

Lecture 5

Institutions II

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History of Economic Growth and Crises
24 January 2023

- ① The Malthusian Era
- ② Fundamental causes of growth
 - ① Geography
 - ② Culture
 - ③ **Institutions**
 - ① overview of European colonialism
 - ② examples: Conquistadores, Jamestown, Moluccas, slave trade
 - ③ the long-run impact of colonial institutions
- ③ Innovation and crises
- ④ Unleashing talent

- Last time, we discussed how long-distance trade affected European institutions
 - the rise and decline of inclusive institutions in medieval Venice
 - (the impact of Atlantic trade on English and Dutch institutions)
- Today, we turn to the impacts on the newly “discovered” places

European colonialism: timeline

- 15th century
 - Portuguese and Spanish exploration of the Americas, and the coasts of Africa, the Middle East, India, and East Asia.
- 16th and 17th centuries
 - England, France, the Dutch establish overseas empires
- End of the 18th, early 19th century
 - the first decolonization: most of the Americas
 - Spain irreversibly weakened
 - UK, France, Portugal, the Dutch turned their attention to Africa, India, South East Asia

[\[map\]](#)

- 19th century
 - “New Imperialism”: pace of colonization rapidly accelerated
 - Scramble for Africa: included also Belgium and Germany
- After World War I
 - colonies of the losers distributed amongst the victors
- After World War II
 - second phase of decolonization
- Next: examples of European colonial institutions

[\[map\]](#)

Example 1: Conquistadores

Acemoglu, Robinson (2012, Ch. 1)



- In the early 16th century, the “conquistadores” colonized much of the Latin America
 - The two most (in)famous examples: Hernán Cortés (conqueror of the Aztec Empire), Francisco Pizarro (the Incan Empire)
- Strategy: capture the indigenous leader, loot, set yourself as the new elite, coerce labor
 - many systems: *encomienda*, *mita*, *repartimiento de mercancías*, *trajín*
 - pushed the ingenious people to subsistence level by expropriating their land, forcing work for low wages, imposing high tariffs and forcing them to buy goods for high prices

Example 2: Jamestown

Acemoglu, Robinson (2012, Ch. 1)

- England was a late-comer to colonializing Americas
 - rich and densely populated South America already taken
→ had to settle for the North
- Jamestown founded in 1607 by the Virginia Company
 - plan to coerce local labor; turned out to be impossible
 - attempts to trade with the locals; turns out to be hard
 - ... and gold and silver were nowhere to be found
- Winter of 1609/1610
 - locals refuse to trade food
 - only six men (out of 500) survive the winter

Example 2: Jamestown

Acemoglu, Robinson (2012, Ch. 1)

- Virginia Company introduces a new strategy in 1610
 - draconian work regime for the English settlers
 - but coercing the settlers turns out to be impossible, too

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 - but coercing the settlers turns out to be impossible, too
- The “headright system” introduced in 1618
 - each settler given 50 acres of land and their houses, freed from their contracts
 - General Assembly in 1619: all adult men given a say in the laws and institutions governing the colony
- Similar developments with later North American colonies
 - by 1720s all 13 colonies that would become the U.S. had similar structures of government

Example 3: the Moluccas

Acemoglu, Robinson (2012, Ch. 9)



- 1498: Vasco da Gama reaches India
- 1511: Portuguese capture Melaka
- 1599: the Dutch arrive
- 1602: the **Dutch East India Company (VOC)** founded
- 1605–: the Dutch start take over the area

Example 3: the Moluccas

Acemoglu, Robinson (2012, Ch. 9)

- Ambon
 - old institutions: citizens own tribute to the ruler and are subject to forced labor
 - Duch institutions: households tied to the soil, obliged to cultivate clove trees, provide forced labor to the Duch
- Banda Islands
 - small states run by village meetings of citizens → no central authority to coerce
→ competition between spice trades

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 - the Dutch solution: genocide followed by a plantation economy distributed to 68 Dutchmen who would buy slaves from VOC

Example 3: the Moluccas

Acemoglu, Robinson (2012, Ch. 9)

- The Dutch spread such practices to the entire region
 - many states reacted by abandoning the production of export crops and ceasing commercial activity (e.g. the Burmese moved their capital from the coast to far inland)
- For VOC, the strategy was extraordinarily profitable
 - by the end of the 17th century, the Dutch had reduced the world supply of spices cultivated in the Moluccas by 60 percent (e.g. the price of nutmeg doubled)

Example 4: Slave trade

Acemoglu, Robinson (2012, Ch. 9)

- Slavery has been present in almost every society
 - Europeans had stopped enslaving each other by 1400
 - early modern era East Africa had vibrant slave trade with North Africa and to the Arabian peninsula
 - early 17th century: establishment of sugar plantation colonies in the Caribbean leads to dramatic escalation of African slavery
- Estimates of Atlantic slave trade
 - 16th century: 300,000 persons
 - 17th century: 1,300,000 persons
 - 18th century: 6,000,000 persons

Example 4: Slave trade

Acemoglu, Robinson (2012, Ch. 9)

- Most slaves were war captives
 - increase in warfare fuelled by the increased demand for slaves
 - and huge imports of guns and ammunitions
- AR argue that slave trade initiated adverse political and cultural processes
 - rise of absolutist polities, organized around selling others
 - destruction of order and legitimate state authority
 - distortion of laws and customs (e.g. Arochukwa oracle)

Example 4: Slave trade

Acemoglu, Robinson (2012, Ch. 9)

- Late 18th century: movement to abolish slavery
 - slave trade made illegal in Britain in 1807 and enforced by stationing naval squadrons in the Atlantic
 - importing slaves prohibited in the US in 1808, but internal slave trade continued until 1860s
- “Legitimate commerce” of exporting commodities from Africa
 - but the products were largely produced by slaves in Africa
 - slavery may have even increased in the 19th century
 - did not vanish with the formal colonialization of entire Africa

Long-term impacts of the slave trade

Nunn (2008)

- Nunn creates data on the number of slaves shipped from each African port using
 - total number of slaves exported (shipping data)
 - ethnicity of slaves from records of sale, slave registers, runaway notices, court records, church records, notarial documents etc.
- **Robust negative association between the number of slaves exported and subsequent economic performance**
 - is this just due to poorest areas selecting into slave trade?
 - unlikely: actually appears that the most developed areas tended to select into the slave trades
 - results similar also when using sailing distances to the nearest locations of demand as an instrumental variable

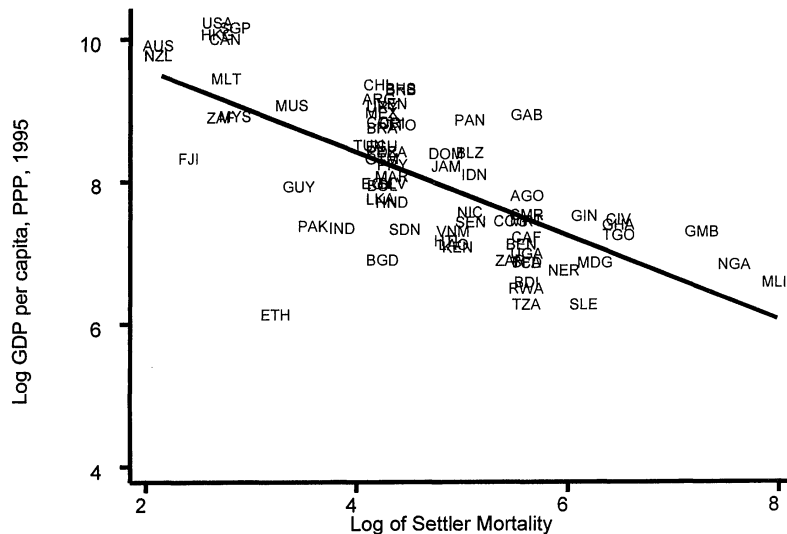
Settler mortality and institutions: hypothesis

Acemoglu, Johnson, Robinson (2001)

- ① Different types of colonization policies
 - extremely "extractive states" (e.g. Belgian Congo)
 - "Neo-Europes" (USA, Canada, Australia, New Zealand)
- ② Colonization strategy influenced by local disease environment
 - "Neo-Europes" not established in high mortality areas
- ③ Colonial institutions persisted even after independence
 - That is, AJR propose the following causal chain
 - (potential) settler mortality → settlement → early institutions
→ current institutions → current economic performance

Settler mortality and (current) GDP per capita

Acemoglu, Johnson, Robinson (2001)



Strong negative correlation between current income per capita and historical settler mortality. Sample: 64 ex-colonies.

Mortality and settlements

Acemoglu, Johnson, Robinson (2001)

- Mortality rates could be very high
 - about half of the early settlers died in a year in West Africa
- ... and they affected settlements
 - the press wrote widely about the mortality rates in the colonies
 - e.g. a committee deciding where to send British convicts rejected Gambia because they decided mortality rates would be too high even for the convicts (they chose Australia instead)

Types of colonization

Acemoglu, Johnson, Robinson (2001)

- Settler colonies
 - lots of Europeans, life modeled after the home country
 - representative institutions which promoted settlers' ability to engage in trade and secured private ownership
 - if did not arise naturally, the settlers successfully fought for them
- Extractive colonies
 - the main objective to obtain gold, other valuables and slaves
 - few constraints on state power
 - much violence, destruction of social and political structures

Institutional persistence

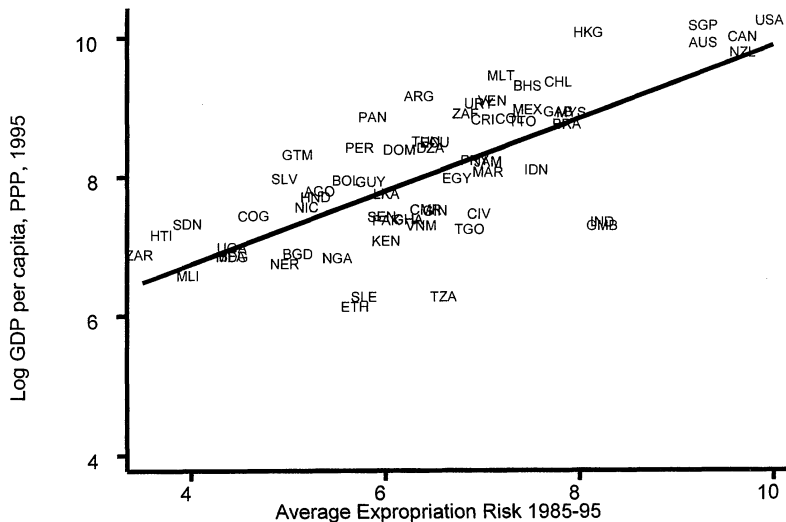
Acemoglu, Johnson, Robinson (2001)

- Many examples of the colonial era institutions persisting
 - property rights in the “Neo-Europes”, Hong Kong, Singapore
 - monopolies in Latin America
 - forced labor in Latin America and Africa
- Possible mechanisms
 - cost of institutional change
 - day-to-day governing often delegated to domestic elite (who remained in power after independence)
 - investments that are complementary to particular institutions

- Current economic performance
 - GDP per capita in 1995 (PPP adjusted)
 - output per worker in 1988 (Hall and Jones, 1999)
- Current institutions
 - protection against expropriation in 1985–1995 (Political Risk Services)
 - constraints on the executive in 1990 (Polity III)
- Early institutions
 - constraints on the executive (Polity III)
 - index of democracy (Polity III)
 - measured either in 1900 or first year of independence
- Other variables
 - fraction of the population of European descent in 1900
 - settler mortality (discussed later)

Current institutions and economic performance

Acemoglu, Johnson, Robinson (2001)



Current institutions and economic performance

Acemoglu, Johnson, Robinson (2001)

| | Whole world (1) | Base sample (2) | Whole world (3) | Whole world (4) | Base sample (5) | Base sample (6) | Whole world (7) | Base sample (8) |
|--|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------------|
| | Dependent variable is log GDP per capita in 1995 | | | | | | Dependent variable is log output per worker in 1988 | |
| Average protection against expropriation risk, 1985–1995 | 0.54 (0.04) | 0.52 (0.06) | 0.47 (0.06) | 0.43 (0.05) | 0.47 (0.06) | 0.41 (0.06) | 0.45 (0.04) | 0.46 (0.06) |
| Latitude | | | 0.89 (0.49) | 0.37 (0.51) | 1.60 (0.70) | 0.92 (0.63) | | |
| Asia dummy | | | | −0.62 (0.19) | | −0.60 (0.23) | | |
| Africa dummy | | | | −1.00 (0.15) | | −0.90 (0.17) | | |
| “Other” continent dummy | | | | −0.25 (0.20) | | −0.04 (0.32) | | |
| R^2 | 0.62 | 0.54 | 0.63 | 0.73 | 0.56 | 0.69 | 0.55 | 0.49 |
| Number of observations | 110 | 64 | 110 | 110 | 64 | 64 | 108 | 61 |

Magnitudes: comparing Nigeria (5.6, roughly at the 25th percentile of the institutional measure) and Chile (7.8, roughly 75th percentile), the first base sample estimate (2) suggests a $(7.8 - 5.6) \times .52 = 1.14$ log-point difference. This corresponds to approximately 2-fold difference, $e^{1.14} - 1 = 2.1$. This GDP gap is actually 2.53 log points (approximately 11-fold). Thus, if the effect estimated in Table 2 were causal, it would imply a fairly large effect of institutions on performance, but still much less than the actual gap between Nigeria and Chile.

Are these associations causal?

Acemoglu, Johnson, Robinson (2001)

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- OLS estimates could be biased upwards because
 - rich countries can afford (or prefer) better institutions
 - unobservable factors affecting both institutions and income
 - institutions measured *ex post*
 - ▶ analysts may have bias in seeing better institutions in richer places

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- ... or downwards due to measurement error
- All problems would be solved with a valid instrument that
 - has an impact on institutions (first-stage)
 - affects income *only* through institutions (exclusion restriction) ▶ IV recap

Settler mortality as an instrumental variable

Acemoglu, Johnson, Robinson (2001)

- Concern: disease environment may directly affect growth
 - if true, exclusion restriction would be violated

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- AJR argue that this is unlikely
 - 80% of settler mortality due to malaria and yellow fever (fatal for Europeans, but most local adults are immune)
 - malaria is not a proxy of some simple geographic or climactic feature of the country: depends as much on the microclimate as temperature, humidity or whether in the tropics

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 - malaria is not a proxy of some simple geographic or climactic feature of the country: depends as much on the microclimate as temperature, humidity or whether in the tropics
- Remaining threats for validity
 - infant mortality may directly affect GDP per capita (recall the Malthusian model discussed in lecture 1)
 - childhood disease environment may affect adult productivity (growing literature on the long-term effects of flu epidemics, vaccinations etc.)

Data on potential settler mortality

Acemoglu, Johnson, Robinson (2001)

- Around 1815: UK, US and France started a systematic effort to understand why so many soldiers were dying in some places
 - by the 1870's, regular reports on the health of soldiers
 - AJR draw from Philip Curtin's work based on these data
- Spain and Portugal did not keep records of mortality
 - data for South America based on mortality rates of bishops
 - party overlaps with Curtin's data → helps for creating a unified dataset
- Note that because settler mortality is used as an instrument, measurement error should not lead to inconsistent estimates

IV approach

Acemoglu, Johnson, Robinson (2001)

The main estimates come from the 2SLS regression

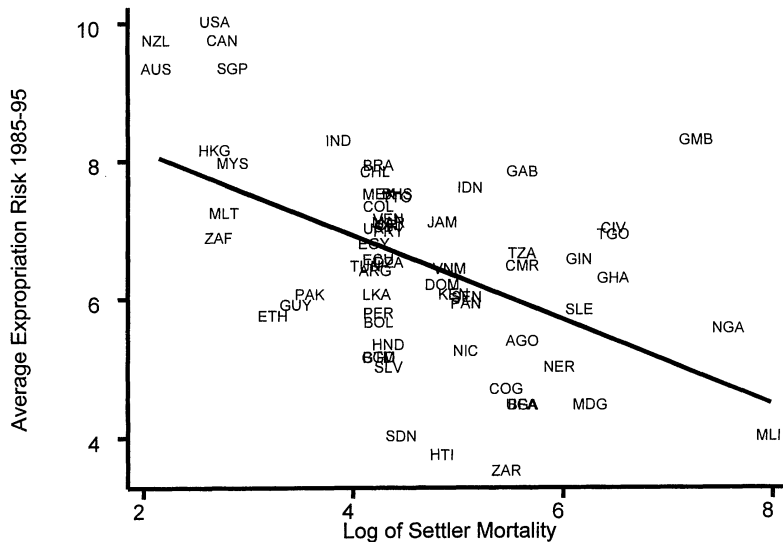
$$\begin{aligned}\log y_i &= \mu + \alpha R_i + X_i \gamma + \epsilon_i \\ R_i &= \zeta + \beta \log M_i + X_i \delta + \nu_i\end{aligned}$$

where y_i is current income, R_i a measure of current institutions, X_i control variables (latitude, continent dummies), M_i historical settler mortality, and μ and ζ are constants.

- First-stage: $\beta \neq 0$
(observed from the data)
- Exclusion restriction: $\text{cov}(M_i, \epsilon_i | X_i) = 0$
(identifying assumption)

First-Stage

Acemoglu, Johnson, Robinson (2001)



Ex-colonies where Europeans faced higher mortality rates have worse institutions today.

Checking the causal chain

Acemoglu, Johnson, Robinson (2001)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|
| Panel A | Dependent Variable Is Average Protection Against Expropriation Risk in 1985–1995 | | | | | | | | | |
| Constraint on executive in 1900 | 0.32 (0.08) | 0.26 (0.09) | | | | | | | | |
| Democracy in 1900 | | | 0.24 (0.06) | 0.21 (0.07) | | | | | | |
| Constraint on executive in first year of independence | | | | | 0.25 (0.08) | 0.22 (0.08) | | | | |
| European settlements in 1900 | | | | | | | 3.20 (0.61) | 3.00 (0.78) | | |
| Log European settler mortality | | | | | | | | | -0.61 (0.13) | -0.51 (0.14) |
| Latitude | | 2.20 (1.40) | | 1.60 (1.50) | | 2.70 (1.40) | | 0.58 (1.51) | | 2.00 (1.34) |
| R^2 | 0.2 | 0.23 | 0.24 | 0.25 | 0.19 | 0.24 | 0.3 | 0.3 | 0.27 | 0.3 |
| Number of observations | 63 | 63 | 62 | 62 | 63 | 63 | 66 | 66 | 64 | 64 |

There is a close association between early and current institutions (cols 1–6) as well as between European settlement in 1900 and current institutions (cols 7–8). Columns 9–10 correspond to the figure on the previous slide, i.e. the first-stage.

Checking the causal chain

Acemoglu, Johnson, Robinson (2001)

| Panel B | Dependent Variable Is Constraint on Executive in 1900 | | | | Dependent Variable Is Democracy in 1900 | | | | Dependent Variable Is European Settlements in 1900 | |
|--------------------------------|--|----------------|-----------------|-----------------|--|----------------|-----------------|-----------------|--|-----------------|
| European settlements in 1900 | 5.50 (0.73) | 5.40 (0.93) | | | 8.60 (0.90) | 8.10 (1.20) | | | | |
| Log European settler mortality | | | -0.82 (0.17) | -0.65 (0.18) | | | -1.22 (0.24) | -0.88 (0.25) | -0.11 (0.02) | -0.07 (0.02) |
| Latitude | | 0.33 (1.80) | | 3.60 (1.70) | | 1.60 (2.30) | | 7.60 (2.40) | | 0.87 (0.19) |
| R^2 | 0.46 | 0.46 | 0.25 | 0.29 | 0.57 | 0.57 | 0.28 | 0.37 | 0.31 | 0.47 |
| Number of observations | 70 | 70 | 75 | 75 | 67 | 67 | 68 | 68 | 73 | 73 |

Furthermore, European settlement and settler mortality are associated with early institutions (cols 1–8) and European settlement in 1900 is associated with settler mortality (cols 9–10). These associations are in line with the proposed chain of causation.

2SLS estimates

Acemoglu, Johnson, Robinson (2001)

| | Base sample (1) | Base sample (2) | Base sample without Neo-Europes (3) | Base sample without Neo-Europes (4) | Base sample without Africa (5) | Base sample without Africa (6) | Base sample with continent dummies (7) | Base sample with continent dummies (8) | Base sample, dependent variable is log output per worker (9) |
|--|-----------------------|-----------------------|--|--|--|--|---|---|--|
| Panel A: Two-Stage Least Squares | | | | | | | | | |
| Average protection against expropriation risk 1985–1995 | 0.94 (0.16) | 1.00 (0.22) | 1.28 (0.36) | 1.21 (0.35) | 0.58 (0.10) | 0.58 (0.12) | 0.98 (0.30) | 1.10 (0.46) | 0.98 (0.17) |
| Latitude | | −0.65 (1.34) | | 0.94 (1.46) | | 0.04 (0.84) | | −1.20 (1.8) | |
| Asia dummy | | | | | | | −0.92 (0.40) | −1.10 (0.52) | |
| Africa dummy | | | | | | | −0.46 (0.36) | −0.44 (0.42) | |
| “Other” continent dummy | | | | | | | −0.94 (0.85) | −0.99 (1.0) | |

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The 2SLS estimates are highly significant and larger than the OLS estimates. One interpretation is that attenuation bias due to measurement error in the institutions variables is more important than reverse causality and omitted variables biases. Measurement error is likely to be very important here, because any single measure is bound to capture only part of the "true institutions". Magnitudes: estimates suggest that institutional differences between Nigeria and Chile should translate into 206 log point (approximately 7-fold) difference.

Robustness Checks

Acemoglu, Johnson, Robinson (2001)

- Control for variables that could plausibly be correlated with both settler mortality and economic outcomes
 - identity of the main colonizing country, legal origin, religion, temperature and humidity, fraction of current population with < European descent, natural resources, soil quality, landlocked
 - redo the analysis using only the British colonies
 - all these specifications yield very similar 2SLS estimates

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- Control for current ethnolinguistic fragmentation, malaria prevalence, life expectancy, infant mortality
 - estimate for institutions decreases, but remains significant
 - AJR: these control variables are endogenous to development (i.e. they are “bad controls” in the current econometrics parlance)
 - Appendix A: biases the coefficient on institutions downwards (knowing this part only required from PhD students)

- Institutions likely to matter for economic performance
 - organization of society, “rules of the game”
- Institutions imposed with *political* power and tend to persist
 - ... political power → economic power → political power ...
(not clear which comes first; but implies persistence regardless)
 - institutional change tends to occur with major social conflict
(but exceptions such as the collapse of the Communist regimes exist)
- Hard to identify causal effects, because evolve incrementally
 - intriguing case studies such as Venice
 - “natural experiments” such as European colonization

- Acemoglu, Reed, Johnson (2014): Chiefs: Economic Development and Elite Control of Civil Society in Sierra Leone. *JPE* 122(2): 319–368
 - locations with less ruling families (originally recognized by British colonial authorities), chiefs face less political competition, and development outcomes are significantly worse today
- Satyanath, Voigtländer, Voth (2017): Bowling for Fascism: Social Capital and the Rise of the Nazi Party. *JPE* 125(2): 478–526.
 - show that denser social networks were associated with faster entry into the Nazi Party

Appendix: A recap of IV

Think of an estimation equation

$$y_{it} = \alpha D_{it} + X_{it}\beta + \epsilon_{it}$$

y_{it} = outcome, D_{it} = treatment, X_{it} = controls, ϵ_{it} = unobservables

- If $\text{cov}(D_{it}, \epsilon_{it} | X_{it}) \neq 0$, OLS estimates of α will be biased
- Solution: an instrumental variable
 - something that affects the likelihood of treatment but not the outcomes (except through the treatment)
 - the first part is known as “having a first-stage”
 - the second part is often referred to as exclusion restriction (the instrument does not appear in the main structural equation)
- Formally, we need an instrument Z for which
 - 1 $\mathbb{E}(D = 1 | X, Z = z) \neq \mathbb{E}(D = 1 | X, Z = z')$
 - 2 $\mathbb{E}[\epsilon | X, Z] = \mathbb{E}[\epsilon | X]$

How does IV work?

Binary instrument, binary treatment

Wald Estimator

Expected values of the outcome conditional on X and Z

$$\mathbb{E}[Y|X, Z = 1] = \alpha \mathbb{E}(D_{it}|X, Z = 1) + X\beta + \mathbb{E}(\epsilon_{it}|X, Z = 1)$$

$$\mathbb{E}[Y|X, Z = 0] = \alpha \mathbb{E}(D_{it}|X, Z = 0) + X\beta + \mathbb{E}(\epsilon_{it}|X, Z = 0)$$

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Subtracting: $\mathbb{E}[Y|X, Z = 1] - \mathbb{E}[Y|X, Z = 0] = \alpha [\mathbb{E}(D_{it}|X, Z = 1) - \mathbb{E}(D_{it}|X, Z = 0)]$

How does IV work?

Binary instrument, binary treatment

Wald Estimator

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Subtracting: $\mathbb{E}[Y|X, Z = 1] - \mathbb{E}[Y|X, Z = 0] = \alpha [\mathbb{E}(D_{it}|X, Z = 1) - \mathbb{E}(D_{it}|X, Z = 0)] \rightarrow$

$$\alpha = \frac{\mathbb{E}[Y|X, Z = 1] - \mathbb{E}[Y|X, Z = 0]}{\mathbb{E}[D|X, Z = 1] - \mathbb{E}[D|X, Z = 0]}$$

- The numerator is the “reduced form” or “intention to treat”
- The denominator is the “first-stage”

- With heterogeneous treatment effects, α_i , IV yields a local average treatment effect (LATE)
 - (weighted) average of the impact for “compliers”: those who got the treatment because of the instrument and would not have gotten it without the instrument
 - we do not learn anything about “never-takers” or “always-takers”
- External validity: How representative are the compliers?
- We also need the monotonicity assumption
 - the instrument affects the likelihood of being treated towards the same direction for *everyone* (always implicitly assumed in 2SLS)

Two-Stage Least-Squares

First-stage

$$D_{it} = \pi_0 + X_{it}\pi_1 + Z_{it}\pi_2 + \nu_{it}$$

Second-stage

$$y_{it} = \alpha \hat{D}_{it} + X_{it}\beta + \epsilon_{it}$$

where \hat{D}_{it} is the predicted values from the first-stage.

- Most of the time 2SLS is fine
- When there are many 'weak' instruments, 2SLS is biased to the same direction as OLS. Then LIML works better.