Interpreting and Critiquing Causal Evidence

Day 1 - Deconstructing an Argument

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Objectives

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5. How can we **Deconstruct** a Political Science Paper?

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2. What **Evidence** strengthens an Explanation?
3. What Types of **Causation** are there?
4. How do we reach **Consistent** Conclusions?
5. How can we **Deconstruct** a Political Science Paper?
6. What Types of **Critiques** of an Argument can we make?

Section 1

Explanation

Causal Evidence

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Does development lead to democracy?	"No, democracy causes development"
Does democracy prevent war?	"Of course not, India and Pakistan were democracies and had a war in 1999"
Did voters support President Trump because of jobs lost to immigration?	"Obviously not, jobs were lost to technological change"

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  - The 'chain of causation'
- If D explains Y, we are saying that the *absence* of D would have led to a different outcome - a different value of Y
- There exists a 'counterfactual' possibility that did not happen

What makes an Explanation Convincing?

- Explanation requires:
  1. Theory
  2. Evidence

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- No! We do not know if the laptop, the charger, the adapter or the socket is the problem. We do not have a *theory* to support our solution
- Next time the laptop fails to charge, our wiggling might not be enough and we won't know how to fix it

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  - Note we cannot *reject* the theory - it may be that both sockets are broken
- We can design other tests to check the laptop, charger, adapter etc.

What makes an Explanation Convincing?

- We might arrive at an explanation like:
  - The socket works fine with other laptops
  - The laptop and charger work fine in newer sockets that don't require an international adapter
  - The problem is the same using alternative international adapters
  - Therefore, when an international adapter is used, the electrical connection between the wires is weak and unreliable, preventing the laptop from charging reliably.

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10. **Policy-relevance** - Can the argument help us design better policy?

Section 2

Evidence

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- A **Convincing Explanation** requires evidence that supports a *specific* theory
  - And *rejects other theories*

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- Some tests are more informative than others
  - If your friend plugs their own laptop and charger into the socket and it charges fine, we can rule out the socket being a problem
  - But we still do not know if your own laptop or charger are the problem
- We need to design tests (produce evidence) that *distinguish between* specific theories

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  4. **Doubly Decisive Test**: Can confirm a hypothesis and reject all other hypotheses
     - If we test the charger with an entirely new socket and laptop that we have previously checked work, *and* similarly for the socket and laptop

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- **Hypothesis:** The introduction of mobile phone service

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- **Hypothesis:** The introduction of mobile phone service
- **Theory:** Mobile phones allowed people to quickly share the price of fish in different villages, so fishermen got the best prices more consistently
  - Jensen et al (2007): Compare price dispersion with the timing of the introduction of new mobile phone masts
  - A 'smoking gun' test at least

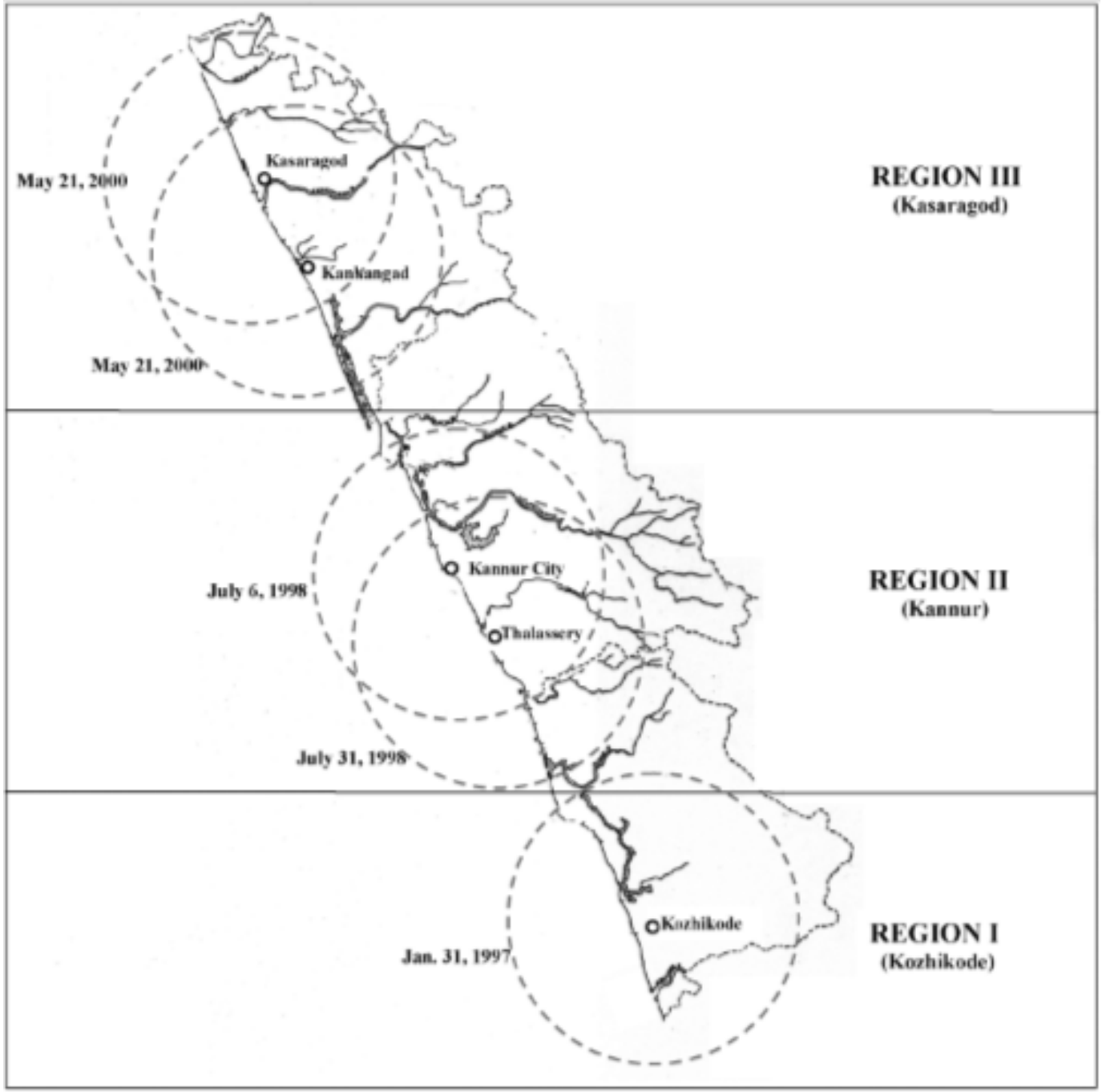

FIGURE II
Spread of Mobile Phone Coverage in Kasaragod, Kannur, and Kozhikode Districts

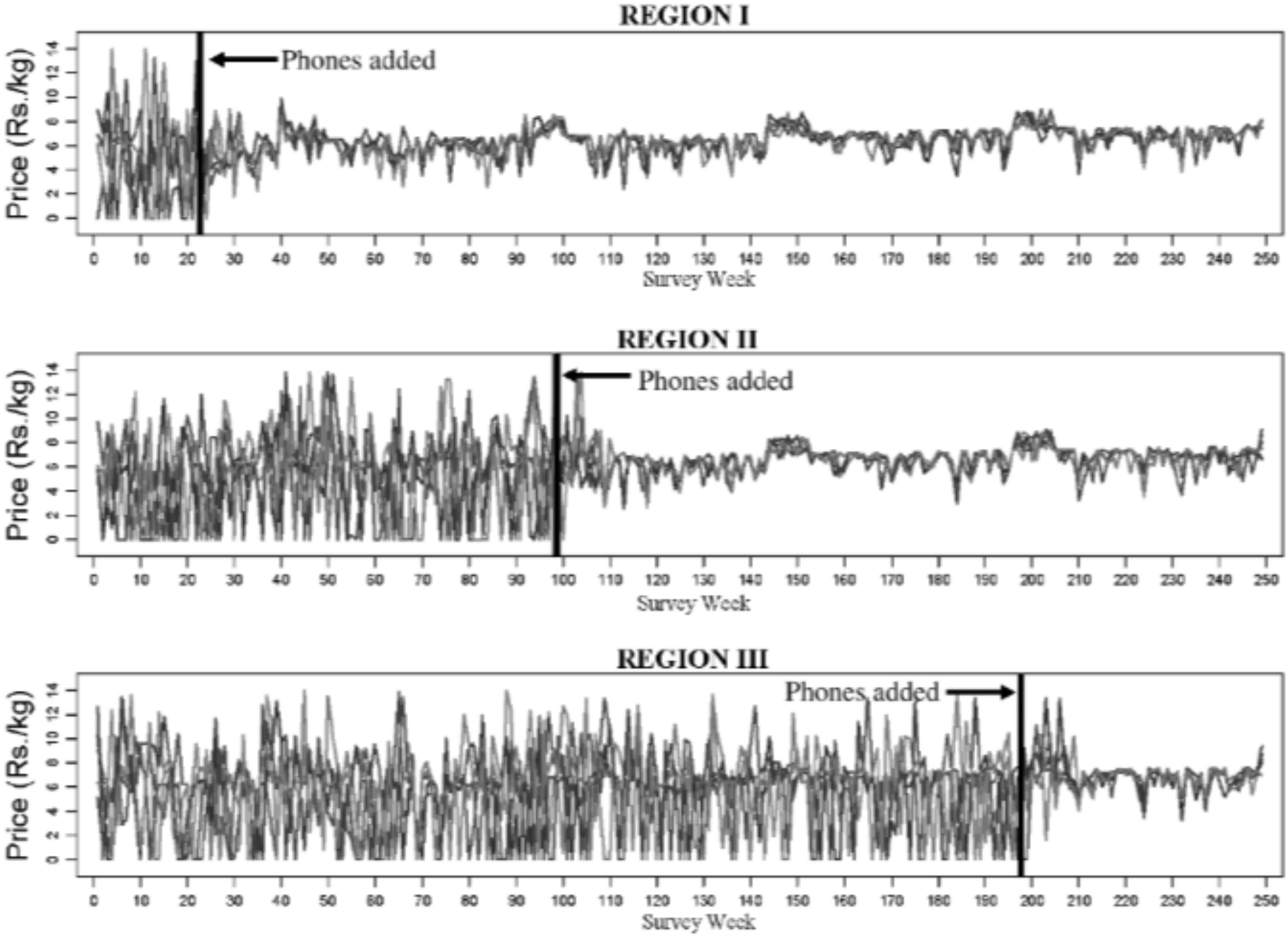

FIGURE IV

Prices and Mobile Phone Service in Kerala

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6. **Transparency** - Do the data tell us about the mechanism connecting D and Y?
7. **Replicability** - Can we take the same (or similar) data and reach the same conclusion?

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  1. Humans are complex and unpredictable, unlike the natural sciences
  2. Societies are even more complex interactions of millions of humans
  3. Everyone has an opinion, including researchers
  4. Ethical constraints on the data we can gather
  5. Political explanations in one place may not work in another

Section 3

Causation

Types of Causation

- When my laptop was not charging, I tried an alternative charger and it worked. But I came back later to use the same charger and it did not work!

Types of Causation

- When my laptop was not charging, I tried an alternative charger and it worked. But I came back later to use the same charger and it did not work!
- The charger only worked about half of the time

Types of Causation

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- Most causes operate only if certain other hard-to-measure conditions are in place
- That means we need to treat causation as **probabilistic**
- For example, a left-wing party in government may not guarantee the passage of social welfare legislation
  - But it can make it more likely

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Probabilistic Explanation

- If *D* happens, the **probability** of *Y* increases

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Deterministic Explanation

- **Sufficient conditions:** Every time D happens, Y happens
- **Necessary conditions:** Y does not happen if D does not happen ('*but for*')

Probabilistic Explanation

- If D happens, the **probability** of Y increases
- Treatment effects are a distribution, not a single value

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6. **Path-Dependent Causation** - If $D1$ in $t = 1$ and $D2$ in $t = 5$ then Y in $t = 5$

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6. **Path-Dependent Causation** - If $D1$ in $t = 1$ and $D2$ in $t = 5$ then Y in $t = 5$
7. **Granger Causation** - If D causes Y, D must occur before Y in time

Causal Diagrams

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- Technically, "Directed Acyclical Graphs" (DAGs)

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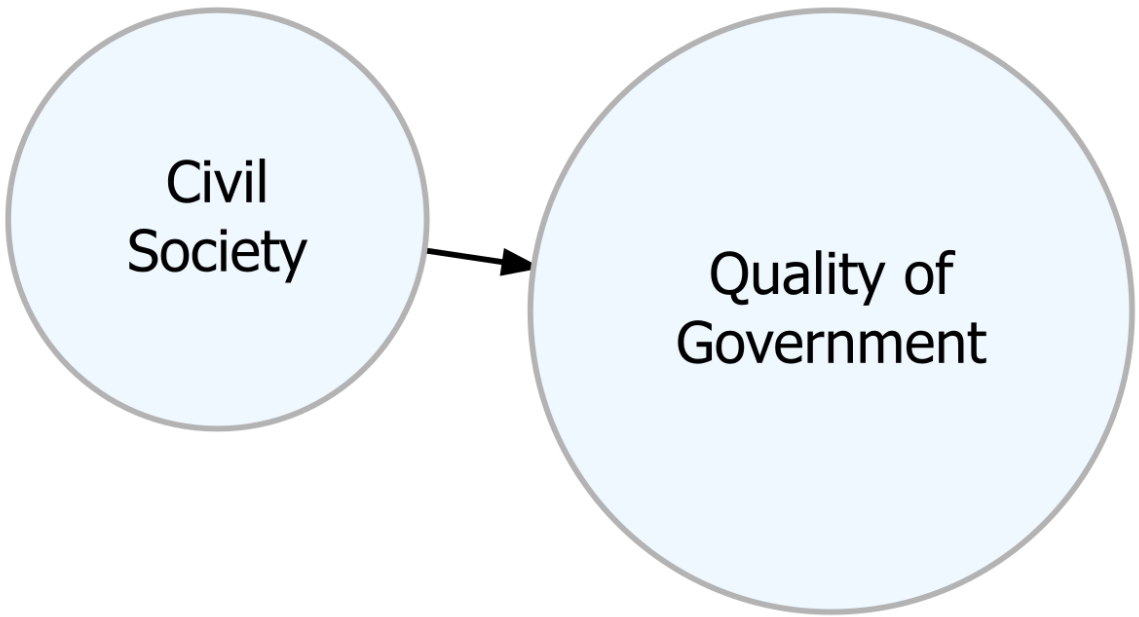
  - And also the *threats* to the author's argument
    - Even if they can't be measured

Causal Diagrams



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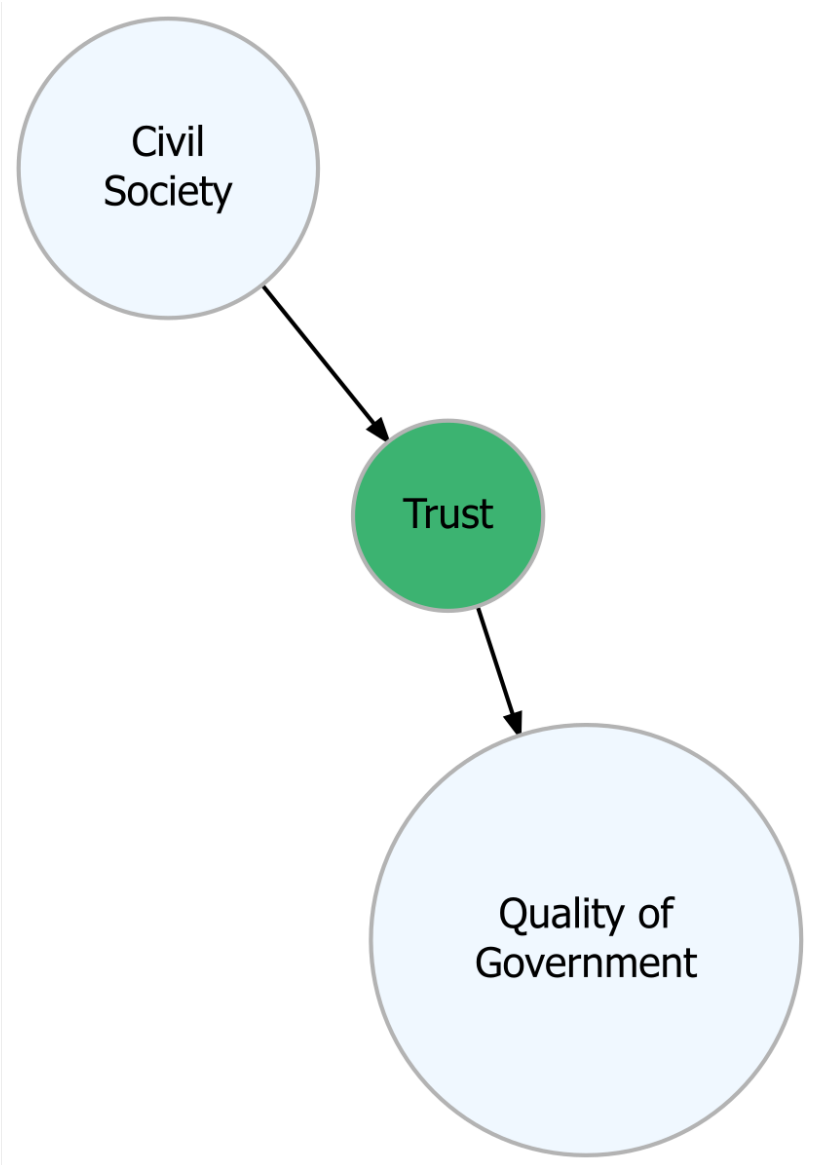

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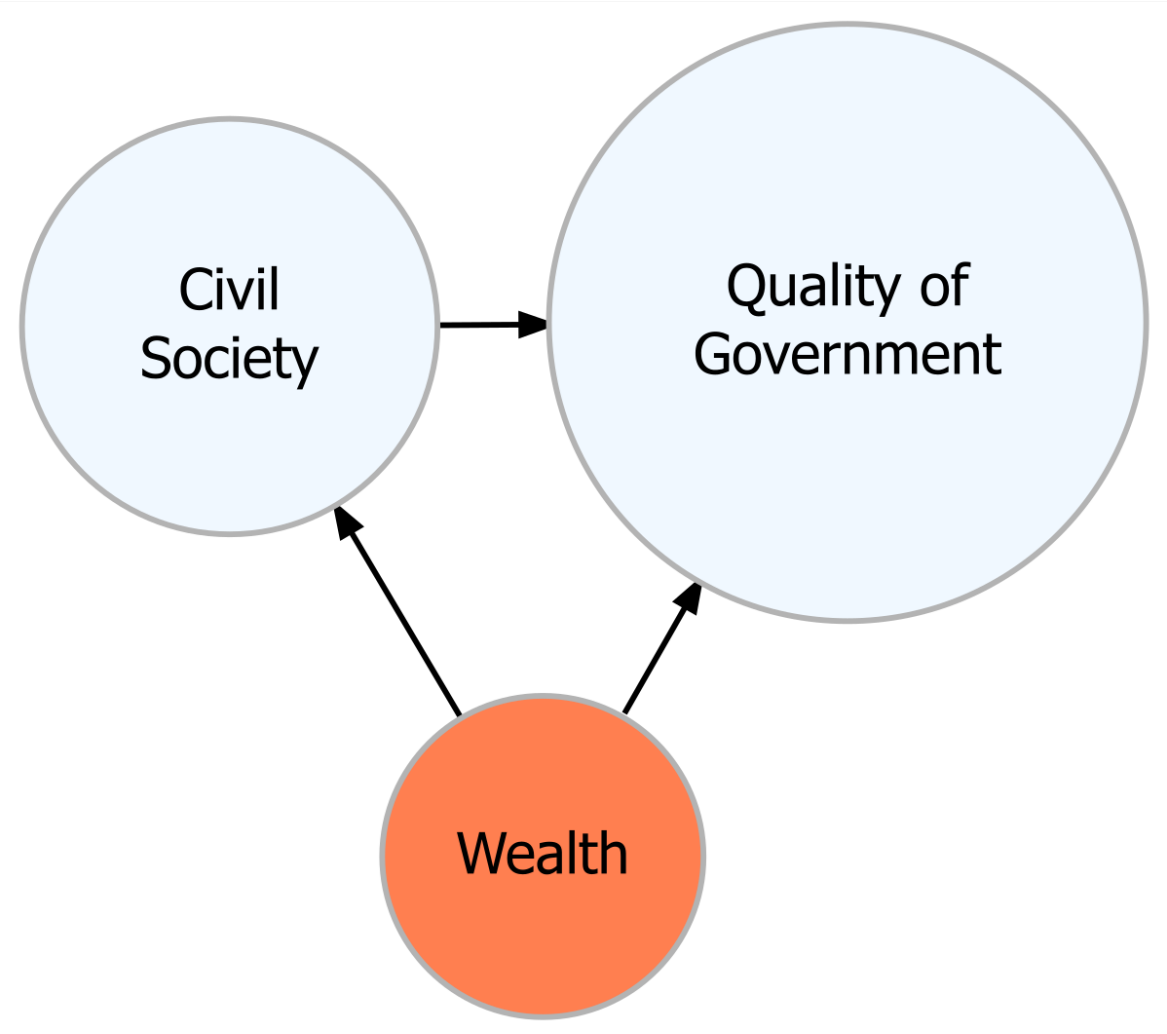

Causal Diagrams

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Causal Diagrams

- We can always break causal connections into smaller chunks
- At some point we rely on theory to provide the causal power:
  - Physical processes (gravity, momentum)
  - Behavioural theory (incentives, psychology)

Types of Explanation

- Two perspectives on explanation:

Types of Explanation

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Causes of Effects	**Effects of Causes**
What caused Y?	Does D cause Y?
Why does Switzerland have so many Nobel laureates?	Does chocolate cause more Nobel laureates?
Backward-looking	Forward-looking

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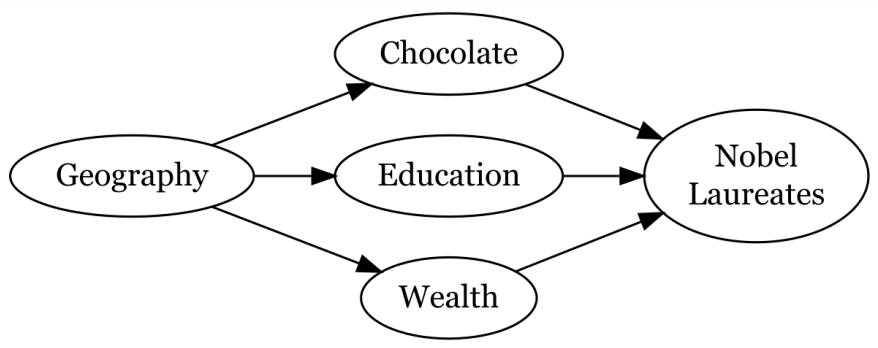

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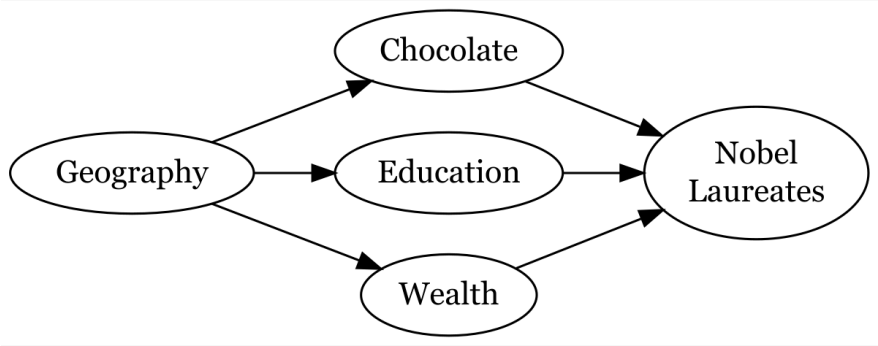

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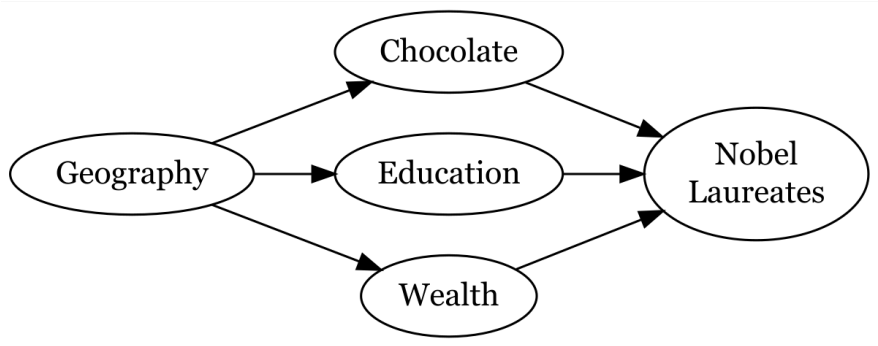

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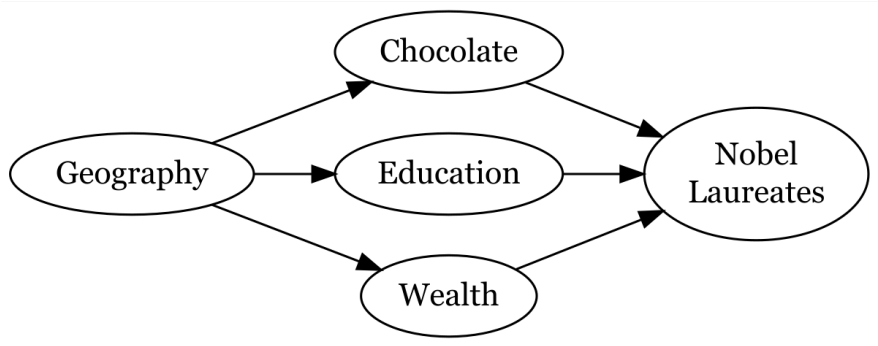

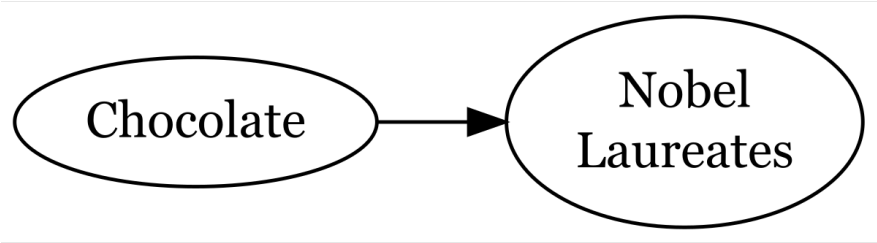

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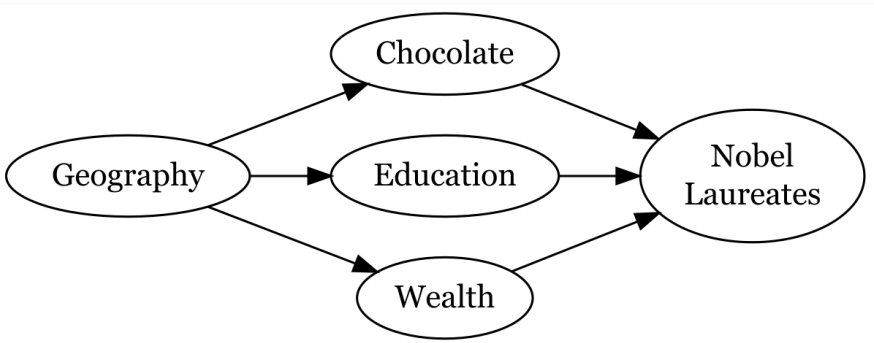

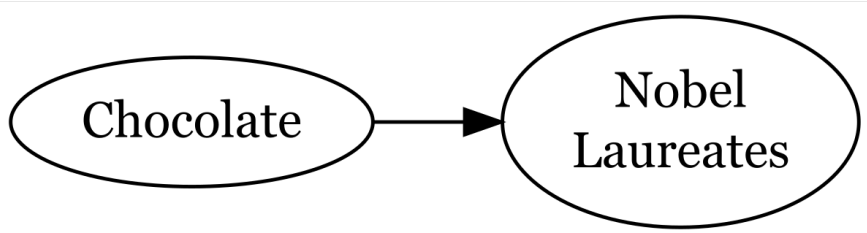

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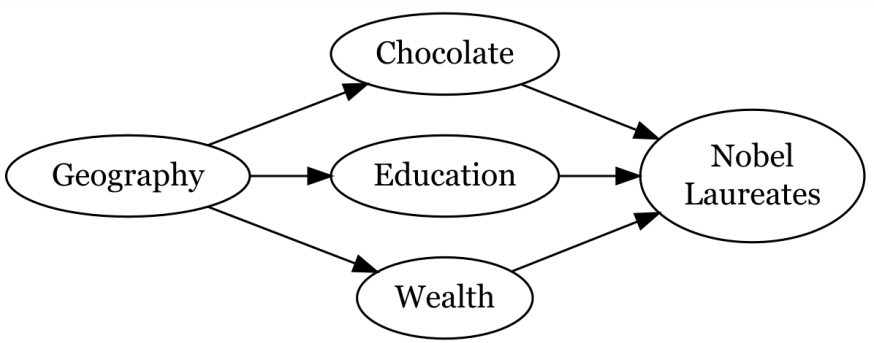

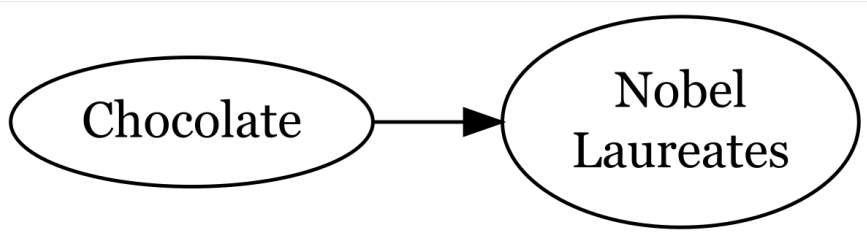

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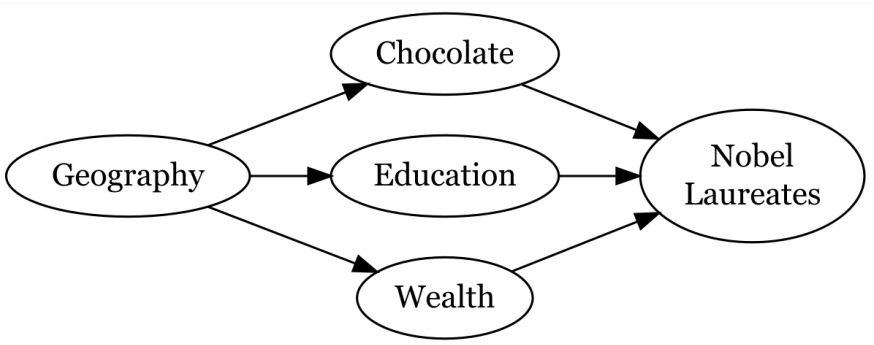

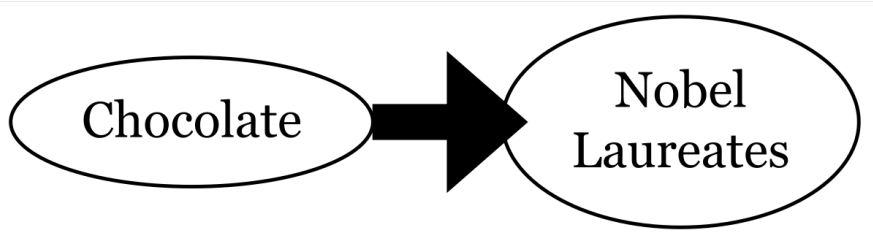

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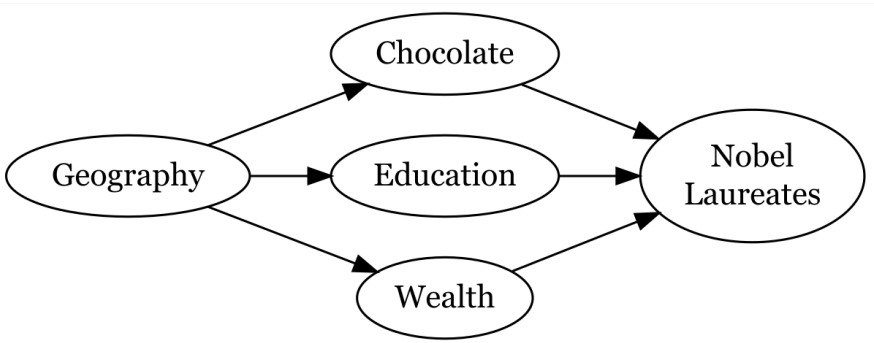

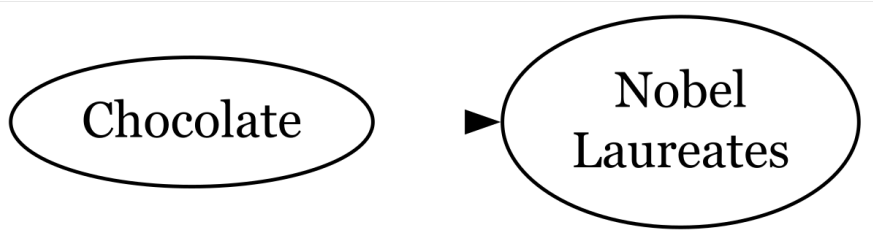

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Section 4

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  - $\forall p : h, h \Rightarrow p$
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  - My laptop has always charged fine on Thursdays. So if I wait until Thursday, it will work again.

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  3. **False dichotomy**: Restricting the possible options to only two
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  4. **Circular reasoning**: The conclusions just restate the premises
     - Eg. "Abortion should be legal because women have the right to an abortion."

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     - Eg. "All of my friends support party X so of course they will win the election"

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  6. **Appeal to Authority**: Assuming the author is right because they are senior
     - Eg. Assuming that political science professors know what they are doing!

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     - Eg. "If someone stands up at a football match, they can see better. Therefore, if everyone stands up, they can all see better."
  8. **Appeal to ignorance**: Absence of evidence is not evidence of absence
     - Eg. "There is no evidence that social distancing can reduce the transmission of coronavirus, therefore is does not work"

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- Of course the other possibility is that the **premise is false**
  - That the explanatory variable/assumption is not present in a specific case
  - But that's a different critique

Section 5

Deconstructing Papers

Deconstructing a Political Science Paper

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  - What is the **scope** of the argument's application?
- Critiques depend on understanding the building blocks of an argument

Deconstructing a Political Science Paper

High school education is central to adolescent socialization and has important downstream consequences for adult life. However, scholars examining schooling's political effects have struggled to reconcile education's correlation with both more liberal social attitudes and greater income. To disentangle this relationship, I exploit a major school leaving age reform in Great Britain that caused almost half the population to remain at high school for at least an additional year. Using a fuzzy regression discontinuity design, I find that each additional year of late high school increases the probability of voting Conservative in later life by 12 percentage points. A similar relationship holds when pooling all cohorts, suggesting that high school education is a key determinant of voting behavior and that the reform could have significantly altered electoral outcomes. I provide evidence suggesting that, by increasing an individual's income, education increases support for right-wing economic policies, and ultimately the Conservative party.

(Marshall 2015)

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  - **Role of Variables** - Which is the outcome variable and which the explanatory? What controls are used?

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  - **Evidence** - What evidence does the methodology produce?

Title:

Authors: **Year:**

Research Question:

Answer/Causal Argument:

Scope of Argument (in Time, Space, Demographics etc.)**:**

Concept/Variable	Measure	Unit of Analysis	Role (DV, XV, Control)

Theory:

Evidence:

Methodology:

- ❑ Case Study, Process Tracing
- ❑ Comparative Cases
- ❑ Regression with Controls
- ❑ Matching
- ❑ Field Experiment
- ❑ Lab/Survey Experiment
- ❑ Natural Experiment
- ❑ Instrumental Variable
- ❑ Regression Discontinuity
- ❑ Difference-in-Differences

Title: Making Democracy Work

Authors: Robert Putnam **Year:** 1993

Research Question: Why are some parts of Italy governed better than others?

Answer/Causal Argument: Places with more civic social interactions have better government

Scope of Argument (in Time, Space, Demographics etc.): Advanced Democracies

Concept/Variable	Measure	Unit of Analysis	Role (DV, XV, Control)
Civil Society	Density of sports clubs, newspapers, electoral turnout	Region	Explanatory Variable
Government Performance	12 Indicators, eg. Budget on time, number of day care centres per child	Region	Dependent Variable
Wealth	GDP per capita	Region	Control Variable

Theory: Civic interactions between people and groups create trust and more 'horizontal' relationships that prevent government from being predatory

Evidence: Regions of Italy with similar institutional rules and similar wealth but with more civil society have, on average, better performing government

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Fundamental Critiques

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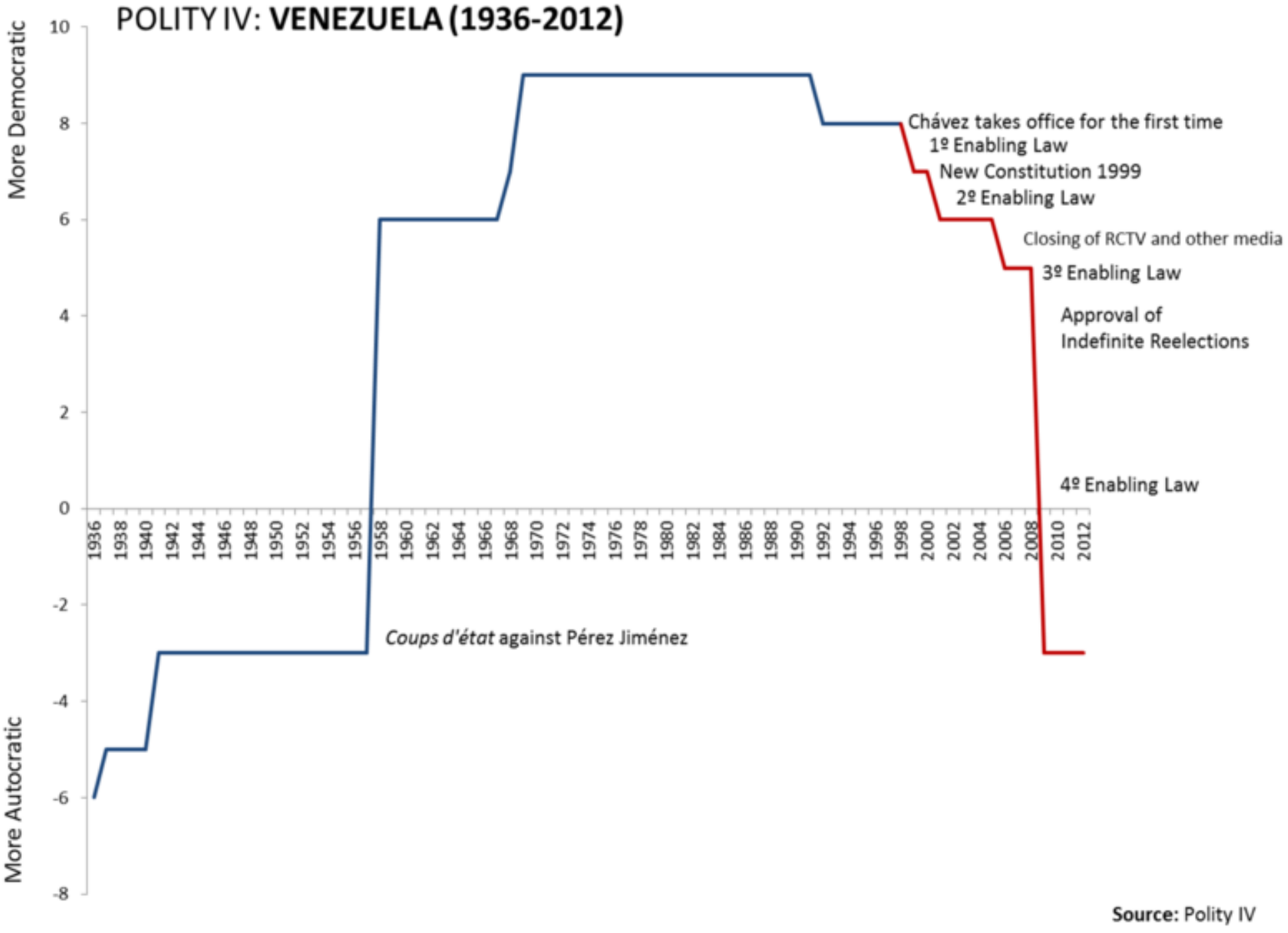
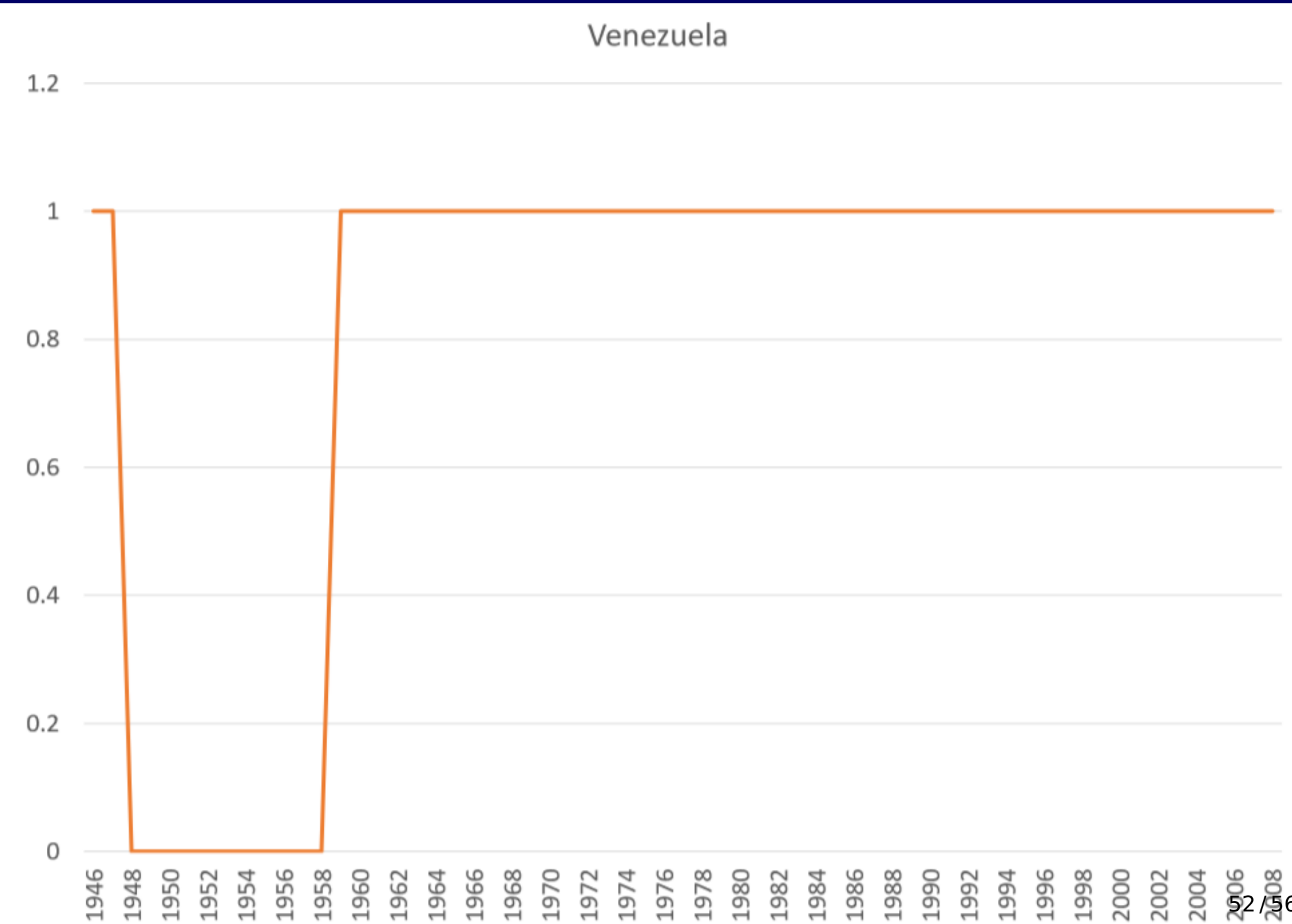
- When scores "meaningfully capture the ideas contained in the corresponding concept"
  - Does the scale make sense?
  - Is democracy binary or continuous? Positive or negative?
  - Are the cases (units) scored correctly? How reliable is the scoring?


POLITY IV: VENEZUELA (1936-2012)
More Democratic
More Autocratic
10
8
6
4
2
0
-2
-4
-6
-8
1936
1938
1940
1942
1944
1946
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Chávez takes office for the first time
1º Enabling Law
New Constitution 1999
2º Enabling Law
Closing of RCTV and other media
3º Enabling Law
Approval of
Indefinite Reelections
4º Enabling Law
Coups d'état against Pérez Jiménez
Source: Polity IV


Venezuela
1.2
1
0.8
0.6
0.4
0.2
0
1946
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008

Fundamental Critiques

- **Unit of Analysis**

Fundamental Critiques

- **Unit of Analysis**
- Does the unit of analysis match the theory?

Fundamental Critiques

- **Unit of Analysis**
- Does the unit of analysis match the theory?
- Would the argument work at an alternative level of analysis?

Fundamental Critiques

- **Unit of Analysis**
- Does the unit of analysis match the theory?
- Would the argument work at an alternative level of analysis?
- Eg. Should we use annual data to assess the effect of Trump's tweets on the stock market?

Fundamental Critiques

- **Theory**

Fundamental Critiques

- **Theory**
- Is the theory internally consistent?

Fundamental Critiques

- **Theory**
- Is the theory internally consistent?
- Is the theory falsifiable?

Fundamental Critiques

- **Theory**
- Is the theory internally consistent?
- Is the theory falsifiable?
- Is the theory portable?

Fundamental Critiques

- **Evidence**

Fundamental Critiques

- **Evidence**
- Where did the dataset come from?

Fundamental Critiques

- **Evidence**
- Where did the dataset come from?
  - Sampling strategy

Fundamental Critiques

- **Evidence**
- Where did the dataset come from?
  - Sampling strategy
  - Questionnaire and survey protocol

Fundamental Critiques

- **Evidence**
- Where did the dataset come from?
  - Sampling strategy
  - Questionnaire and survey protocol
  - Data entry, cleaning

Fundamental Critiques

- **Evidence**
- Where did the dataset come from?
  - Sampling strategy
  - Questionnaire and survey protocol
  - Data entry, cleaning
  - Statistics/statistical model chosen

Fundamental Critiques

- **Evidence**
- Where did the dataset come from?
  - Sampling strategy
  - Questionnaire and survey protocol
  - Data entry, cleaning
  - Statistics/statistical model chosen
- What was the "Data Generating Process"?
- How does this data help us answer the question?

Fundamental Critiques

- **Methodologies/Research Designs** for gathering evidence:

Fundamental Critiques

- **Methodologies/Research Designs** for gathering evidence:
- Observational Studies:
  - Comparative Cases

Fundamental Critiques

- **Methodologies/Research Designs** for gathering evidence:
- Observational Studies:
  - Comparative Cases
  - Regression with controls

Fundamental Critiques

- **Methodologies/Research Designs** for gathering evidence:
- Observational Studies:
  - Comparative Cases
  - Regression with controls
  - Matching
- Methodologies for gathering evidence:

Fundamental Critiques

- **Methodologies/Research Designs** for gathering evidence:
- Observational Studies:
  - Comparative Cases
  - Regression with controls
  - Matching
- Methodologies for gathering evidence:
- Experimental Studies:

Fundamental Critiques

- **Methodologies/Research Designs** for gathering evidence:
- Observational Studies:
  - Comparative Cases
  - Regression with controls
  - Matching
- Methodologies for gathering evidence:
- Experimental Studies:
  - Field Experiment

Fundamental Critiques

- **Methodologies/Research Designs** for gathering evidence:
- Observational Studies:
  - Comparative Cases
  - Regression with controls
  - Matching
- Methodologies for gathering evidence:
- Experimental Studies:
  - Field Experiment
  - Lab/Survey Experiment

Methodology

- Methodologies for gathering evidence:

Methodology

- Methodologies for gathering evidence:
- Quasi-Experimental Studies:

Methodology

- Methodologies for gathering evidence:
- Quasi-Experimental Studies:
  - Natural Experiment

Methodology

- Methodologies for gathering evidence:
- Quasi-Experimental Studies:
  - Natural Experiment
  - Instrumental Variable

Methodology

- Methodologies for gathering evidence:
- Quasi-Experimental Studies:
  - Natural Experiment
  - Instrumental Variable
  - Regression Discontinuity

Methodology

- Methodologies for gathering evidence:
- Quasi-Experimental Studies:
  - Natural Experiment
  - Instrumental Variable
  - Regression Discontinuity
  - Difference-in-Differences
- Small-N Studies:

Methodology

- Methodologies for gathering evidence:
- Quasi-Experimental Studies:
  - Natural Experiment
  - Instrumental Variable
  - Regression Discontinuity
  - Difference-in-Differences
- Small-N Studies:
  - Comparative cases

Methodology

- Methodologies for gathering evidence:
- Quasi-Experimental Studies:
  - Natural Experiment
  - Instrumental Variable
  - Regression Discontinuity
  - Difference-in-Differences
- Small-N Studies:
  - Comparative cases
  - Process Tracing