Yale

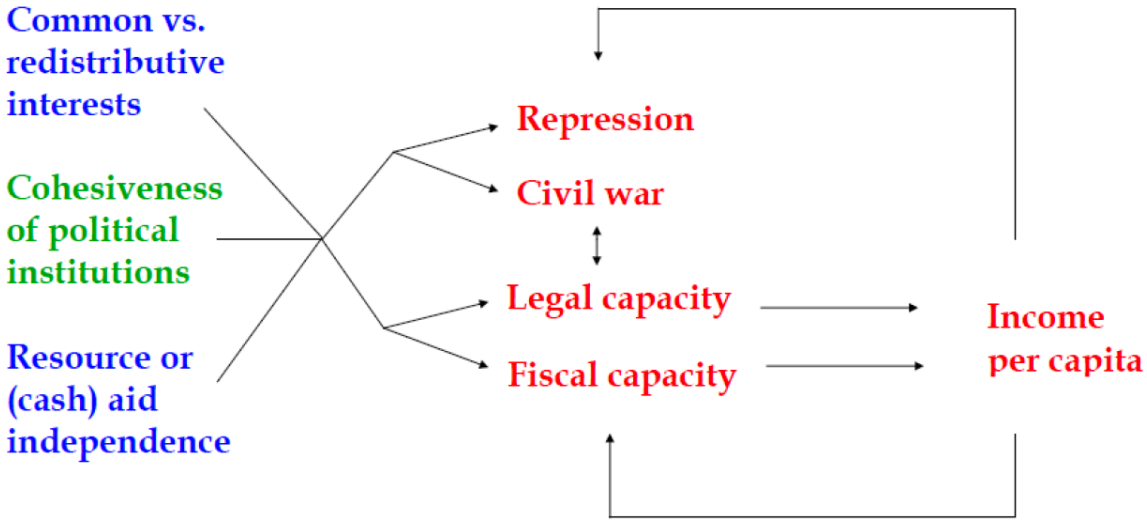
Causal Inference for IR and IPE with Substantive Applications

Carlos Felipe Balcazar

MacMillan Center

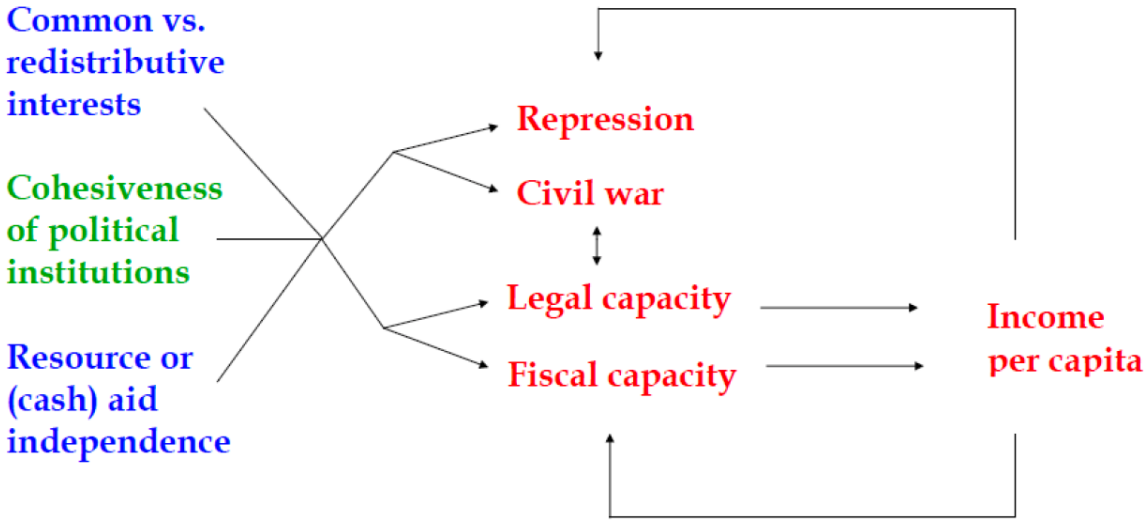
March, 2024

The natural resource curse



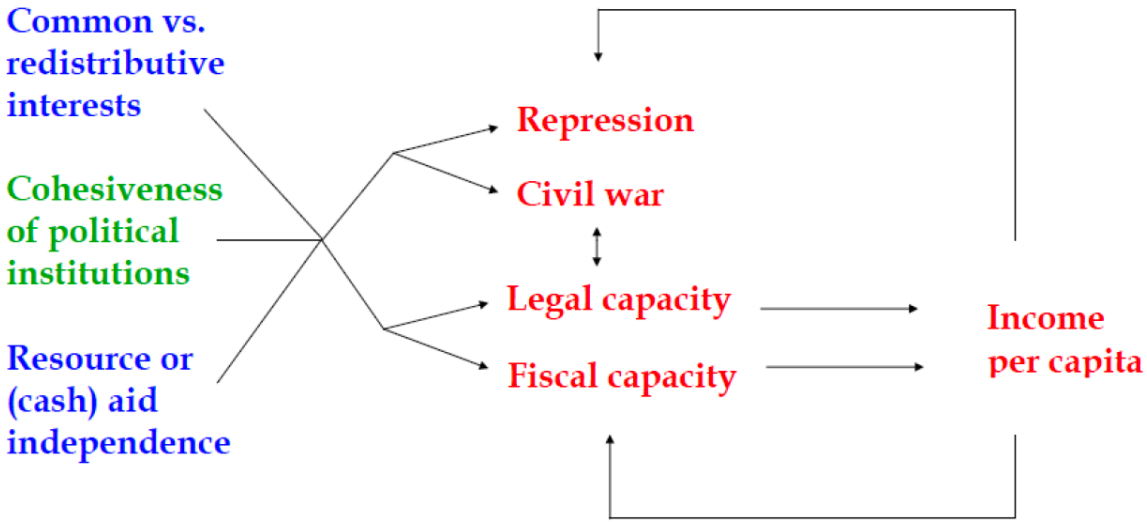
- Fiscal windfalls $\Rightarrow$ control govt. and consume rents.
- Fiscal windfalls can undermine institutions.
  - Scope conditions: common interests and cohesive institutions?
  - Size of windfalls also matter (non-monotonic effect?).
- Reduce the opportunity cost of violence.

The natural resource curse



- Fiscal windfalls $\Rightarrow$ control govt. and consume rents.
- Fiscal windfalls can undermine institutions.
  - Scope conditions: common interests and cohesive institutions?
  - Size of windfalls also matter (non-monotonic effect?).
- Reduce the opportunity cost of violence.

The natural resource curse



- Fiscal windfalls $\Rightarrow$ control govt. and consume rents.
- Fiscal windfalls can undermine institutions.
  - Scope conditions: common interests and cohesive institutions?
  - Size of windfalls also matter (non-monotonic effect?).
- Reduce the opportunity cost of violence.

Measurement issues

- Multiple ways to measure natural resource windfalls.
  - Exports; size of tax rents; discoveries; price shocks, etc.
  - What is the treatment trying to capture theoretically?
  - Is the measure as good-as-random. Instrument? Placebos?
- Also: multiple ways to measure violence and institutions.
  - Polity indexes? V-Dem scores? Their components? Corruption?
  - Casualties? Terrorism? Combats? Cut-offs?
  - What is the outcome trying to capture theoretically?
- Recall commensurability!

Measurement issues

- Multiple ways to measure natural resource windfalls.
  - Exports; size of tax rents; discoveries; price shocks, etc.
  - What is the treatment trying to capture theoretically?
  - Is the measure as good-as-random. Instrument? Placebos?
- Also: multiple ways to measure violence and institutions.
  - Polity indexes? V-Dem scores? Their components? Corruption?
  - Casualties? Terrorism? Combats? Cut-offs?
  - What is the outcome trying to capture theoretically?
- Recall commensurability!

Measurement issues

- Multiple ways to measure natural resource windfalls.
  - Exports; size of tax rents; discoveries; price shocks, etc.
  - What is the treatment trying to capture theoretically?
  - Is the measure as good-as-random. Instrument? Placebos?
- Also: multiple ways to measure violence and institutions.
  - Polity indexes? V-Dem scores? Their components? Corruption?
  - Casualties? Terrorism? Combats? Cut-offs?
  - What is the outcome trying to capture theoretically?
- Recall commensurability!

Empirical implications of measurement problems

- Independent variable:
  - Random ME: attenuation bias. When?

Empirical implications of measurement problems

- Independent variable:
  - Random ME: attenuation bias. When?
- Dependent variable:
  - Random ME: lower efficiency (type II error). When?
  - Caused by treatment: post-treatment bias. When?
    - Effect of inst.; colonial legacies; human rights; SDGs; climate.

Empirical implications of measurement problems

- Independent variable:
  - Random ME: attenuation bias. When?
- Dependent variable:
  - Random ME: lower efficiency (type II error). When?
  - Caused by treatment: post-treatment bias. When?
    - Effect of inst.; colonial legacies; human rights; SDGs; climate.

Empirical implications of measurement problems

- Independent variable:
  - Random ME: attenuation bias. When?
- Dependent variable:
  - Random ME: lower efficiency (type II error). When?
  - Caused by treatment: post-treatment bias. When?
    - Effect of inst.; colonial legacies; human rights; SDGs; climate.
- Both dependent and independent variables:
  - Non-random ME: omitted variable bias. When?

Common measurement problems

Table 2. Significant changes recommended, by highest action level

	Threats	*Shows/Alerts*	*Seizures*	*Attacks/Clashes*	*Declare/Join War*	*Other*	*Total*
Could not find	3	2	6	6	1	1	19
Drop	35	28	53	85	8	36	245
Merge	2	5	11	44	2	8	72
Major change	6	24	19	143	16	21	229

- Differences in coding and coding errors change the variance!
- Measurement matters; us theory to define best proxy.
- Use other similar measures for robustness (second best proxies).
- Assess bias from second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

Common measurement problems

Table 7. Reanalysis of Weeks (2008, Table 4)

	Original MID Data				*Revised MID Data*			
	(Model 1) Nondemocracies base category	*(Model 2) Democracies base category*	*(Model 3) Bilateral disputes only*	*(Model 4) Nondemocracies; personalists base*	*(Model 1) Nondemocracies base category*	*(Model 2) Democracies base category*	*(Model 3) Bilateral disputes only*	*(Model 4) Nondemocracies; personalists base*
Democratic (<2 years)	−0.400*				−0.018			
	(0.171)				(0.210)			
Perosnalist		0.911***	0.707**			0.407	0.441	
		(0.209)	(0.219)			(0.249)	(0.232)	

- Differences in coding and coding errors change the variance!
- Measurement matters; us theory to define best proxy.
- Use other similar measures for robustness (second best proxies).
- Assess bias from second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

Common measurement problems

Table 7. Reanalysis of Weeks (2008, Table 4)

	Original MID Data				*Revised MID Data*			
	(Model 1) Nondemocracies base category	*(Model 2) Democracies base category*	*(Model 3) Bilateral disputes only*	*(Model 4) Nondemocracies; personalists base*	*(Model 1) Nondemocracies base category*	*(Model 2) Democracies base category*	*(Model 3) Bilateral disputes only*	*(Model 4) Nondemocracies; personalists base*
Democratic (<2 years)	−0.400*				−0.018			
	(0.171)				(0.210)			
Perosnalist		0.911***	0.707**			0.407	0.441	
		(0.209)	(0.219)			(0.249)	(0.232)	

- Differences in coding and coding errors change the variance!
- Measurement matters; us theory to define best proxy.
- Use other similar measures for robustness (second best proxies).
- Assess bias from second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

Common measurement problems

Table 7. Reanalysis of Weeks (2008, Table 4)

	Original MID Data				*Revised MID Data*			
	(Model 1) Nondemocracies base category	*(Model 2) Democracies base category*	*(Model 3) Bilateral disputes only*	*(Model 4) Nondemocracies; personalists base*	*(Model 1) Nondemocracies base category*	*(Model 2) Democracies base category*	*(Model 3) Bilateral disputes only*	*(Model 4) Nondemocracies; personalists base*
Democratic (<2 years)	−0.400*				−0.018			
	(0.171)				(0.210)			
Perosnalist		0.911***	0.707**			0.407	0.441	
		(0.209)	(0.219)			(0.249)	(0.232)	

- Differences in coding and coding errors change the variance!
- Measurement matters; us theory to define best proxy.
- Use other similar measures for robustness (second best proxies).
- Assess bias from second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

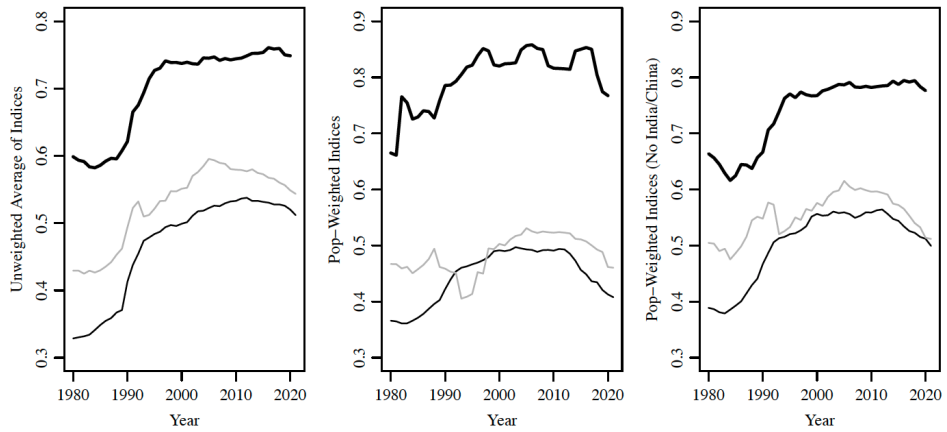
An example: considerations for measuring democracy

Table 6. Pairwise correlation coefficients. Bottom left: for all observations; top right: only observations coded in all datasets. Number of observations in parentheses below.

	Polity2	Polyarchy	FHI
Polity2	1	0.9083 (6546)	0.8889 (6546)
Polyarchy	0.8661 (11,781)	1	0.9219 (6546)
FHI	0.8892 (6580)	0.9200 (6902)	1

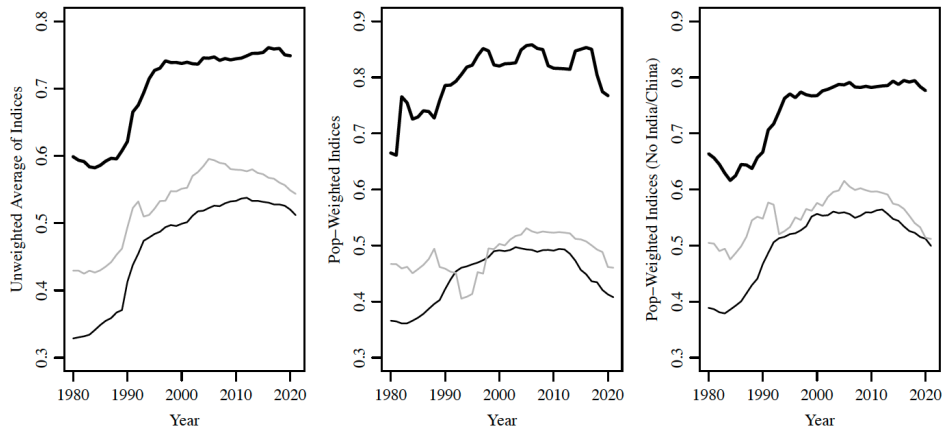
- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

An example: considerations for measuring democracy



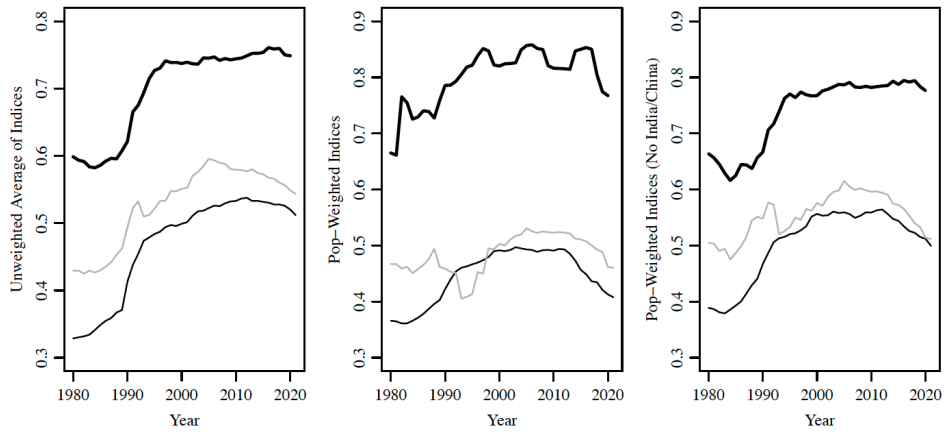
- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

An example: considerations for measuring democracy



- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

An example: considerations for measuring democracy



- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

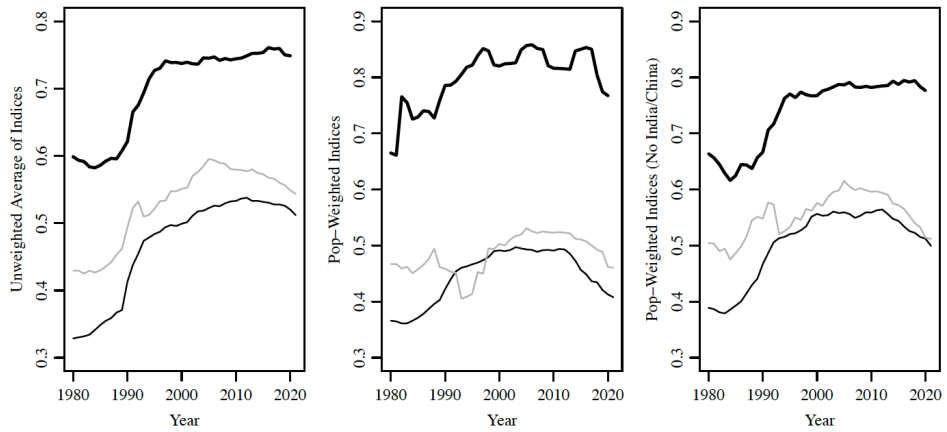
An example: considerations for measuring democracy

Table 6. Pairwise correlation coefficients. Bottom left: for all observations; top right: only observations coded in all datasets. Number of observations in parentheses below.

	Polity2	Polyarchy	FHI
Polity2	1	0.9083 (6546)	0.8889 (6546)
Polyarchy	0.8661 (11,781)	1	0.9219 (6546)
FHI	0.8892 (6580)	0.9200 (6902)	1

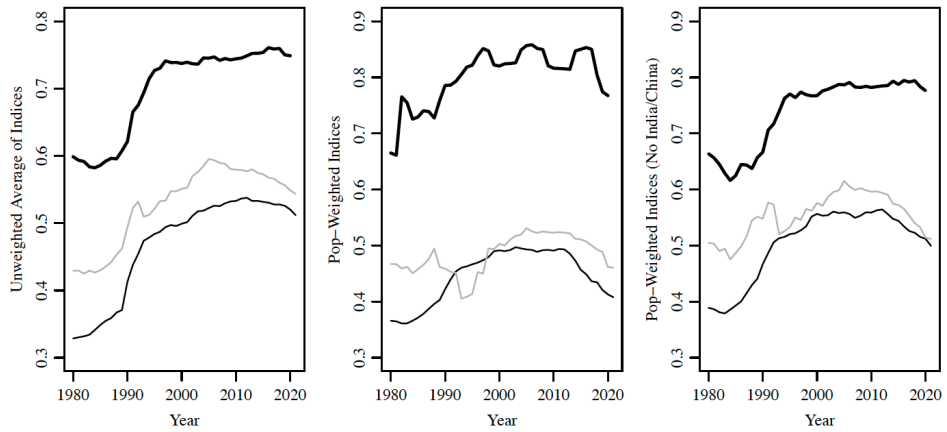
- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

An example: considerations for measuring democracy



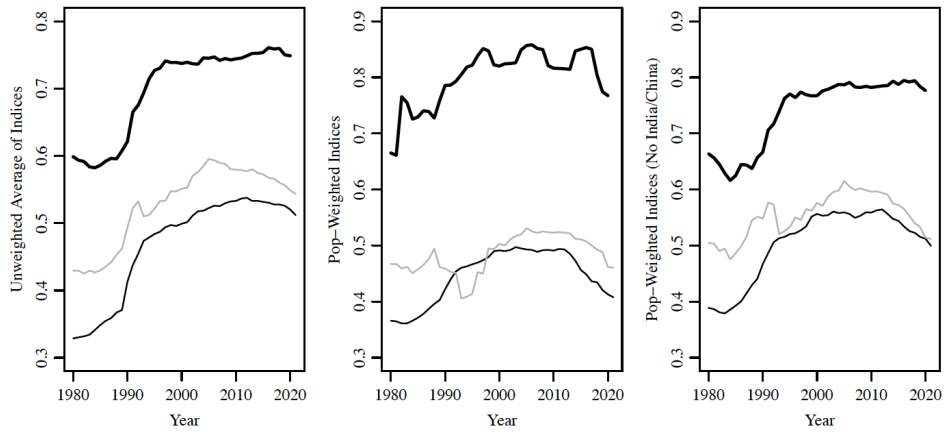
- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

An example: considerations for measuring democracy



- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

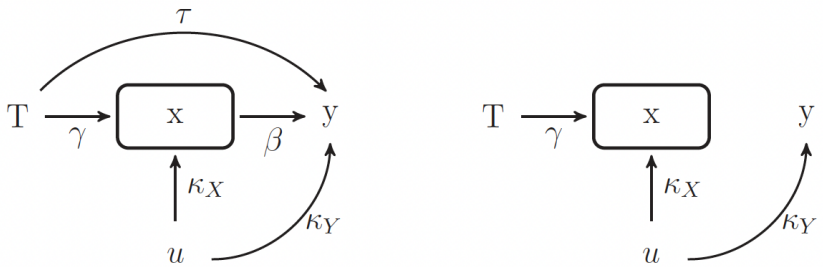
An example: considerations for measuring democracy



- Binary (Pzeworski)? Categorical? Continuous index (V-DEM)?
  - Ordinality? Cardinality? Comparability? Aggregation?
- What is being measured? Commensurate with theory?
  - Anocracies relevant? Interregnum or transition periods?
- Use other similar measures for robustness (second best proxies).
- Assess bias from other second best proxies using theory.
  - Attenuation? Omitted variable bias? Post-treatment ME?

Analyzing post-treatment ME: DAGs, sensitivity, controlling ME

FIGURE 2 Causal Graph When Covariate Is a Posttreatment Variable



(a) Researcher-assumed causal model (b) Actual causal model

- DAGs can be used as a theoretical representation ("toy" model).

Analyzing post-treatment ME: DAGs, sensitivity, controlling ME

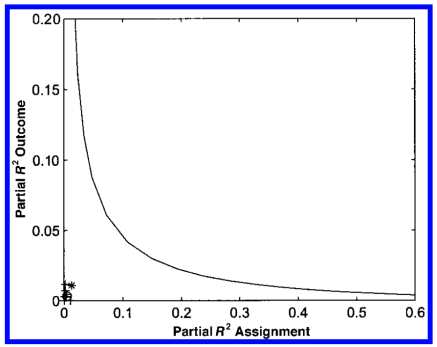


FIGURE 1. LALONDE EXPERIMENTAL SAMPLE

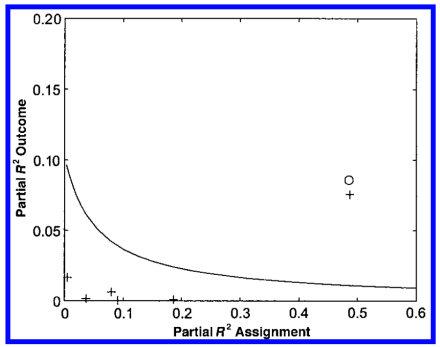
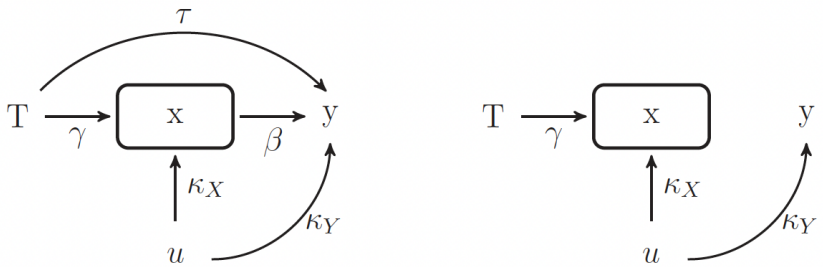


FIGURE 3. LALONDE NONEXPERIMENTAL GAIN SAMPLE

- DAGs can be used as a theoretical representation ("toy" model).
- Use partial R^2 to analyze sensitivity to measurement error.

Analyzing post-treatment ME: DAGs, sensitivity, controlling ME

FIGURE 2 Causal Graph When Covariate Is a Posttreatment Variable

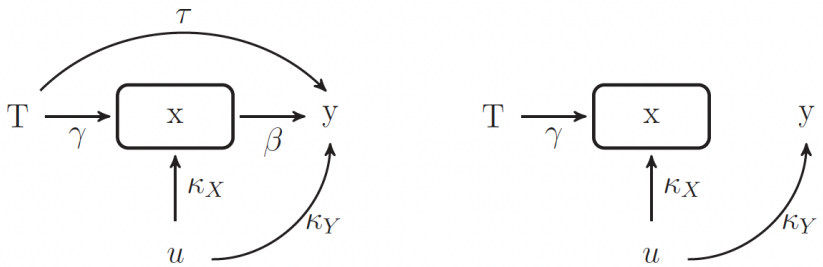


(a) Researcher-assumed causal model (b) Actual causal model

- DAGs can be used as a theoretical representation ("toy" model).
- Use partial R^2 to analyze sensitivity to measurement error.
- Matching on post-treatment to control for mechanisms.

Analyzing post-treatment ME: DAGs, sensitivity, controlling ME

FIGURE 2 Causal Graph When Covariate Is a Posttreatment Variable



(a) Researcher-assumed causal model (b) Actual causal model

- DAGs can be used as a theoretical representation ("toy" model).
- Use partial R^2 to analyze sensitivity to measurement error.
- Matching on post-treatment to control for mechanisms.
- Problem is absence of sequential non-confoundedness.

Next class...

Intervention, violence, and domestic and international responses!