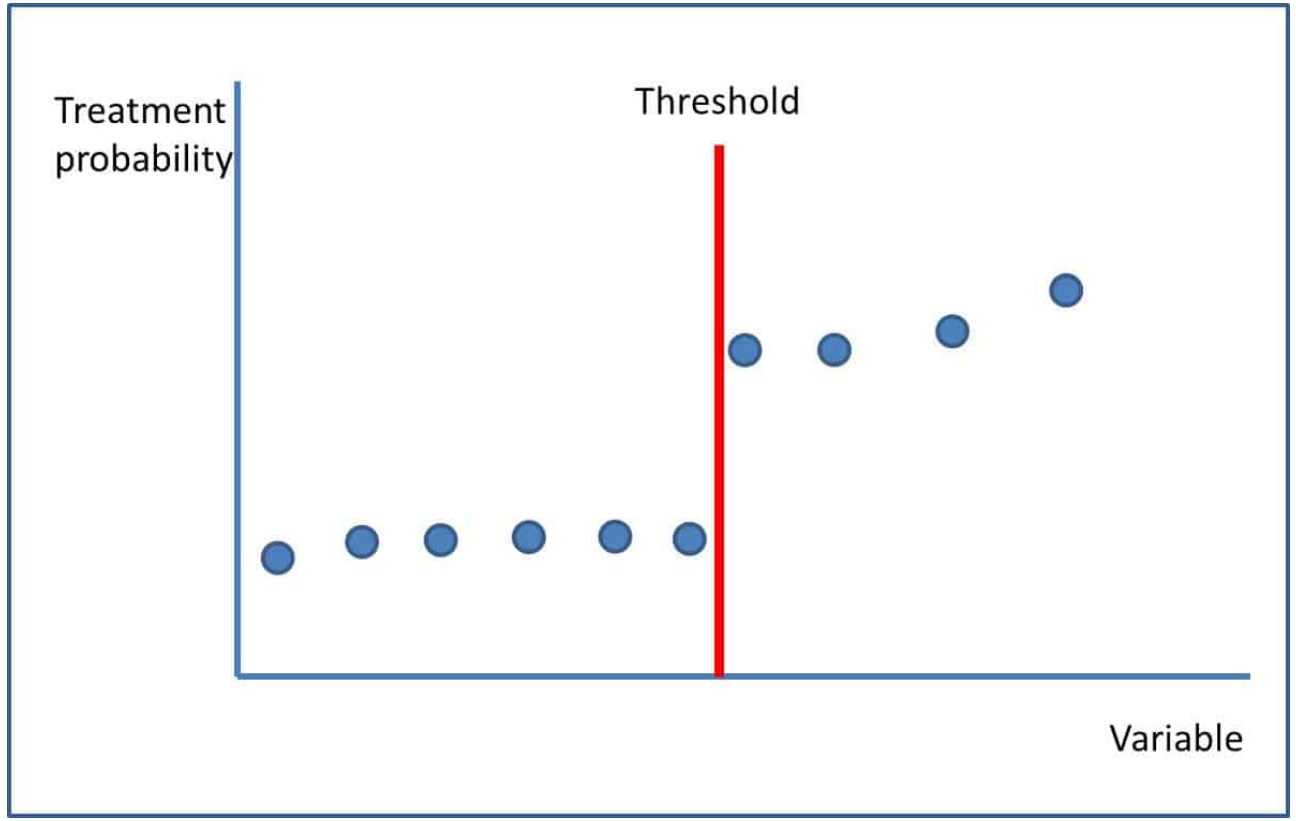
FirmanWitoelar.Kartaadipoetra@anu.edu.au

February 2025

Working Papers in Trade and Development

No. 2025-04

UU Ketenagakerjaan 2003 menaikkan usia minimum kerja dari 15 ke 18 dan memperketat berbagai pengecualian



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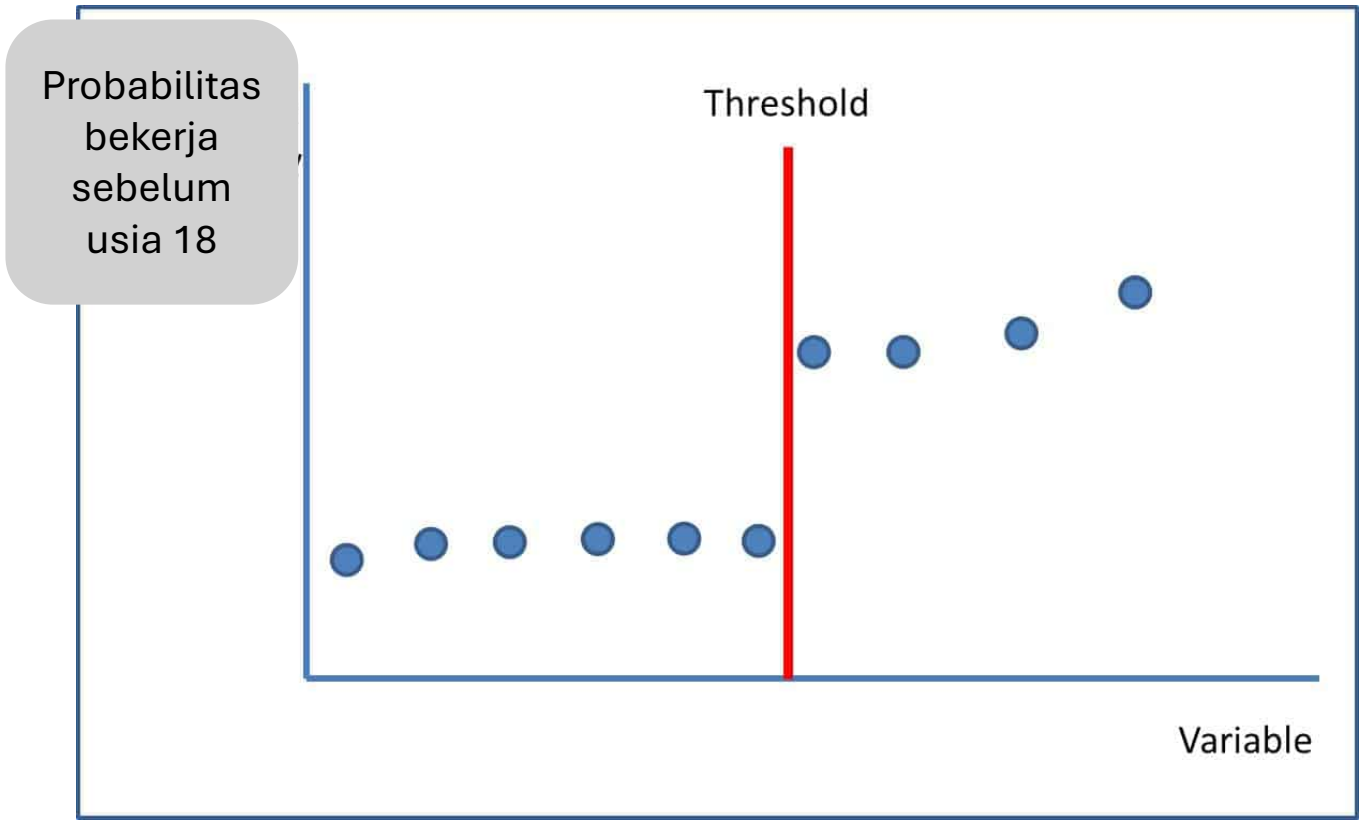

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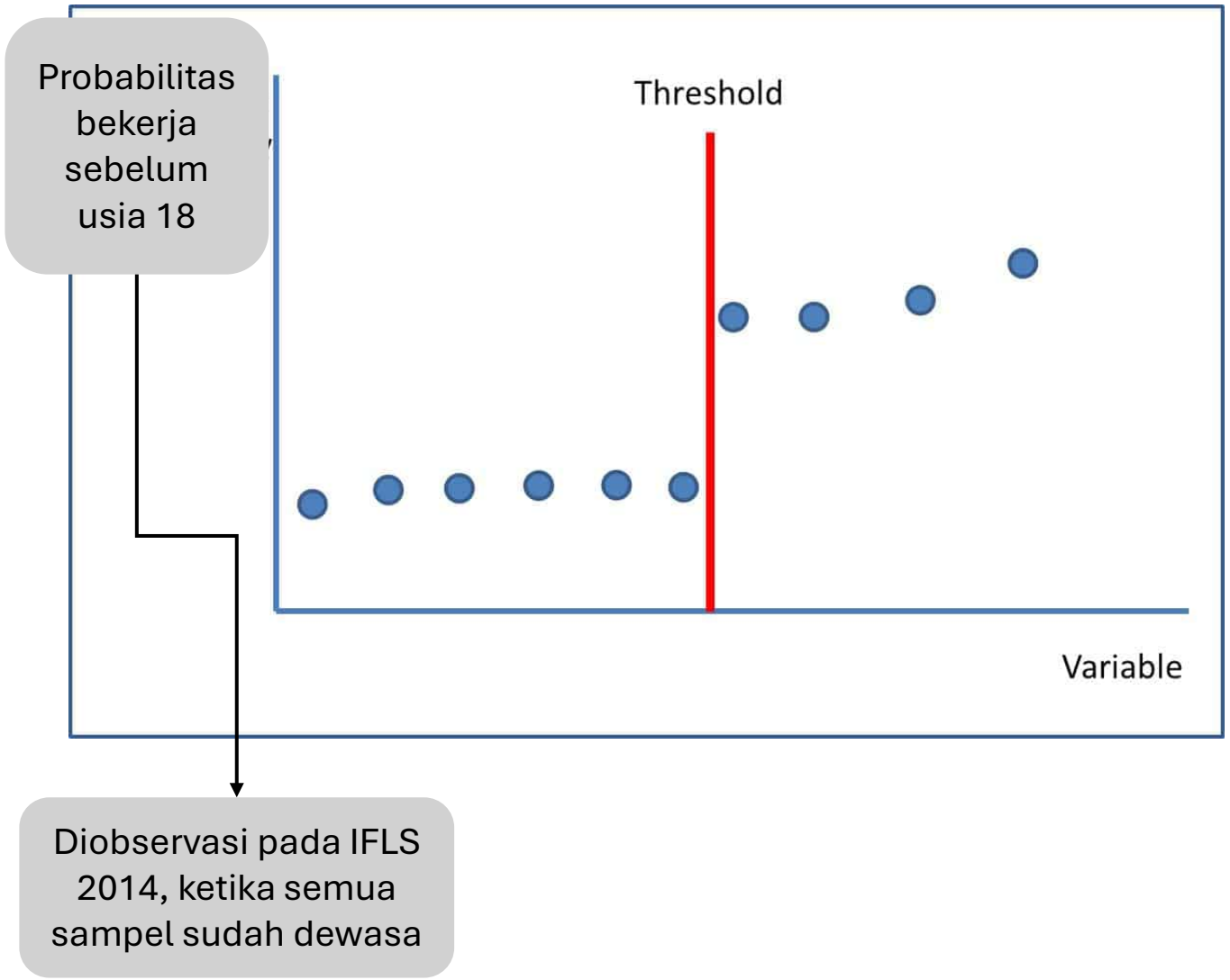

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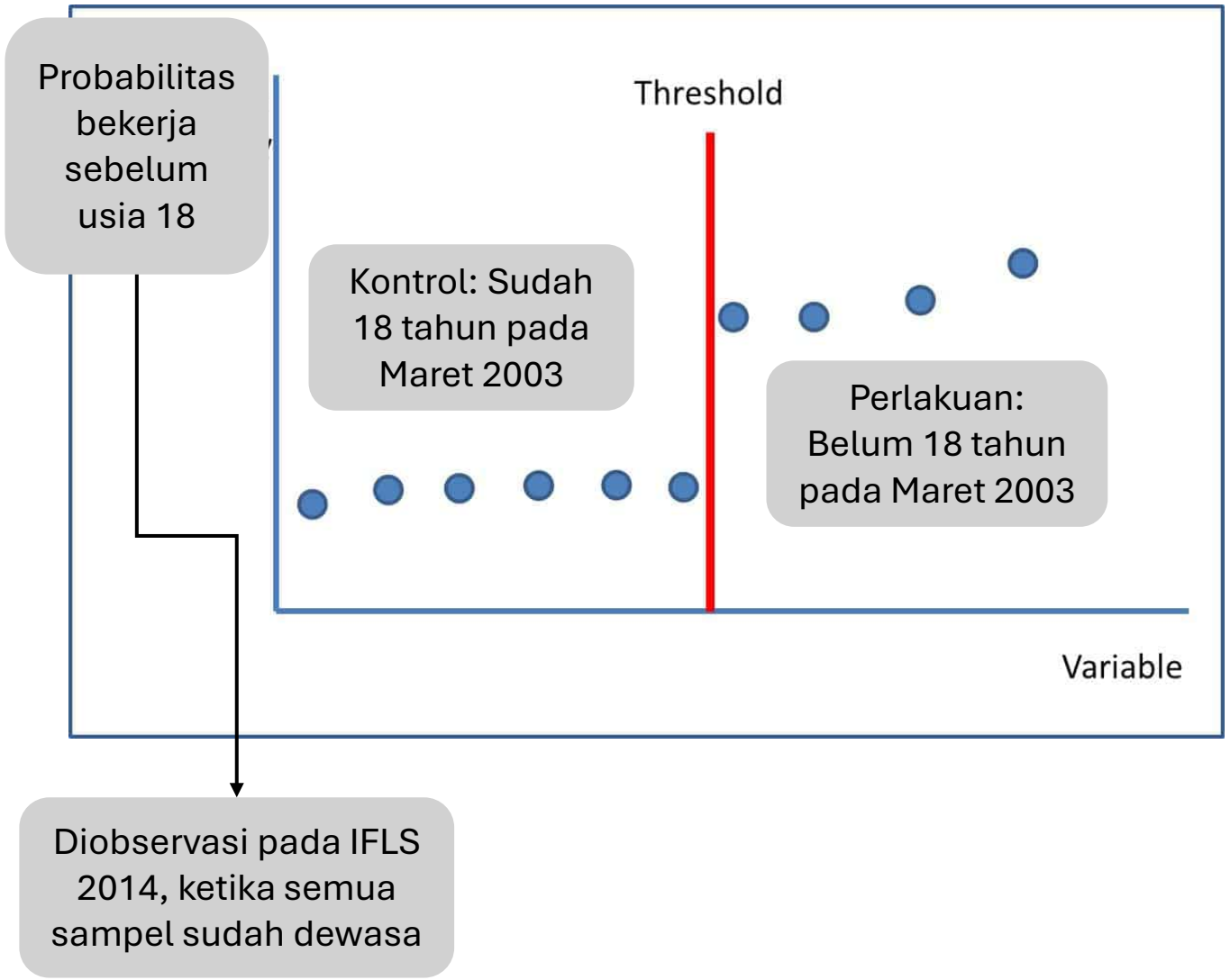

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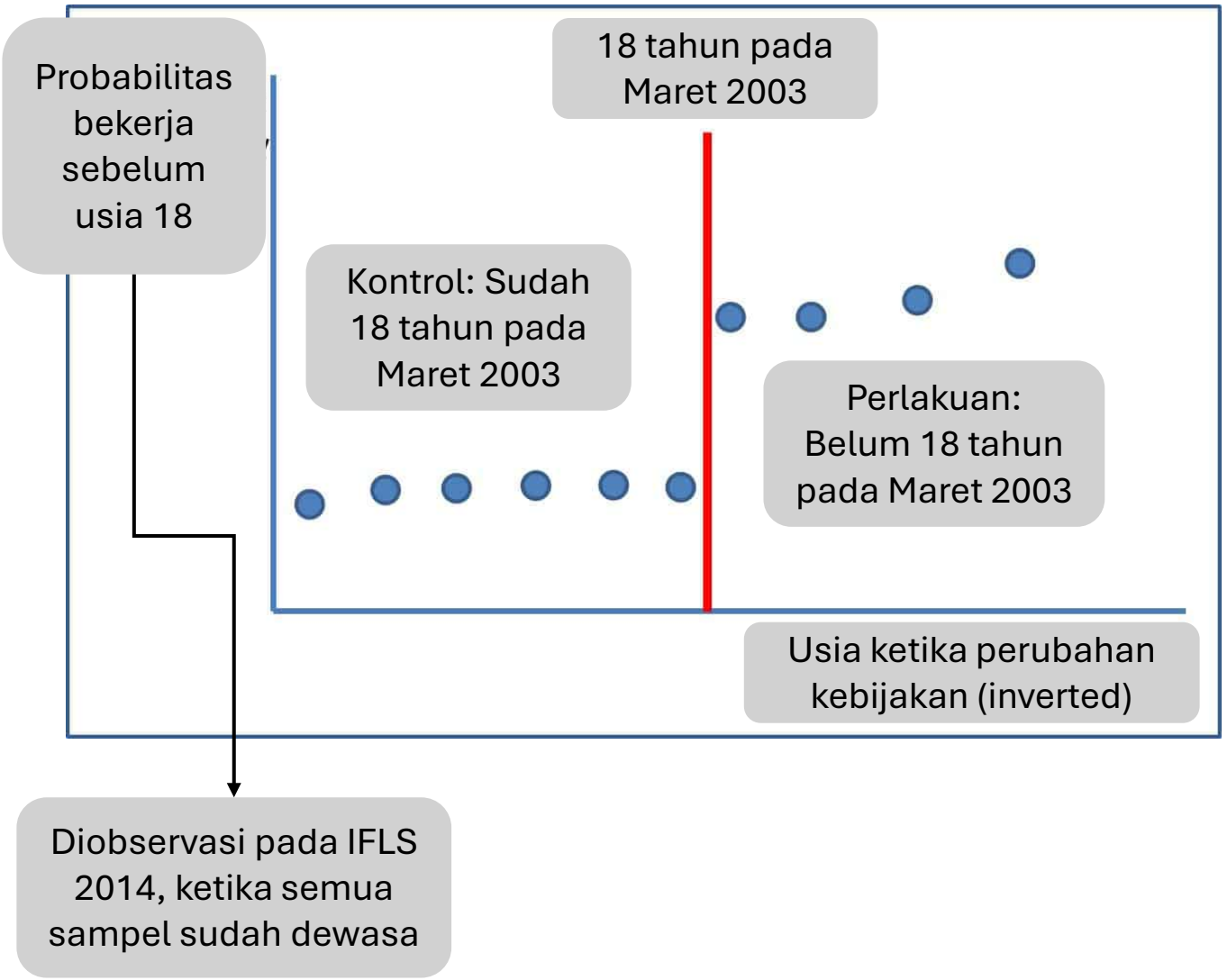


A Practical Introduction to Regression Discontinuity Designs: Foundations

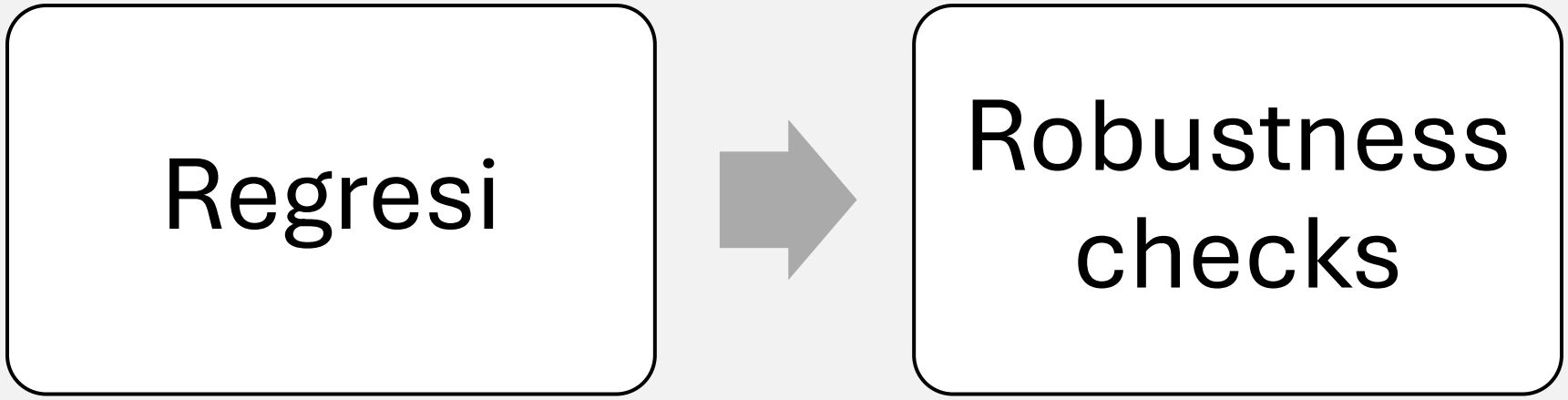
Matias D. Cattaneo* Nicolás Idrobo† Rocío Titiunik‡

Pastikan syntax sudah tersedia di Stata Anda

- net install rdrobust, from(https://raw.githubusercontent.com/rdpackages/rdrobust/master/stata) replace
- net install rdlocrand, from(https://raw.githubusercontent.com/rdpackages/rdlocrand/master/stata) replace
- net install rddensity, from(https://raw.githubusercontent.com/rdpackages/rddensity/master/stata) replace
- net install rdpower, from(https://raw.githubusercontent.com/rdpackages/rdpower/master/stata) replace

Biasakan uji keabsahan metode Anda dulu sebelum mulai analisis

Alur konvensional



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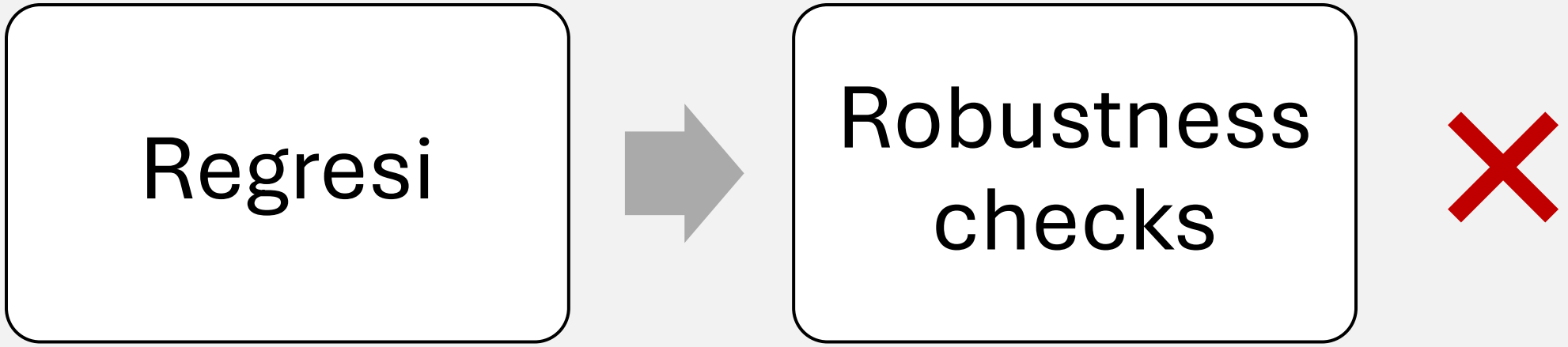

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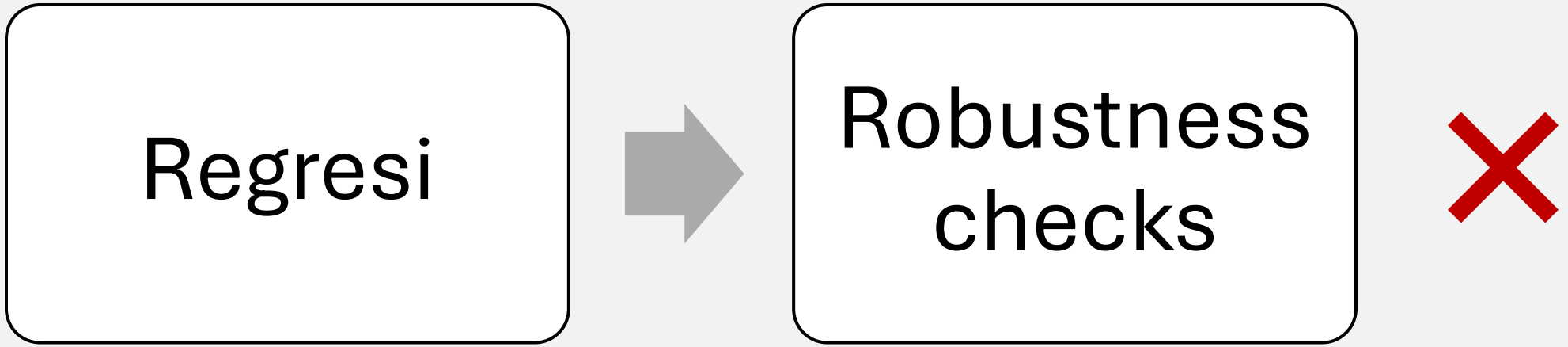
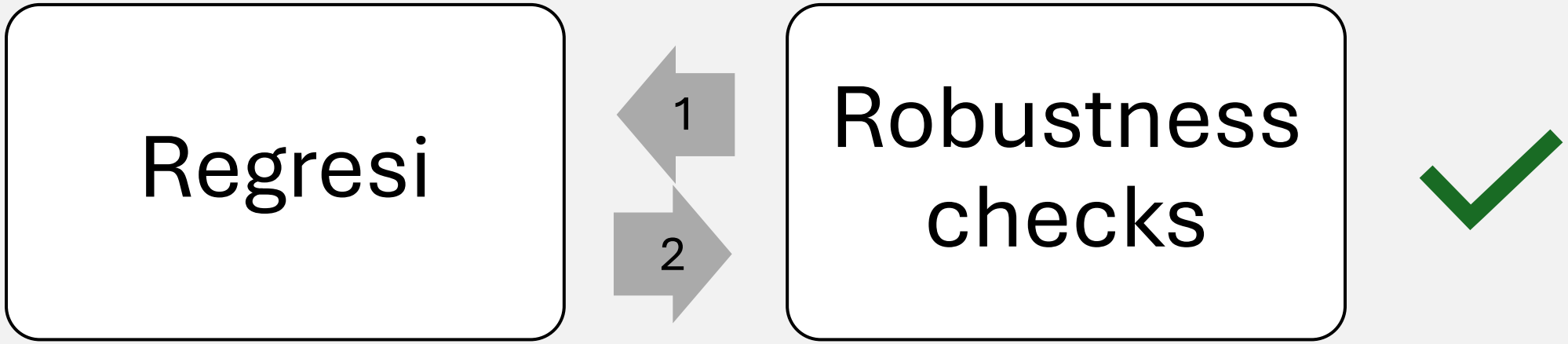


Saran saya



Mulailah pengecekan awal dengan uji manipulasi running variable

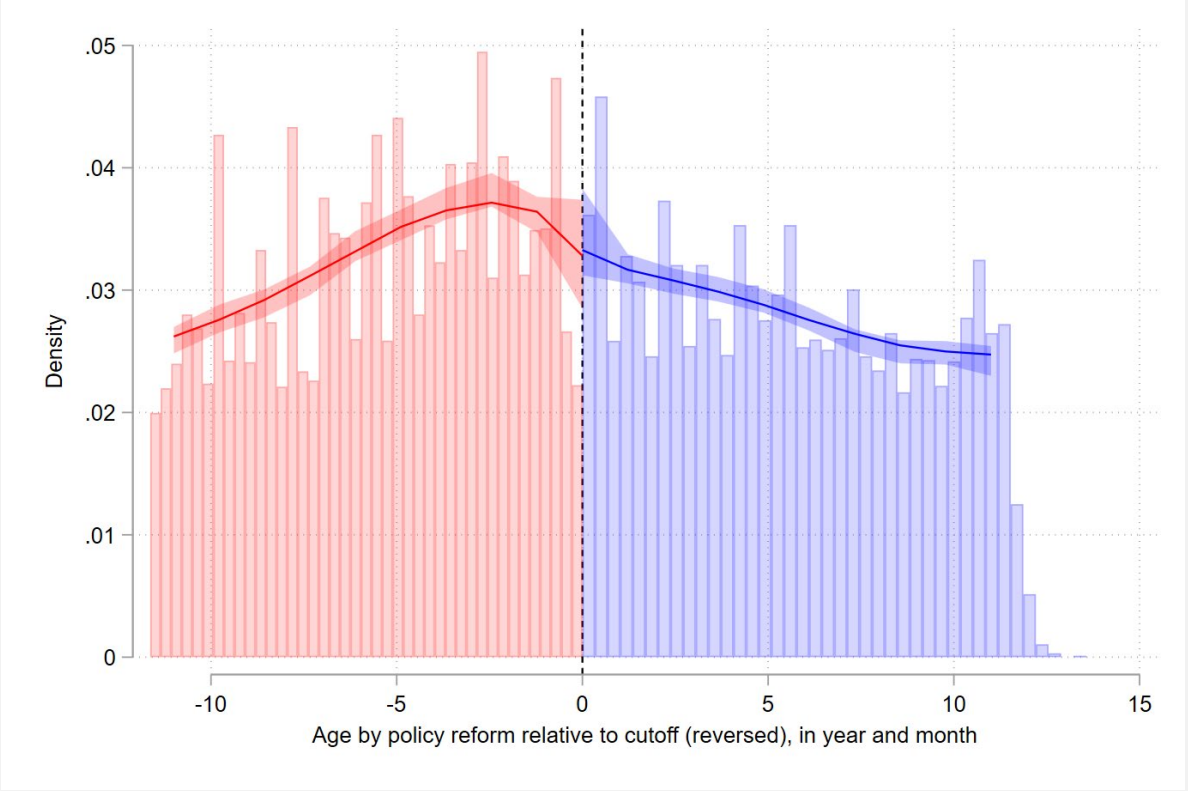
c = 0.000	Left of c	Right of c
Number of obs	18636	9420
Eff. Number of obs	3936	4122
Order est. (p)	2	2
Order bias (q)	3	3
BW est. (h)	3.879	4.635

Running variable: runvar_abp03.

Method	T	P>|T|
Robust	0.6156	0.5382

Number of obs = 28056
Model = unrestricted
BW method = comb
Kernel = triangular
VCE method = jackknife

rddensity runvar_abp03, plot plot_range(-11 11)



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H0: Density function is continuous
H1: Density function is discontinuous

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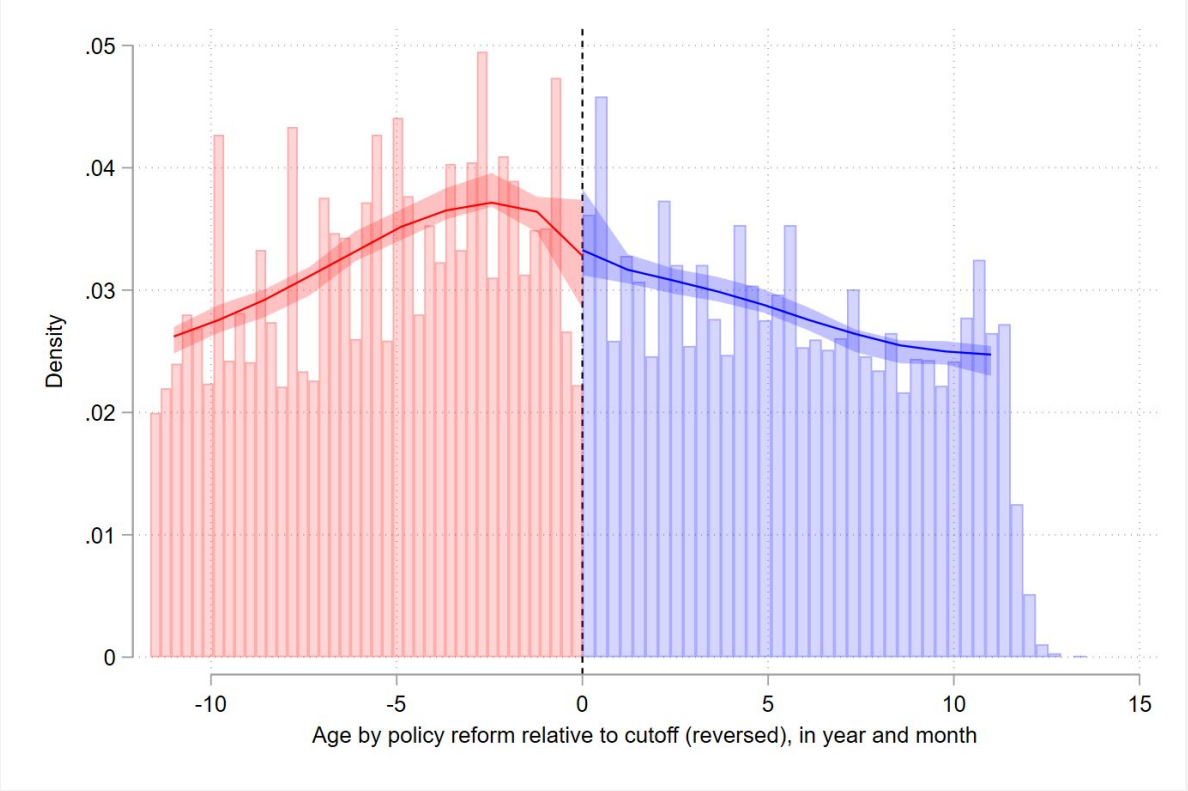

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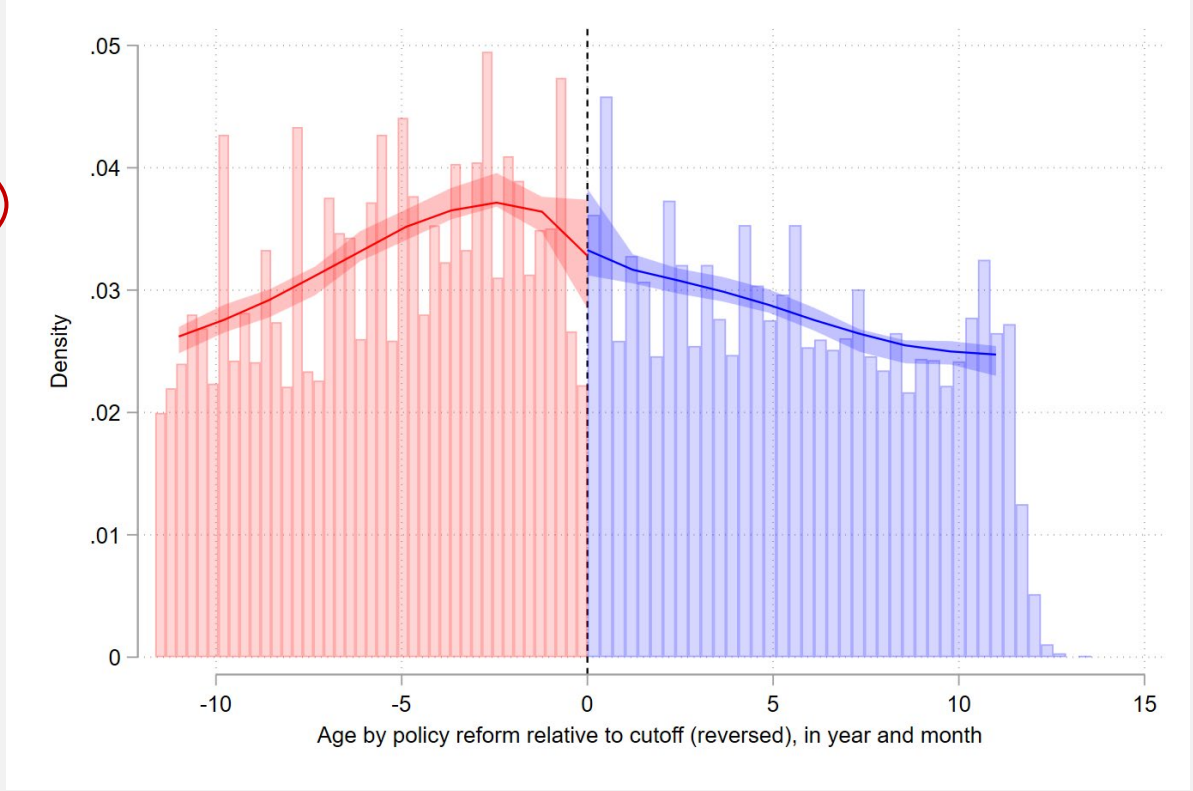


Hasil uji statistik dan grafik menunjukan tidak ada cukup bukti bahwa ada manipulasi running variable

Periksa jumlah seluruh observasi dan mass points sebelum memulai estimasi

Jumlah mass-point cukup besar untuk melakukan continuity-based RDD

Table: Sample size and mass points

	Control	Treatment
Number of observations	18,636	9,420
Mass points	323	152
Observation per mass point	58	62

```
. distinct runvar_abp03 if itt_abp03==0
```

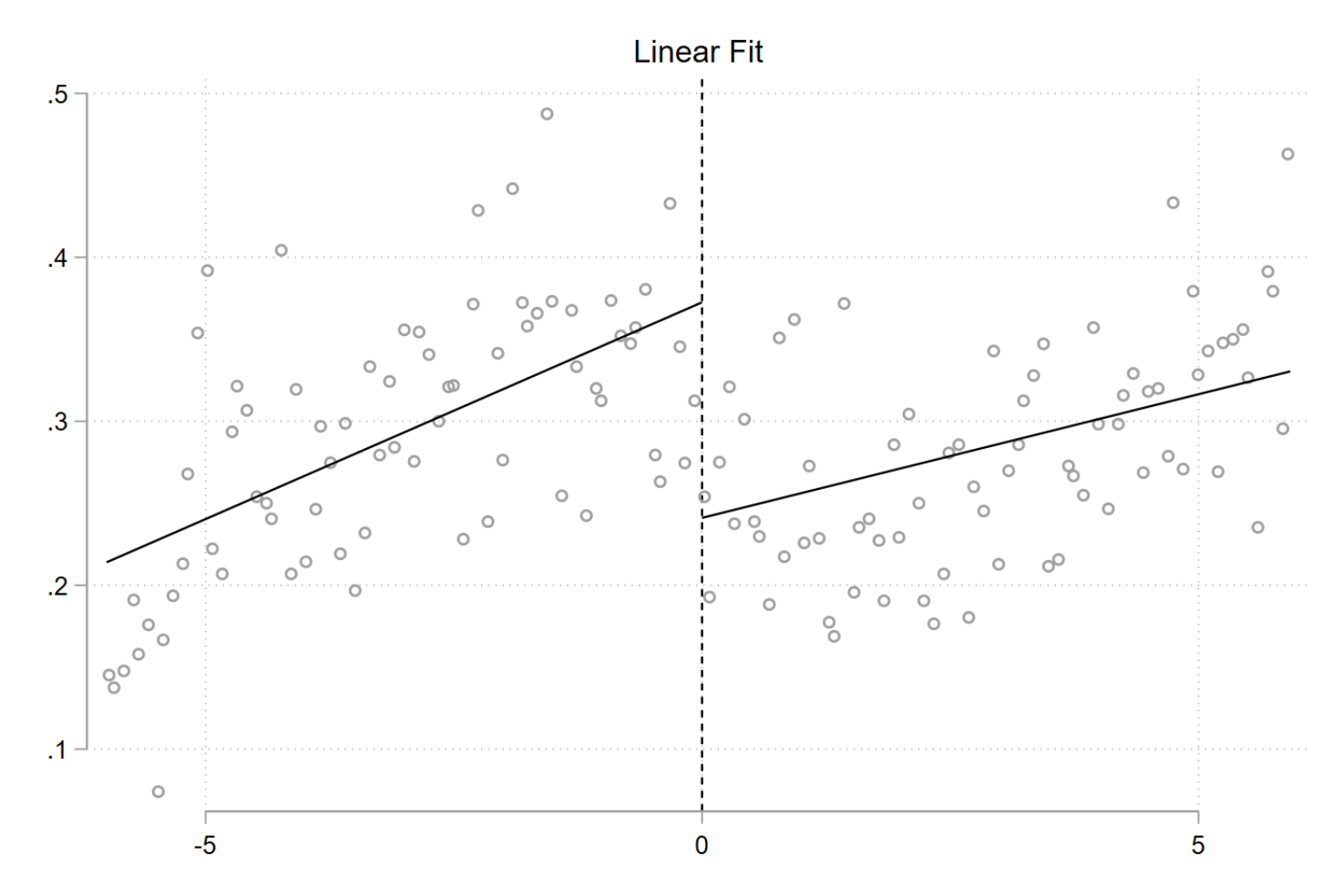
	Observations	
	total	distinct
runvar_abp03	18636	323

```
. distinct runvar_abp03 if itt_abp03==1
```

	Observations	
	total	distinct
runvar_abp03	9420	152

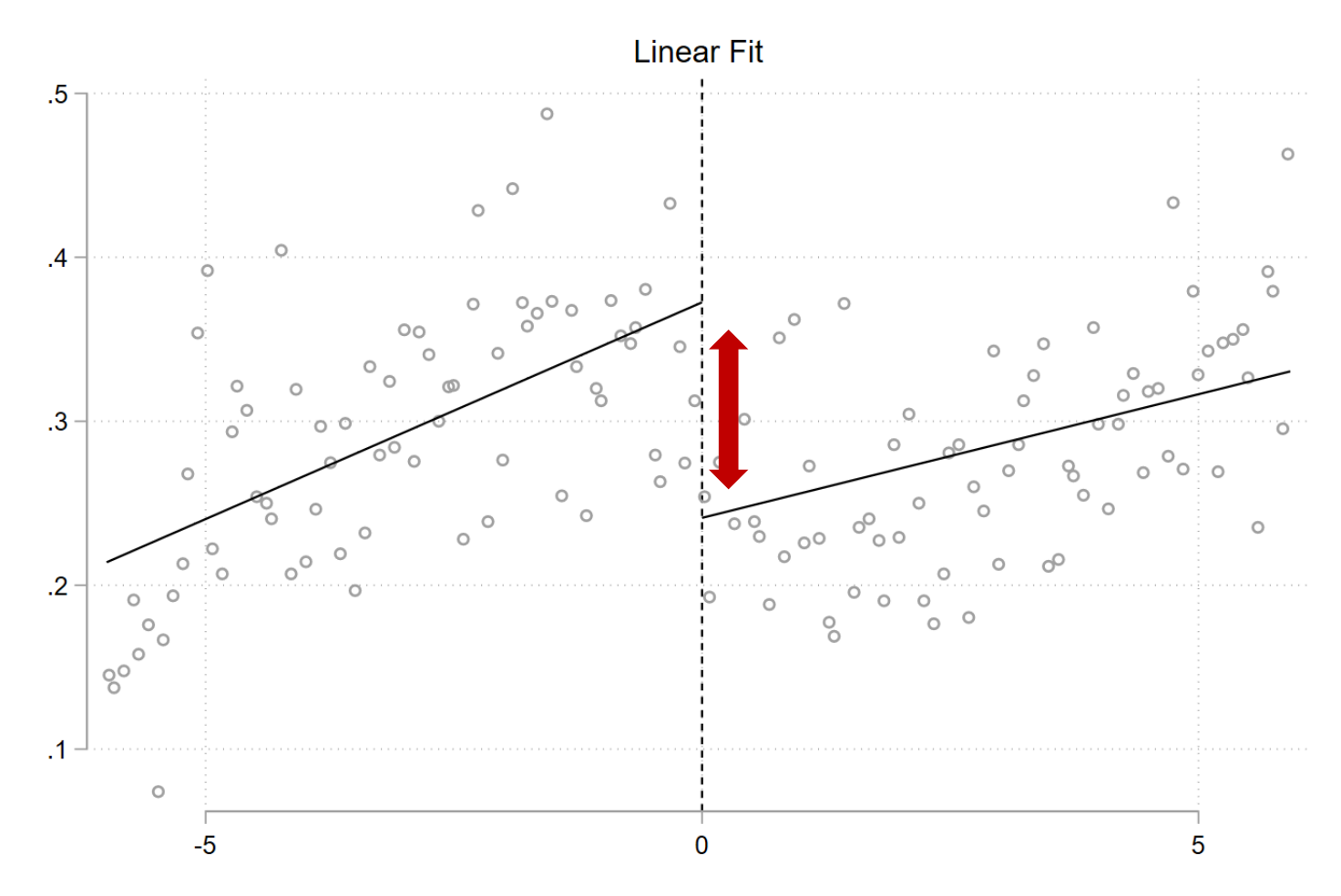
ssc install distinct, replace
ssc install unique, replace

Selalu mulai analisis dengan RD plot



- rdplot childlabor18 runvar_abp03 if inrange(runvar_abp03,-6,6), p(1) kernel(tri)

Selalu mulai analisis dengan RD plot



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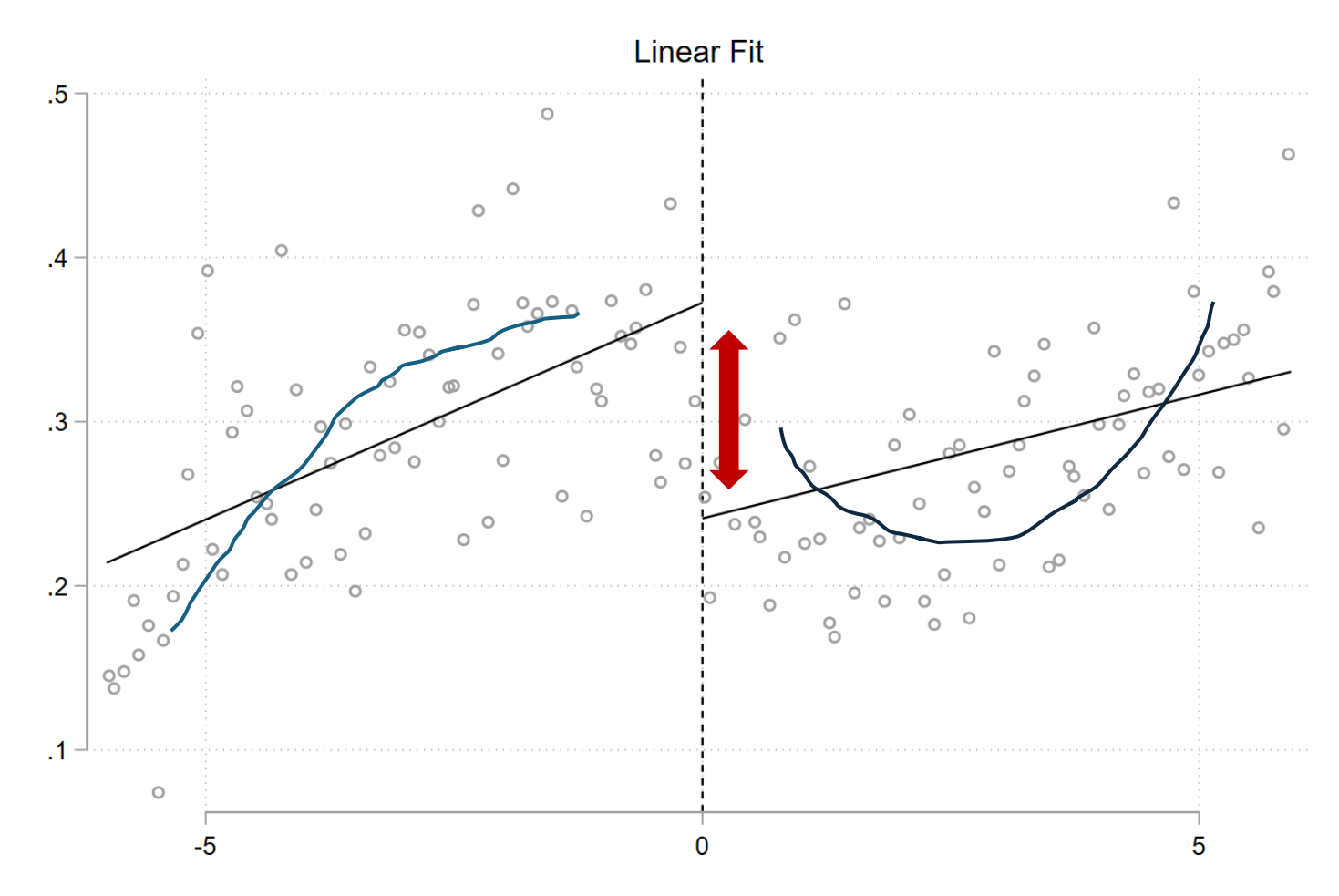

- rdplot childlabor18 runvar_abp03 if inrange(runvar_abp03,-6,6), p(1) kernel(tri)
- Discontinuity di cutoff menunjukan ada **potensi** dampak kebijakan
- Grafik menunjukan ada kemungkinan hubungan nonlinear. Sebaiknya tunjukan juga quadratic fitnya (polynomial derajat dua)
- Robustness check dengan polynomial derajat 0 (randomization-based RD)

Published on **Development Impact**

How should you draw an RDD graph?

DAVID MCKENZIE | MARCH 12, 2023

Awali estimasi dengan metode paling dasar, yaitu nonparametric continuity-based RD

```
. rdrobust childlabor18 runvar_abp03, p(1) covs(male javanese urban earlyenforcer bwin_formalwork
> electric filtered_water owntoilet hhsize_ch) vce(cluster runvar_abp03) all
Mass points detected in the running variable.

Covariate-adjusted Sharp RD estimates using local polynomial regression.

      Cutoff c = 0 | Left of c  Right of c            Number of obs =      24835
                   |                                 BW type       =      mserd
     Number of obs |     16468        8367            Kernel        = Triangular
Eff. Number of obs |      1814        1725            VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
        BW est. (h) |     2.146       2.146
        BW bias (b) |     3.905       3.905
          rho (h/b) |     0.549       0.549
        Unique obs |       322         152
Number of clusters |        46          47

Outcome: childlabor18. Running variable: runvar_abp03.
-------------------------------------------------------------------------------
            Method |   Coef.    Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+-----------------------------------------------------------
      Conventional |  -.06958     .02693   -2.5839  0.010    -.122353     -.016801
    Bias-corrected |  -.05401     .02693   -2.0059  0.045    -.106789     -.001237
            Robust |  -.05401      .0317   -1.7040  0.088    -.116137      .008112
-------------------------------------------------------------------------------
Covariate-adjusted estimates. Additional covariates included: 9
Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Awali estimasi dengan metode paling dasar, yaitu nonparametric continuity-based RD

- Uji sensitivitas dengan polynomial derajat dua

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Awali estimasi dengan metode paling dasar, yaitu nonparametric continuity-based RD

- Uji sensitivitas dengan polynomial derajat dua
- Gunakan kovariat untuk meningkatkan presisi estimasi (menurunkan SE)

```
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Awali estimasi dengan metode paling dasar, yaitu nonparametric continuity-based RD

- Uji sensitivitas dengan polynomial derajat dua
- Gunakan kovariat untuk meningkatkan presisi estimasi (menurunkan SE)
- Kluster SE pada tingkat observasi atau running variable (jika terdapat mass points)

```
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       BW est. (h) |     2.146       2.146
       BW bias (b) |     3.905       3.905
         rho (h/b) |     0.549       0.549
        Unique obs |       322         152
Number of clusters |        46          47

Outcome: childlabor18. Running variable: runvar_abp03.
-------------------------------------------------------------------------------
            Method |   Coef.    Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+-----------------------------------------------------------
      Conventional | -.06958     .02693   -2.5839  0.010    -.122353     -.016801
    Bias-corrected | -.05401     .02693   -2.0059  0.045    -.106789     -.001237
            Robust | -.05401      .0317   -1.7040  0.088    -.116137      .008112
-------------------------------------------------------------------------------
Covariate-adjusted estimates. Additional covariates included: 9
Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Awali estimasi dengan metode paling dasar, yaitu nonparametric continuity-based RD

- Uji sensitivitas dengan polynomial derajat dua
- Gunakan kovariat untuk meningkatkan presisi estimasi (menurunkan SE)
- Kluster SE pada tingkat observasi atau running variable (jika terdapat mass points)
- Laporkan conventional coefficient estimate tapi gunakan robust SE. Hitung ulang Z statistiknya.

```
. rdrobust childlabor18 runvar_abp03, p(1) covs(male javanese urban earlyenforcer bwin_formalwork
> electric filtered_water owntoilet hhsize_ch) vce(cluster runvar_abp03) all
Mass points detected in the running variable.

Covariate-adjusted Sharp RD estimates using local polynomial regression.

      Cutoff c = 0 | Left of c  Right of c           Number of obs =      24835
                   |                                 BW type       =      mserd
     Number of obs |     16468        8367           Kernel        = Triangular
Eff. Number of obs |      1814        1725           VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
       BW est. (h) |     2.146       2.146
       BW bias (b) |     3.905       3.905
         rho (h/b) |     0.549       0.549
        Unique obs |       322         152
Number of clusters |        46          47

Outcome: childlabor18. Running variable: runvar_abp03.
------------------------------------------------------------------------------
            Method |   Coef.    Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
      Conventional |  -.06958     .02693   -2.5839  0.010    -.122353     -.016801
    Bias-corrected |  -.05401     .02693   -2.0059  0.045    -.106789     -.001237
            Robust |  -.05401      .0317   -1.7040  0.088    -.116137      .008112
------------------------------------------------------------------------------
Covariate-adjusted estimates. Additional covariates included: 9
Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Awali estimasi dengan metode paling dasar, yaitu nonparametric continuity-based RD

- Uji sensitivitas dengan polynomial derajat dua
- Gunakan kovariat untuk meningkatkan presisi estimasi (menurunkan SE)
- Kluster SE pada tingkat observasi atau running variable (jika terdapat mass points)
- Laporkan conventional coefficient estimate tapi gunakan robust SE. Hitung ulang Z statistiknya.
- Reformasi kebijakan buruh anak menurunkan probabilitas bekerja sebelum 18 tahun sebesar 6.9 pp.

```
. rdrobust childlabor18 runvar_abp03, p(1) covs(male javanese urban earlyenforcer bwin_formalwork
> electric filtered_water owntoilet hhsize_ch) vce(cluster runvar_abp03) all
Mass points detected in the running variable.

Covariate-adjusted Sharp RD estimates using local polynomial regression.

      Cutoff c = 0 | Left of c  Right of c            Number of obs =      24835
                   |                                 BW type       =      mserd
     Number of obs |     16468        8367            Kernel        = Triangular
Eff. Number of obs |      1814        1725            VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
       BW est. (h) |     2.146       2.146
       BW bias (b) |     3.905       3.905
         rho (h/b) |     0.549       0.549
        Unique obs |       322         152
Number of clusters |        46          47

Outcome: childlabor18. Running variable: runvar_abp03.
------------------------------------------------------------------------------
      Method |   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Conventional |  -.06958    .02693   -2.5839   0.010    -.122353     -.016801
Bias-corrected |  -.05401    .02693   -2.0059   0.045    -.106789     -.001237
      Robust |  -.05401     .0317   -1.7040   0.088    -.116137      .008112
------------------------------------------------------------------------------
Covariate-adjusted estimates. Additional covariates included: 9
Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Periksa statistical power untuk memastikan keabsahan hasil estimasi

```
. rdpow childlabor18 runvar_abp03, p(1) covs(male javanese urban earlyenforcer bwin_formalwork ele
> ctric filtered_water owntoilet hhsize_ch) vce(cluster runvar_abp03)
```

Cutoff c = 0	Left of c	Right of c
Number of obs	18636	9420
Eff. Number of obs	2061	1942
BW loc. poly. (h)	2.146	2.146
Order loc. poly. (p)	1	1
Number of clusters	323	152
Eff. Num. of clusters	25	26
Sampling BW	2.146	2.146
New cluster sample	25	26

Number of obs =	28056
BW type =	mserd
Kernel =	Triangular
VCE method =	Cluster
Derivative =	0
HA: tau =	0.236

Outcome: childlabor18. Running variable: runvar_abp03. Number of covariates: 9.

Power against:	H0: tau= 0.000	0.2*tau = 0.047	0.5*tau = 0.118	0.8*tau = 0.188	tau = 0.236
Robust bias-corrected	0.050	0.318	0.960	1.000	1.000

Standard errors clustered by runvar_abp03.

- Standard minimal kekuatan statistik = 80%
- Uji sensitivitas dengan polynomial derajat dua

Periksa statistical power untuk memastikan keabsahan hasil estimasi

```
. rdpow childlabor18 runvar_abp03, p(1) covs(male javanese urban earlyenforcer bwin_formalwork ele
> ctric filtered_water owntoilet hhsize_ch) vce(cluster runvar_abp03)
```

Cutoff c = 0	Left of c	Right of c
Number of obs	18636	9420
Eff. Number of obs	2061	1942
BW loc. poly. (h)	2.146	2.146
Order loc. poly. (p)	1	1
Number of clusters	323	152
Eff. Num. of clusters	25	26
Sampling BW	2.146	2.146
New cluster sample	25	26

Number of obs =	28056
BW type =	mserd
Kernel =	Triangular
VCE method =	Cluster
Derivative =	0
HA: tau =	0.236

Outcome: childlabor18. Running variable: runvar_abp03. Number of covariates: 9.

Power against:	H0: tau= 0.000	0.2*tau = 0.047	0.5*tau = 0.118	0.8*tau = 0.188	tau = 0.236
Robust bias-corrected	0.050	0.318	0.960	1.000	1.000

Standard errors clustered by runvar_abp03.

- Standard minimal kekuatan statistik = 80%
- Uji sensitivitas dengan polynomial derajat dua
- Jumlah observasi efektif menghasilkan kekuatan statistik sebesar 100%

Uji keabsahan hasil estimasi dengan memeriksa keseimbangan kovariat

```
. rdrobust male runvar_abp03, p(1) vce(cluster runvar_abp03) all
Mass points detected in the running variable.

Sharp RD estimates using local polynomial regression.

      Cutoff c = 0 | Left of c  Right of c           Number of obs =      28056
                   |                                 BW type       =      mserd
     Number of obs |     18636        9420           Kernel        = Triangular
Eff. Number of obs |      5231        4588           VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
       BW est. (h) |     5.225       5.225
       BW bias (b) |     8.112       8.112
         rho (h/b) |     0.644       0.644
        Unique obs |       323         152
Number of clusters |        97          98

Outcome: male. Running variable: runvar_abp03.

------------------------------------------------------------------------------
            Method |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
      Conventional |     .00468      .0183    0.2560   0.798    -.031182      .040552
    Bias-corrected |     .00513      .0183    0.2805   0.779    -.030733        .041
            Robust |     .00513     .02197    0.2337   0.815    -.037917      .048185
------------------------------------------------------------------------------

Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Uji keabsahan hasil estimasi dengan memeriksa keseimbangan kovariat

- Tidak ada perbedaan yang signifikan secara statistik dalam hal gender antara kelompok perlakuan dan kontrol (kovariat seimbang di sekitar cutoff) – sebuah pertanda bahwa dampak hanya muncul karena kebijakan dan tidak terpengaruhi oleh faktor lainnya
- Uji sensitivitas dengan polynomial derajat dua

```
. rdrobust male runvar_abp03, p(1) vce(cluster runvar_abp03) all
Mass points detected in the running variable.

Sharp RD estimates using local polynomial regression.
```

Cutoff c = 0	Left of c	Right of c
Number of obs	18636	9420
Eff. Number of obs	5231	4588
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	5.225	5.225
BW bias (b)	8.112	8.112
rho (h/b)	0.644	0.644
Unique obs	323	152
Number of clusters	97	98

Number of obs	28056
BW type	mserd
Kernel	Triangular
VCE method	Cluster

Outcome: male. Running variable: runvar_abp03.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	.00468	.0183	0.2560	0.798	-.031182	.040552
Bias-corrected	.00513	.0183	0.2805	0.779	-.030733	.041
Robust	.00513	.02197	0.2337	0.815	-.037917	.048185

```
Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Uji keabsahan hasil estimasi dengan placebo cutoff (cutoff gadungan)

```
. rdrobust childlabor18 runvar_abp03, c(1) p(1) covs(male javanese urban earlyenforcer bwin_formal
> work electric filtered_water owntoilet hhsize_ch) vce(cluster runvar_abp03) all
Mass points detected in the running variable.

Covariate-adjusted Sharp RD estimates using local polynomial regression.

      Cutoff c = 1 | Left of c  Right of c            Number of obs =      24835
-------------------+----------------------            BW type       =      mserd
     Number of obs |     17325        7510            Kernel        = Triangular
Eff. Number of obs |      2090        1931            VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
       BW est. (h) |     2.511       2.511
       BW bias (b) |     3.881       3.881
         rho (h/b) |     0.647       0.647
        Unique obs |       334         140
Number of clusters |        46          47

Outcome: childlabor18. Running variable: runvar_abp03.

------------------------------------------------------------------------------
            Method |   Coef.    Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
      Conventional |  -.02366     .03665   -0.6457  0.519    -.095498       .04817
    Bias-corrected |  -.01305     .03665   -0.3559  0.722     -.08488      .058788
            Robust |  -.01305     .04537   -0.2875  0.774    -.101967      .075876
------------------------------------------------------------------------------

Covariate-adjusted estimates. Additional covariates included: 9
Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Uji keabsahan hasil estimasi dengan placebo cutoff (cutoff gadungan)

- Tidak ada dampak kebijakan ketika cutoff dimajukan satu bulan – sebuah pertanda dampak memang disebabkan oleh cutoff kebijakan
- Uji sensitivitas dengan polynomial derajat dua

```
. rdrobust childlabor18 runvar_abp03, c(1) p(1) covs(male javanese urban earlyenforcer bwin_formal
> work electric filtered_water owntoilet hhsize_ch) vce(cluster runvar_abp03) all
Mass points detected in the running variable.

Covariate-adjusted Sharp RD estimates using local polynomial regression.
```

Cutoff c = 1	Left of c	Right of c
Number of obs	17325	7510
Eff. Number of obs	2090	1931
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	2.511	2.511
BW bias (b)	3.881	3.881
rho (h/b)	0.647	0.647
Unique obs	334	140
Number of clusters	46	47

Number of obs	24835
BW type	mserd
Kernel	Triangular
VCE method	Cluster

Outcome: childlabor18. Running variable: runvar_abp03.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	-.02366	.03665	-0.6457	0.519	-.095498	.04817
Bias-corrected	-.01305	.03665	-0.3559	0.722	-.08488	.058788
Robust	-.01305	.04537	-0.2875	0.774	-.101967	.075876

```
Covariate-adjusted estimates. Additional covariates included: 9
Std. Err. adjusted for clusters in runvar_abp03
Estimates adjusted for mass points in the running variable.
```

Uji sensitivitas hasil estimasi dengan randomization-based RD

```
. rdrandinf childlabor18 runvar_abp03, kernel(triangular) cov(male javanese urban earlyenforcer bw
> in_formalwork electric filtered_water owntoilet hhsize_ch) wmasspoints level(0.1)
Calculating window...
Missing values detected in covariates
Consider dropmissing option to exclude missing values
Mass points detected in running variable
You may use wmasspoints option for constructing windows at each mass point


Window selection for RD under local randomization
```

Cutoff c = 0.00	Left of c	Right of c
Number of obs	18636	9420
1st percentile	253	74
5th percentile	957	531
10th percentile	1780	956
20th percentile	3675	1864

Number of obs =	28056
Order of poly =	0
Kernel type =	uniform
Reps =	1000
Testing method =	rdrandinf
Balance test =	diffmeans

Window		Bal. test p-value	Var. name (min p-value)	Bin. test p-value	Obs<c	Obs>=c
-0.077	0.008	0.337	electric	0.184	48	63
-0.153	0.090	0.168	owntoilet	0.003	99	146
-0.238	0.175	0.213	hhsize_ch	0.000	154	226
-0.323	0.258	0.201	hhsize_ch	0.000	221	307
-0.405	0.342	0.309	bwin_formalwork	0.000	278	387
-0.490	0.427	0.136	owntoilet	0.000	346	470
-0.573	0.510	0.466	male	0.002	438	537
-0.658	0.595	0.374	electric	0.002	508	611
-0.742	0.677	0.323	urban	0.011	603	696
-0.825	0.762	0.386	javanese	0.039	674	753

```
Variable used in binomial test (running variable): runvar_abp03
Covariates used in balance test: male javanese urban earlyenforcer bwin_formalwo
> rk electric filtered_water owntoilet hhsize_ch

Recommended window is [-0.825;  0.762] with 1427 observations (674 below, 753 above).

Selected window = [-.82465744 ; .76164436]
```

Uji sensitivitas hasil estimasi dengan randomization-based RD

```
. rdrandinf childlabor18 runvar_abp03, kernel(triangular) cov(male javanese urban earlyenforcer bw
> in_formalwork electric filtered_water owntoilet hhsize_ch) wmasspoints level(0.1)
Calculating window...
Missing values detected in covariates
Consider dropmissing option to exclude missing values
Mass points detected in running variable
You may use wmasspoints option for constructing windows at each mass point


Window selection for RD under local randomization
```

Cutoff c = 0.00	Left of c	Right of c
Number of obs	18636	9420
1st percentile	253	74
5th percentile	957	531
10th percentile	1780	956
20th percentile	3675	1864

Number of obs =	28056
Order of poly =	0
Kernel type =	uniform
Reps =	1000
Testing method =	rdrandinf
Balance test =	diffmeans

Window		Bal. test p-value	Var. name (min p-value)	Bin. test p-value	Obs<c	Obs>=c
-0.077	0.008	0.337	electric	0.184	48	63
-0.153	0.090	0.168	owntoilet	0.003	99	146
-0.238	0.175	0.213	hhsize_ch	0.000	154	226
-0.323	0.258	0.201	hhsize_ch	0.000	221	307
-0.405	0.342	0.309	bwin_formalwork	0.000	278	387
-0.490	0.427	0.136	owntoilet	0.000	346	470
-0.573	0.510	0.466	male	0.002	438	537
-0.658	0.595	0.374	electric	0.002	508	611
-0.742	0.677	0.323	urban	0.011	603	696
-0.825	0.762	0.386	javanese	0.039	674	753

```
Variable used in binomial test (running variable): runvar_abp03
Covariates used in balance test: male javanese urban earlyenforcer bwin_formalwo
> rk electric filtered_water owntoilet hhsize_ch

Recommended window is [-0.825;  0.762] with 1427 observations (674 below, 753 above).

Selected window = [-.82465744 ; .76164436]
```

- Otomatis melakukan pengujian keseimbangan kovariat untuk mencari bandwidth/window yang tepat

Uji sensitivitas hasil estimasi dengan randomization-based RD

```
. rdrandinf childlabor18 runvar_abp03, kernel(triangular) cov(male javanese urban earlyenforcer bw
> in_formalwork electric filtered_water owntoilet hhsize_ch) wmasspoints level(0.1)
Calculating window...
Missing values detected in covariates
Consider dropmissing option to exclude missing values
Mass points detected in running variable
You may use wmasspoints option for constructing windows at each mass point


Window selection for RD under local randomization
```

Cutoff c = 0.00	Left of c	Right of c
Number of obs	18636	9420
1st percentile	253	74
5th percentile	957	531
10th percentile	1780	956
20th percentile	3675	1864

Number of obs =	28056
Order of poly =	0
Kernel type =	uniform
Reps =	1000
Testing method =	rdrandinf
Balance test =	diffmeans

Window		Bal. test p-value	Var. name (min p-value)	Bin. test p-value	Obs<c	Obs>=c
-0.077	0.008	0.337	electric	0.184	48	63
-0.153	0.090	0.168	owntoilet	0.003	99	146
-0.238	0.175	0.213	hhsize_ch	0.000	154	226
-0.323	0.258	0.201	hhsize_ch	0.000	221	307
-0.405	0.342	0.309	bwin_formalwork	0.000	278	387
-0.490	0.427	0.136	owntoilet	0.000	346	470
-0.573	0.510	0.466	male	0.002	438	537
-0.658	0.595	0.374	electric	0.002	508	611
-0.742	0.677	0.323	urban	0.011	603	696
-0.825	0.762	0.386	javanese	0.039	674	753

```
Variable used in binomial test (running variable): runvar_abp03
Covariates used in balance test: male javanese urban earlyenforcer bwin_formalwo
> rk electric filtered_water owntoilet hhsize_ch

Recommended window is [-0.825;  0.762] with 1427 observations (674 below, 753 above).

Selected window = [-.82465744 ; .76164436]
```

- Otomatis melakukan pengujian keseimbangan kovariat untuk mencari bandwidth/window yang tepat
- Putuskan apakah ingin menggunakan setiap mass point sebagai potensi window

Uji sensitivitas hasil estimasi dengan randomization-based RD

```
. rdrandinf childlabor18 runvar_abp03, kernel(triangular) cov(male javanese urban earlyenforcer bw
> in_formalwork electric filtered_water owntoilet hhsize_ch) wmasspoints level(0.1)
Calculating window...
Missing values detected in covariates
Consider dropmissing option to exclude missing values
Mass points detected in running variable
You may use wmasspoints option for constructing windows at each mass point


Window selection for RD under local randomization
```

Cutoff c = 0.00	Left of c	Right of c
Number of obs	18636	9420
1st percentile	253	74
5th percentile	957	531
10th percentile	1780	956
20th percentile	3675	1864

Number of obs =	28056
Order of poly =	0
Kernel type =	uniform
Reps =	1000
Testing method =	rdrandinf
Balance test =	diffmeans

Window		Bal. test p-value	Var. name (min p-value)	Bin. test p-value	Obs<c	Obs>=c
-0.077	0.008	0.337	electric	0.184	48	63
-0.153	0.090	0.168	owntoilet	0.003	99	146
-0.238	0.175	0.213	hhsize_ch	0.000	154	226
-0.323	0.258	0.201	hhsize_ch	0.000	221	307
-0.405	0.342	0.309	bwin_formalwork	0.000	278	387
-0.490	0.427	0.136	owntoilet	0.000	346	470
-0.573	0.510	0.466	male	0.002	438	537
-0.658	0.595	0.374	electric	0.002	508	611
-0.742	0.677	0.323	urban	0.011	603	696
-0.825	0.762	0.386	javanese	0.039	674	753

```
Variable used in binomial test (running variable): runvar_abp03
Covariates used in balance test: male javanese urban earlyenforcer bwin_formalwo
> rk electric filtered_water owntoilet hhsize_ch

Recommended window is [-0.825;  0.762] with 1427 observations (674 below, 753 above).

Selected window = [-.82465744 ; .76164436]
```

- Otomatis melakukan pengujian keseimbangan kovariat untuk mencari bandwidth/window yang tepat
- Putuskan apakah ingin menggunakan setiap mass point sebagai potensi window
- Putuskan tingkat signifikansi

Uji sensitivitas hasil estimasi dengan randomization-based RD

- Besaran sampel menentukan inference

Inference for sharp design

Cutoff c = 0.00	Left of c	Right of c
Number of obs	18636	9420
Eff. Number of obs	766	840
Mean of outcome	0.321	0.251
S.D. of outcome	0.467	0.434
Window	-0.825	0.762

Number of obs =	28056
Order of poly =	0
Kernel type =	triangular
Reps =	1000
Window =	rdwinselect
H0: tau =	0.000
Randomization =	fixed margins

Outcome: childlabor18. Running variable: runvar_abp03.

		Finite sample	Large sample	
Statistic	T	P>|T|	P>|T|	Power vs d = 0.23
Diff. in means	-0.062	0.019	0.022	1.000

Uji sensitivitas hasil estimasi dengan randomization-based RD

- Besaran sampel menentukan inference
- Prosedur otomatis melakukan perhitungan kekuatan statistik

Inference for sharp design

Cutoff c = 0.00	Left of c	Right of c
Number of obs	18636	9420
Eff. Number of obs	766	840
Mean of outcome	0.321	0.251
S.D. of outcome	0.467	0.434
Window	-0.825	0.762

Number of obs =	28056
Order of poly =	0
Kernel type =	triangular
Reps =	1000
Window =	rdwinselect
H0: tau =	0.000
Randomization =	fixed margins

Outcome: childlabor18. Running variable: runvar_abp03.

		Finite sample	Large sample	
Statistic	T	P>|T|	P>|T|	Power vs d = 0.23
Diff. in means	-0.062	0.019	0.022	1.000

Uji sensitivitas hasil estimasi dengan randomization-based RD

- Besaran sampel menentukan inference
- Prosedur otomatis melakukan perhitungan kekuatan statistik
- Kebijakan reformasi pekerja anak menurunkan kemungkinan bekerja sebelum 18 tahun sebesar 6.2 pp.

Inference for sharp design

Cutoff c = 0.00	Left of c	Right of c
Number of obs	18636	9420
Eff. Number of obs	766	840
Mean of outcome	0.321	0.251
S.D. of outcome	0.467	0.434
Window	-0.825	0.762

Number of obs =	28056
Order of poly =	0
Kernel type =	triangular
Reps =	1000
Window =	rdwinselect
H0: tau =	0.000
Randomization =	fixed margins

Outcome: childlabor18. Running variable: runvar_abp03.

		Finite sample	Large sample	
Statistic	T	P>|T|	P>|T|	Power vs d = 0.23
Diff. in means	-0.062	0.019	0.022	1.000

Gunakan metode estimasi parametrik sebagai alternatif uji sensitivitas hasil analisis heterogenitas

```
. reg childlabor18 itt_abp03##c.runvar_abp03 male javanese urban earlyenforcer bwin_formalwork ele
> ctric filtered_water owntoilet hhsize_ch if male==1 & inrange(runvar_abp03,-2.146,2.146), cluste
> r(runvar_abp03)
note: male omitted because of collinearity

Linear regression                               Number of obs     =      1,572
                                                F(11, 50)         =      22.04
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0837
                                                Root MSE          =     .46054

                                      (Std. Err. adjusted for 51 clusters in runvar_abp03)
------------------------------------------------------------------------------
             |               Robust
childlabor18 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      1.itt_abp03 |  -.1235322   .0346101    -3.57   0.001    -.1930486   -.0540158
      runvar_abp03 |   .0124526   .0266385     0.47   0.642    -.0410524    .0659576
                   |
itt_abp03#c.runvar_abp03 |
                1  |  -.0491396   .0331433    -1.48   0.144      -.11571    .0174308
                   |
             male  |          0  (omitted)
          javanese |   .0283876   .0267537     1.06   0.294    -.0253488    .0821239
             urban |  -.0027145   .0234074    -0.12   0.908    -.0497296    .0443006
       earlyenforcer |   .0106785   .0297797     0.36   0.721    -.0491358    .0704928
     bwin_formalwork |  -.0964517    .026041    -3.70   0.001    -.1487565   -.0441469
          electric |  -.1371552   .0295582    -4.64   0.000    -.1965247   -.0777858
     filtered_water |  -.0436332   .0940113    -0.46   0.645    -.2324605     .145194
          owntoilet |   -.130619   .0261872    -4.99   0.000    -.1832175   -.0780205
          hhsize_ch |  -.0007053   .0055401    -0.13   0.899    -.0118329    .0104223
              _cons |   .6426779   .0609032    10.55   0.000     .5203503    .7650056
------------------------------------------------------------------------------
```

Gunakan metode estimasi parametrik sebagai alternatif uji sensitivitas hasil analisis heterogenitas

- Atur bandwidth secara manual berdasarkan hasil nonparametrik
- Bobot observasi pasti uniform

```
. reg childlabor18 itt_abp03##c.runvar_abp03 male javanese urban earlyenforcer bwin_formalwork ele
> ctric filtered_water owntoilet hhsize_ch if male==1 & inrange(runvar_abp03,-2.146,2.146), cluste
> r(runvar_abp03)
note: male omitted because of collinearity

Linear regression                               Number of obs     =      1,572
                                                F(11, 50)         =      22.04
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0837
                                                Root MSE          =     .46054

                                   (Std. Err. adjusted for 51 clusters in runvar_abp03)
------------------------------------------------------------------------------
             |               Robust
childlabor18 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  1.itt_abp03 |  -.1235322   .0346101    -3.57   0.001    -.1930486   -.0540158
  runvar_abp03 |   .0124526   .0266385     0.47   0.642    -.0410524    .0659576
               |
itt_abp03#c.runvar_abp03 |
            1  |  -.0491396   .0331433    -1.48   0.144      -.11571    .0174308
               |
        male   |          0  (omitted)
    javanese   |   .0283876   .0267537     1.06   0.294    -.0253488    .0821239
       urban   |  -.0027145   .0234074    -0.12   0.908    -.0497296    .0443006
  earlyenforcer |   .0106785   .0297797     0.36   0.721    -.0491358    .0704928
bwin_formalwork |  -.0964517    .026041    -3.70   0.001    -.1487565   -.0441469
    electric   |  -.1371552   .0295582    -4.64   0.000    -.1965247   -.0777858
filtered_water |  -.0436332   .0940113    -0.46   0.645    -.2324605     .145194
    owntoilet  |   -.130619   .0261872    -4.99   0.000    -.1832175   -.0780205
    hhsize_ch  |  -.0007053   .0055401    -0.13   0.899    -.0118329    .0104223
         _cons |   .6426779   .0609032    10.55   0.000     .5203503    .7650056
------------------------------------------------------------------------------
```

Gunakan metode estimasi parametrik sebagai alternatif uji sensitivitas hasil analisis heterogenitas

- Atur bandwidth secara manual berdasarkan hasil nonparametrik
- Bobot observasi pasti uniform
- Reformasi kebijakan buruh anak menurunkan probabilitas bekerja sebelum 18 tahun sebesar 12.35 pp.

```
. reg childlabor18 itt_abp03##c.runvar_abp03 male javanese urban earlyenforcer bwin_formalwork ele
> ctric filtered_water owntoilet hhsize_ch if male==1 & inrange(runvar_abp03,-2.146,2.146), cluste
> r(runvar_abp03)
note: male omitted because of collinearity

Linear regression                               Number of obs     =      1,572
                                                F(11, 50)         =      22.04
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0837
                                                Root MSE          =     .46054

                                   (Std. Err. adjusted for 51 clusters in runvar_abp03)
------------------------------------------------------------------------------
             |               Robust
childlabor18 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  1.itt_abp03 |  -.1235322   .0346101    -3.57   0.001    -.1930486   -.0540158
  runvar_abp03 |   .0124526   .0266385     0.47   0.642    -.0410524    .0659576
               |
itt_abp03#c.runvar_abp03 |
            1  |  -.0491396   .0331433    -1.48   0.144      -.11571    .0174308
               |
         male  |          0  (omitted)
     javanese  |   .0283876   .0267537     1.06   0.294    -.0253488    .0821239
        urban  |  -.0027145   .0234074    -0.12   0.908    -.0497296    .0443006
  earlyenforcer |   .0106785   .0297797     0.36   0.721    -.0491358    .0704928
bwin_formalwork |  -.0964517    .026041    -3.70   0.001    -.1487565   -.0441469
     electric  |  -.1371552   .0295582    -4.64   0.000    -.1965247   -.0777858
 filtered_water |  -.0436332   .0940113    -0.46   0.645    -.2324605     .145194
     owntoilet  |   -.130619   .0261872    -4.99   0.000    -.1832175   -.0780205
     hhsize_ch  |  -.0007053   .0055401    -0.13   0.899    -.0118329    .0104223
          _cons |   .6426779   .0609032    10.55   0.000     .5203503    .7650056
------------------------------------------------------------------------------
```

Metode estimasi parametrik juga bisa menggunakan polynomial derajat >1

```
. reg childlabor18 itt_abp03##c.runvar_abp03 itt_abp03##c.runvarsq_abp03 male javanese urban early
> enforcer bwin_formalwork electric filtered_water owntoilet hhsize_ch if male==1 & inrange(runvar
> _abp03,-4.4993,4.4993), cluster(runvar_abp03)
note: male omitted because of collinearity

Linear regression                               Number of obs     =      3,351
                                                F(13, 107)        =      36.30
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0827
                                                Root MSE          =     .45224

                                   (Std. Err. adjusted for 108 clusters in runvar_abp03)
------------------------------------------------------------------------------
             |               Robust
childlabor18 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  1.itt_abp03 |  -.1455523   .0350004    -4.16   0.000    -.2149364   -.0761682
  runvar_abp03 |   .0323629   .0318234     1.02   0.311    -.0307233     .095449
               |
itt_abp03#c.runvar_abp03 |
            1  |  -.0926572   .0391846    -2.36   0.020    -.1703361   -.0149784
               |
  runvarsq_abp03 |  -.0043211   .0069294    -0.62   0.534    -.0180578    .0094157
               |
itt_abp03#c.runvarsq_abp03 |
            1  |   .0215125   .0087192     2.47   0.015     .0042278    .0387972
```

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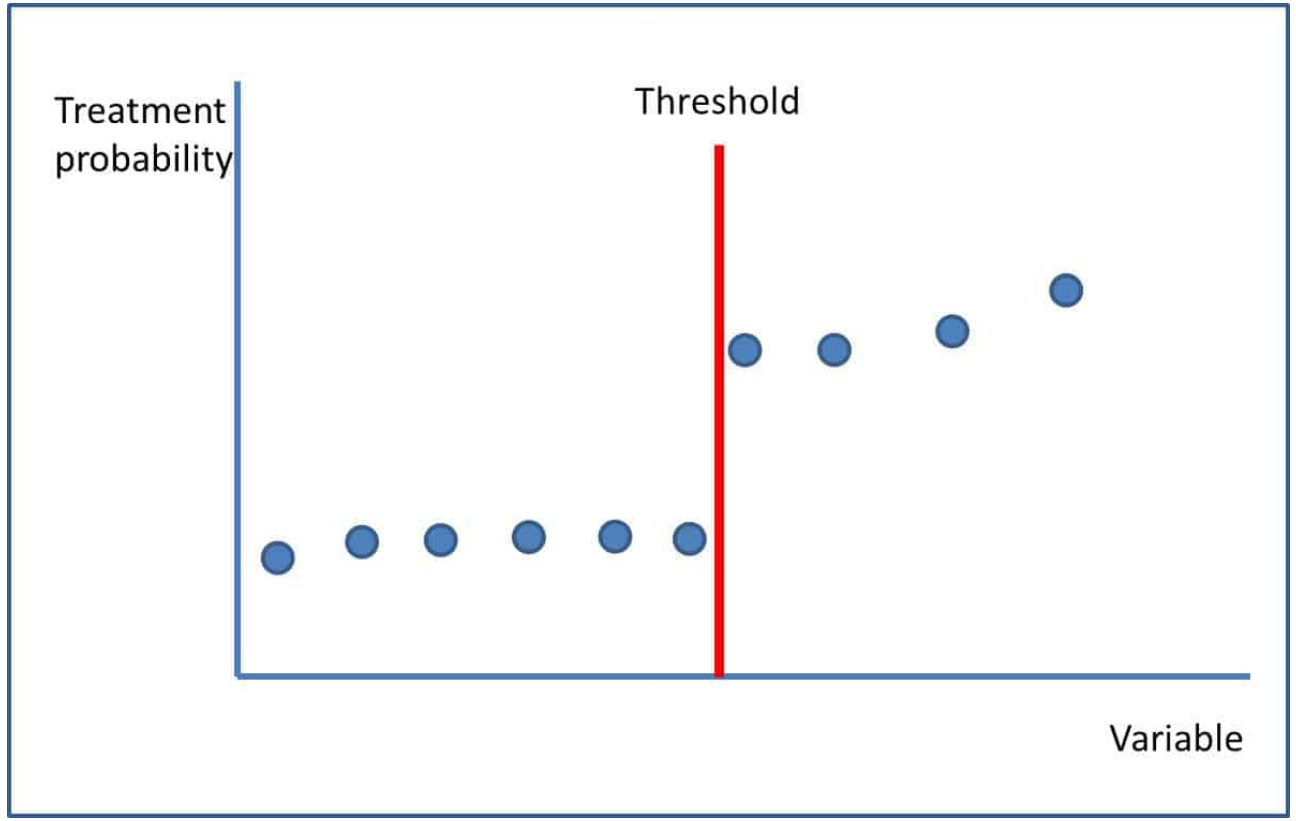
Assessing the causal impact of compulsory schooling policy in Indonesia

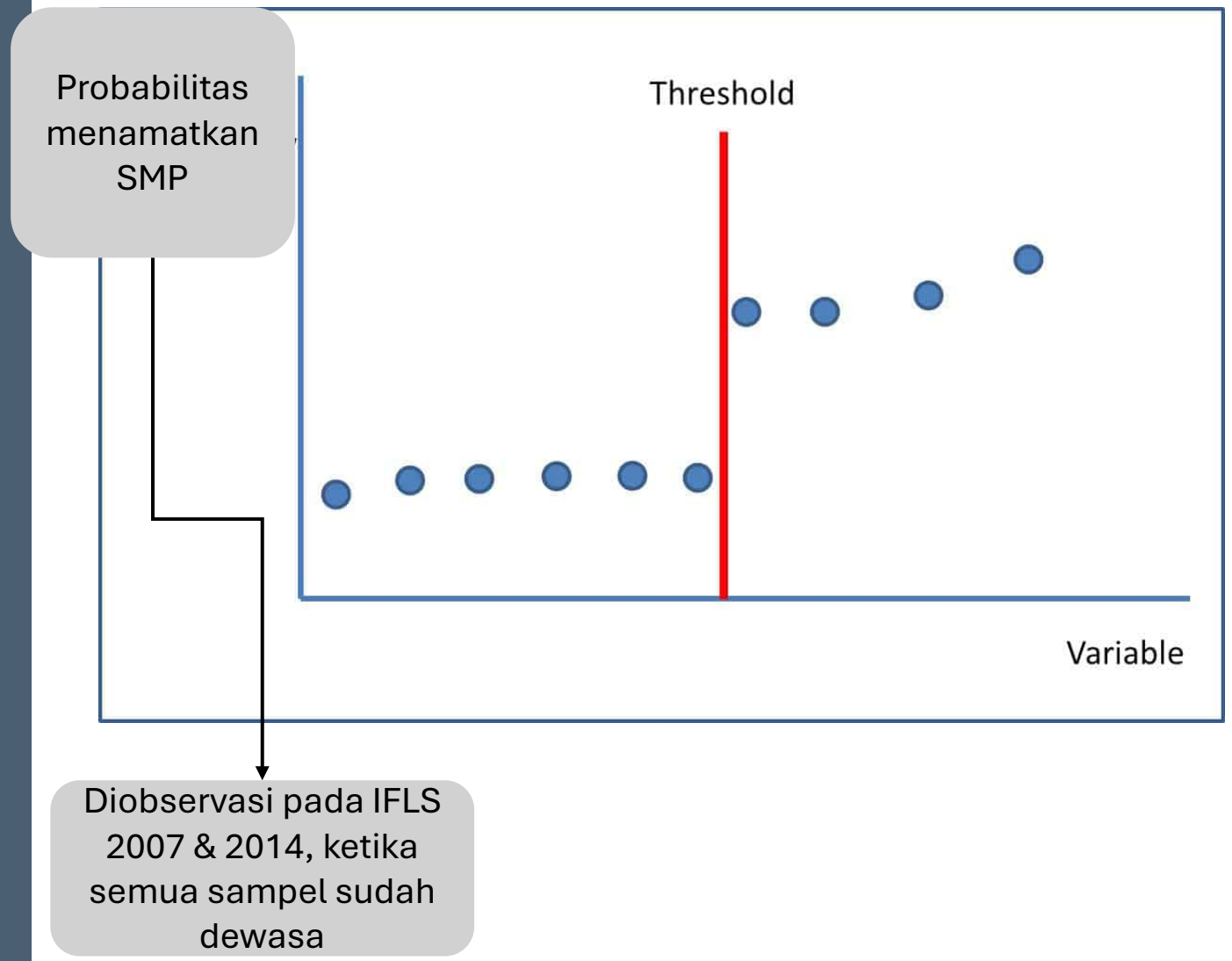
Blane D. Lewis *, Hieu T.M. Nguyen

Arndt-Corden Department of Economics, HC Coombs Building, Room 7132, Crawford School of Public Policy, The Australian National University, Canberra, ACT, 2601, Australia

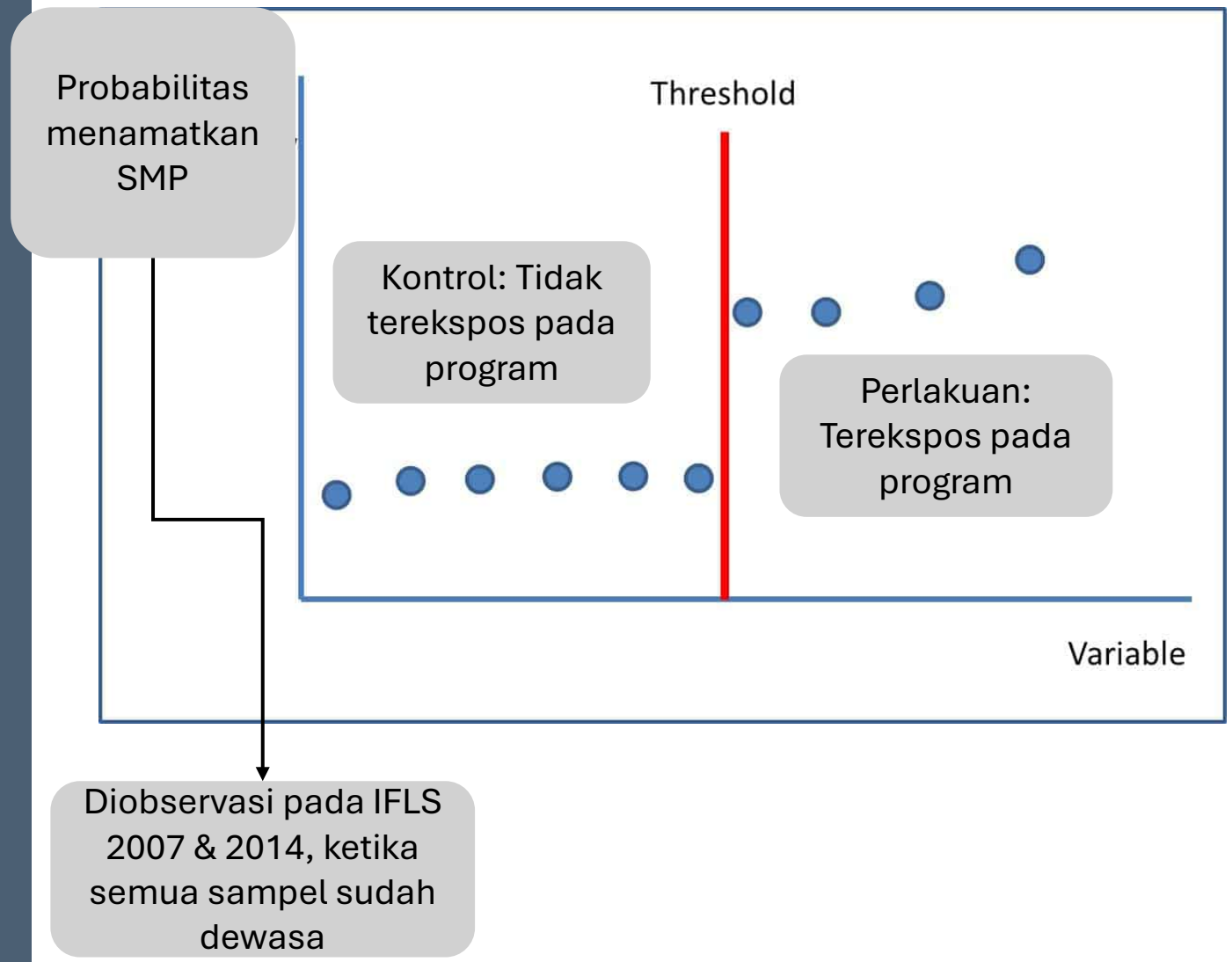
Evaluasi dampak wajib sekolah 9 tahun (1994) terhadap tingkat penyelesaian SMP



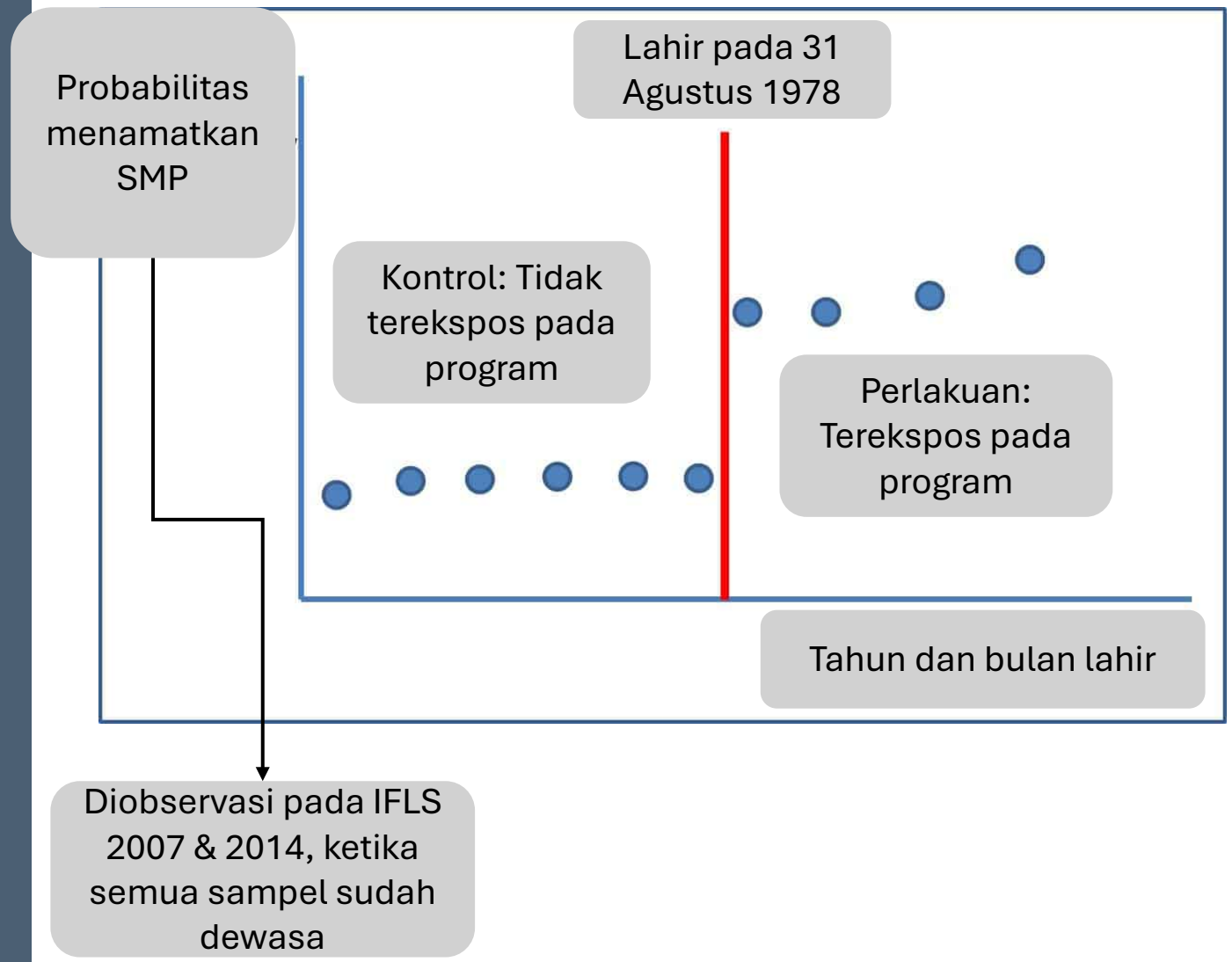
Evaluasi dampak wajib sekolah 9 tahun (1994) terhadap tingkat penyelesaian SMP



Evaluasi dampak wajib sekolah 9 tahun (1994) terhadap tingkat penyelesaian SMP

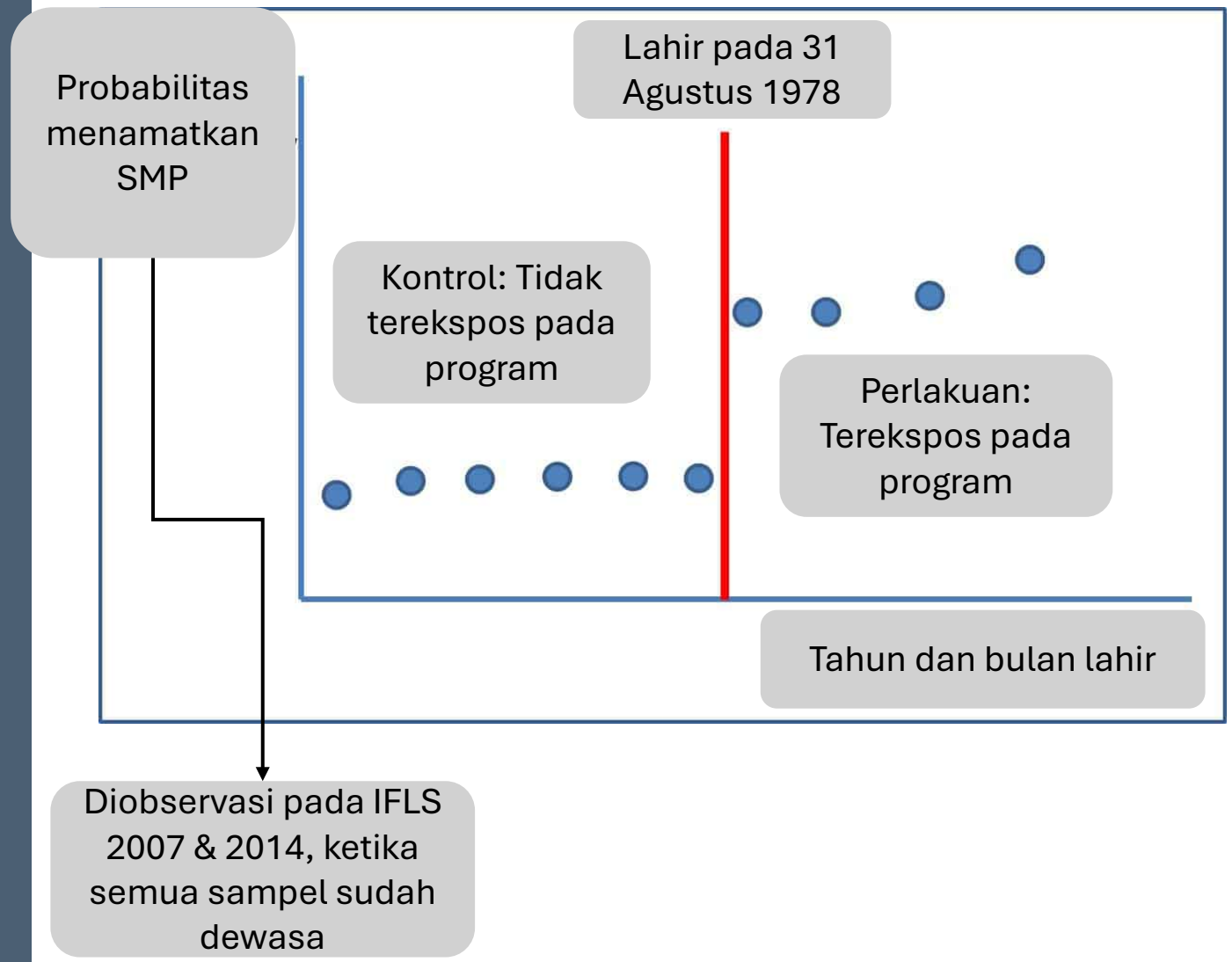


Evaluasi dampak wajib sekolah 9 tahun (1994) terhadap tingkat penyelesaian SMP



Evaluasi dampak wajib sekolah 9 tahun (1994) terhadap tingkat penyelesaian SMP

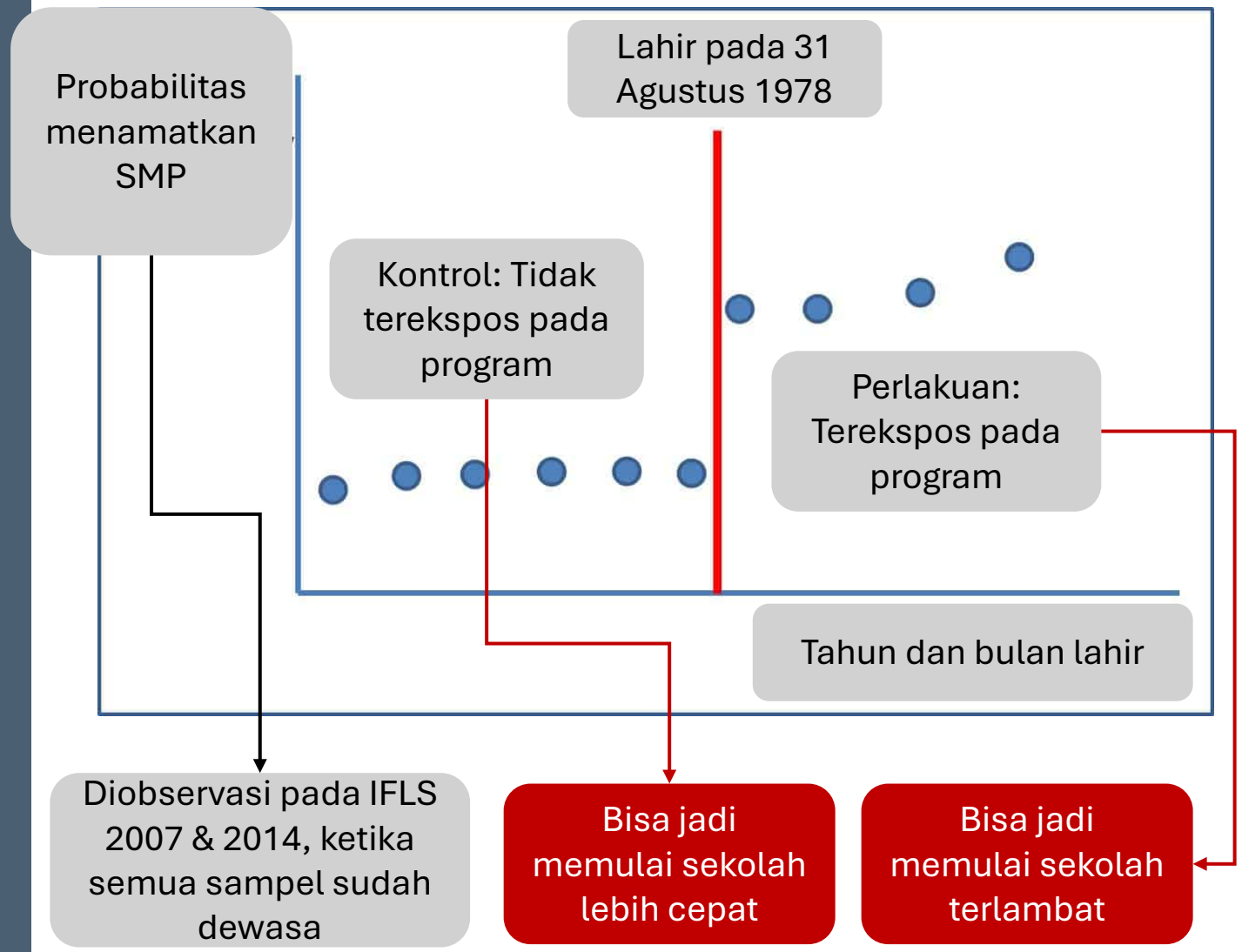
Ada potensi masalah apa?



Evaluasi dampak wajib sekolah 9 tahun (1994) terhadap tingkat penyelesaian SMP

Ada potensi masalah apa?

Setup mengasumsikan anak memulai sekolah tepat waktu



Gunakan fuzzy RDD jika terdapat imperfect compliance dalam pembagian kontrol-perlakuan

```
. rdrobust gJSS runvar_0978, c(0) p(1) kernel(tri) fuzzy(treat_tot_0978) vce(cluster runvar_0978)
> masspoints(adjust)
Mass points detected in the running variable.

Fuzzy RD estimates using local polynomial regression.

      Cutoff c = 0 | Left of c  Right of c           Number of obs =      31992
-------------------+----------------------           BW type       =      mserd
     Number of obs |     12292       19700           Kernel        = Triangular
Eff. Number of obs |      3249        3990           VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
       BW est. (h) |    44.279      44.279
       BW bias (b) |    78.732      78.732
         rho (h/b) |     0.562       0.562
        Unique obs |       249         265
Number of clusters |        78          79

First-stage estimates. Outcome: treat_tot_0978. Running variable: runvar_0978.
------------------------------------------------------------------------------
            Method |   Coef.    Std. Err.    z     P>|z|    [95% Conf. Interval]
-------------------+----------------------------------------------------------
      Conventional | -.08396     .03277   -2.5623  0.010   -.148189     -.019739
            Robust |    -          -     -1.9506  0.051   -.180932      .000432
------------------------------------------------------------------------------

Treatment effect estimates. Outcome: gJSS. Running variable: runvar_0978. Treatment Status: treat_
> tot_0978.
------------------------------------------------------------------------------
            Method |   Coef.    Std. Err.    z     P>|z|    [95% Conf. Interval]
-------------------+----------------------------------------------------------
      Conventional | -.17256     .28713   -0.6010  0.548   -.735317      .390205
            Robust |    -          -     -0.3813  0.703   -.778154       .52471
------------------------------------------------------------------------------
Std. Err. adjusted for clusters in runvar_0978
Estimates adjusted for mass points in the running variable.
```

Gunakan fuzzy RDD jika terdapat imperfect compliance dalam pembagian kontrol-perlakuan

```
. rdrobust gJSS runvar_0978, c(0) p(1) kernel(tri) fuzzy(treat_tot_0978) vce(cluster runvar_0978)
> masspoints(adjust)
Mass points detected in the running variable.

Fuzzy RD estimates using local polynomial regression.

      Cutoff c = 0 | Left of c  Right of c           Number of obs =      31992
-------------------+----------------------           BW type       =      mserd
     Number of obs |     12292       19700           Kernel        = Triangular
Eff. Number of obs |      3249        3990           VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
       BW est. (h) |    44.279      44.279
       BW bias (b) |    78.732      78.732
         rho (h/b) |     0.562       0.562
        Unique obs |       249         265
Number of clusters |        78          79

First-stage estimates. Outcome: treat_tot_0978. Running variable: runvar_0978.
------------------------------------------------------------------------------
            Method |   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
      Conventional |  -.08396     .03277   -2.5623   0.010    -.148189    -.019739
            Robust |      -           -    -1.9506   0.051    -.180932     .000432
------------------------------------------------------------------------------

Treatment effect estimates. Outcome: gJSS. Running variable: runvar_0978. Treatment Status: treat_
> tot_0978.
------------------------------------------------------------------------------
            Method |   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
      Conventional |  -.17256     .28713   -0.6010   0.548    -.735317     .390205
            Robust |      -           -    -0.3813   0.703    -.778154      .52471
------------------------------------------------------------------------------
Std. Err. adjusted for clusters in runvar_0978
Estimates adjusted for mass points in the running variable.
```

- Variabel ITT menjadi instrument untuk TOT

Gunakan fuzzy RDD jika terdapat imperfect compliance dalam pembagian kontrol-perlakuan

```
. rdrobust gJSS runvar_0978, c(0) p(1) kernel(tri) fuzzy(treat_tot_0978) vce(cluster runvar_0978)
> masspoints(adjust)
Mass points detected in the running variable.

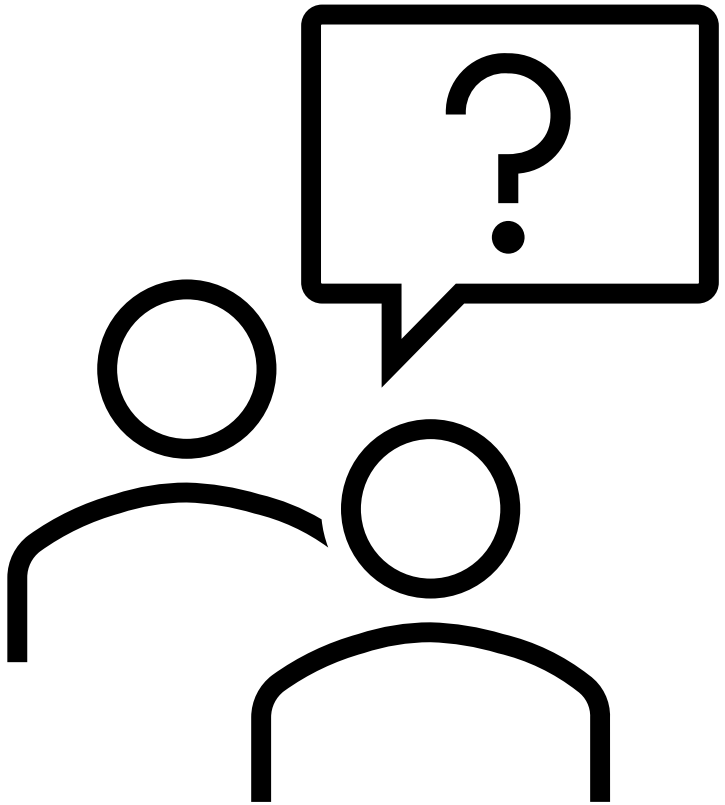
Fuzzy RD estimates using local polynomial regression.

      Cutoff c = 0 | Left of c  Right of c           Number of obs =      31992
-------------------+----------------------           BW type       =      mserd
     Number of obs |     12292       19700           Kernel        = Triangular
Eff. Number of obs |      3249        3990           VCE method    =    Cluster
    Order est. (p) |         1           1
    Order bias (q) |         2           2
       BW est. (h) |    44.279      44.279
       BW bias (b) |    78.732      78.732
         rho (h/b) |     0.562       0.562
        Unique obs |       249         265
Number of clusters |        78          79

First-stage estimates. Outcome: treat_tot_0978. Running variable: runvar_0978.
-------------------------------------------------------------------------------
            Method |   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+-----------------------------------------------------------
      Conventional |  -.08396     .03277   -2.5623   0.010    -.148189    -.019739
            Robust |      -           -    -1.9506   0.051    -.180932     .000432
-------------------------------------------------------------------------------

Treatment effect estimates. Outcome: gJSS. Running variable: runvar_0978. Treatment Status: treat_
> tot_0978.
-------------------------------------------------------------------------------
            Method |   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+-----------------------------------------------------------
      Conventional |  -.17256     .28713   -0.6010   0.548    -.735317     .390205
            Robust |      -           -    -0.3813   0.703    -.778154      .52471
-------------------------------------------------------------------------------
Std. Err. adjusted for clusters in runvar_0978
Estimates adjusted for mass points in the running variable.
```

- Variabel ITT menjadi instrument untuk TOT
- Instrumen harus tetap memenuhi persyaratan IV
- Instrumen lemah dan berhubungan negatif dengan TOT
- F statistic sekitar 10 ekuivalen ke Z statistic sekitar 3.16



Regression Discontinuity Design in Practice

Elghafiky Bimardhika

3 December 2024

elghafiky.bimardhika@alumni.anu.edu.au