14.75: The Deep Determinants of Economic Development: Micro Evidence

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Introduction

- In the previous lecture, we introduced the idea that the effect of "institutions" may persist long after the institution itself is no longer there
  - E.g., the legacy of extractive institutions under colonialism
- But, how might this happen?
  - Something must happen in between to allow these things to persist. What is it?
  - And how do we know?

An example from Peru

Dell 2010: "The Persistent Effects of Peru's Mining Mita"

- A recent paper by a current MIT graduate student shows how this might work by looking at the "Mining Mita" in Peru
- What was the Mita?
  - In colonial Peru and Bolivia, a major economic activity was mining, based at Potosí (silver) and Huancavelica (mercury)
  - To support the mines, from 1573 to 1812, indigenous communities were forced to send $\frac{1}{7}$ of their adult male population to work in the mines(!)
- Why might this matter at the time?
  - Local native elites were required to find the conscripts. What might this do?
  - Reduce trust, undermine institutions, encourage outmigration, make it hard to get good labor

Regression Discontinuity

- To identify the impact of the Mita, Dell takes advantage of the fact that the Mita had a well-defined border

The Mita

Image removed due to copyright restrictions. See: Dell, Melissa. "The Persistent Effects of Peru's Mining Mita." *Econometrica* 78, no. 6 (2010): 1863-903. Figure 1

Regression Discontinuity

- To identify the impact of the Mita, Dell takes advantage of the fact that the Mita had a well-defined border.Why might she do that?
- She focuses on the part of the border not coincident with mountains etcWhy?
- She then traces how communities on both sides of the border evolved from 1573 to present to tease out how the Mita may have had a long run impact
- This is an example of a general empirical design called "regression discontinuity."
- This will also come up a nubmer of times this semester, so let's take a bit of a detour to explore what this is.

Regression discontinuity

- Consider a case where treatment is assigned based on a strict threshold.
- This is a sharp RD:

$$\begin{aligned} T_i &= 1 \text{ if } X_i \geq c \\ &= 0 \text{ if } X_i < c \end{aligned}$$

- Can you think of some examples of discontinuities?
  - Win an election if the most votes
  - Eligible for Medicare when you turn 65
  - Become a National Merit Semi-Finalist if your PSAT scores above a certain threshold
  - Legally allowed to buy alcohol when you turn 21
  - etc.

Regression discontinuity

- What does a discontinuity buy us?
- Lots of things in the world vary with X
  - e.g., you become more mature as you age
- The idea is that - except for the treatment, which varies discontinuously – the other covariates change continuously
  - e.g. you can legally buy alcohol when you turn 21, but your maturity grows continuously as you age
  - e.g., better popular politicians running for Governor get more votes, but there is a huge difference between getting 1 more vote than the competitor and getting 1 fewer vote, in that one of you becomes Governor and the other does not
- Technically, the assumption is that:

$$lim_{x \downarrow c} E[Y_i(0)|Xi = x] = lim_{x \uparrow c} E[Y_i(0)|Xi = x]$$

where $Y_i(0)$ is the counterfactual outcome variable if there had been no treatment

Fuzzy regression discontinuity

- Note that in some of these examples the discontinuity may not be strict
  - e.g., some people < 21 were able to buy alcohol
  - But, it discontinuously becomes easier to buy alcohol once you turn 21
  - This is called a "fuzzy" RD, and here what we reqiure is

$$lim_{x \downarrow c} pr(T_i = 1 | X_i = x) \neq lim_{x \uparrow c} pr(T_i = 1 | X_i = x)$$

  - The same general ideas hold – we use the "jump" in T at the discontinuity to gain identification
- RD in practice
  - RD regressions tend to estimate equations like

$$y = \beta \mathbf{1}_{X_i > x} + f(X_i) + \varepsilon$$

    where $\mathbf{1}_{X_i > x}$ is a dummy variable for being above the discontinuity, and $f(X_i)$ is a very flexible function of the X_i (e.g. quadratic, cubic, etc)
  - β is the coefficient of interest

Back to the Mita

- In the Mita case, what is X? What is the discontinuity?

Back to the Mita

Image removed due to copyright restrictions. See: Dell, Melissa. "The Persistent Effects of Peru's Mining Mita." *Econometrica* 78, no. 6 (2010): 1863-903.
Figure 1

Back to the Mita

- In the Mita case, what is X?What is the discontinuity?
- This case is a little tricky since the discontinuity is a border, and X is really in two dimensions
- So in this case, Dell does it several ways
  - polynomial in latitude and longitude
  - distance to the mine at Potosi
  - distance to the border
- She also "zooms in" to get closer to the border – this is also common practice

Checking the discontinuity

- How might you check that the discontinuity – the border – is a good empirical design?
- You should check that nothing else systematically varies at the border
- In this case, what could you check?
  - Geography (elevation, slope)
  - Pre-period characteristics (log 1572 tribute rate)
- (Aside: why do we log so many variables? If a variable is in logs, how do we interpret coefficients?)

Peru's Mining Mita

Image removed due to copyright restrictions. See: Figure 1 in Dell, Melissa. "The Persistent Effects of Peru's Mining Mita." *Econometrica* 78 no. 6 (2010): 1863-903.
Table I: Summary Statistics
Table II: Living Standards
Table VI: Land Tenure and Labor Systems
Table VII: Education
Table VIII: Toads

Bottom line

- What has the paper shown?
- Looking over time, areas inside the Mita area had:
  - Fewer haciendas
  - Fewer public goods (roads)
  - Less education
  - Less income today
  - And more likely to have Shining Path violence
- Suggests channels of institutional persistence

Ethnic institutions or national institutions

Michalopoulos and Papaioannou: "Divide and Rule or Rule of the Divided? Evidence from Africa"

- Acemoglu, Johnson, and Robinson argued it was national institutions (influenced by colonialization) that affect modern development
- However, others have argued that in fact, pre-colonial ethnic institutions may also be important – how pre-colonial ethnic institutions were organized may also affect contempary development.
- Why? One reason is that in many African countries, national governments have little power outside of national capitals, so old, pre-colonial instituions may largely be in place
- MP seek to answer this question, using a similar RD approach
  - Obtain data on pre-colonial ethnic boundaries and ethnic instituions from Murdock's *Ethnolinguistic Atlas of Africa*
  - Use the fact that national borders in Africa were drawn artificially
  - Use data on light intensity at night (remember the Korea picture?) to see how economic activity changes across the national border within ethnic boundaries

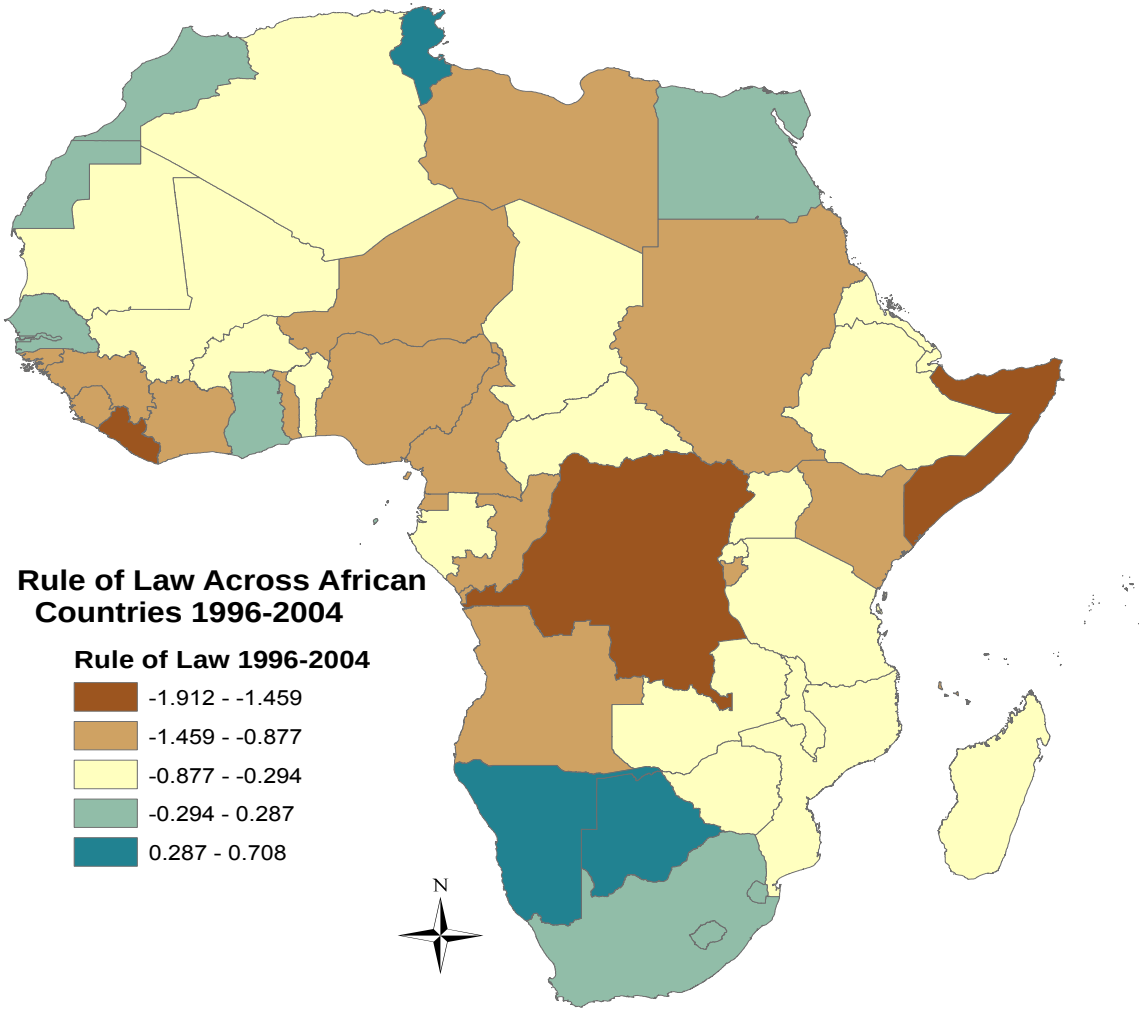
How African Borders Were Created

Berlin Conference Partitioned Africa Among Colonizers

How African Borders Were Created

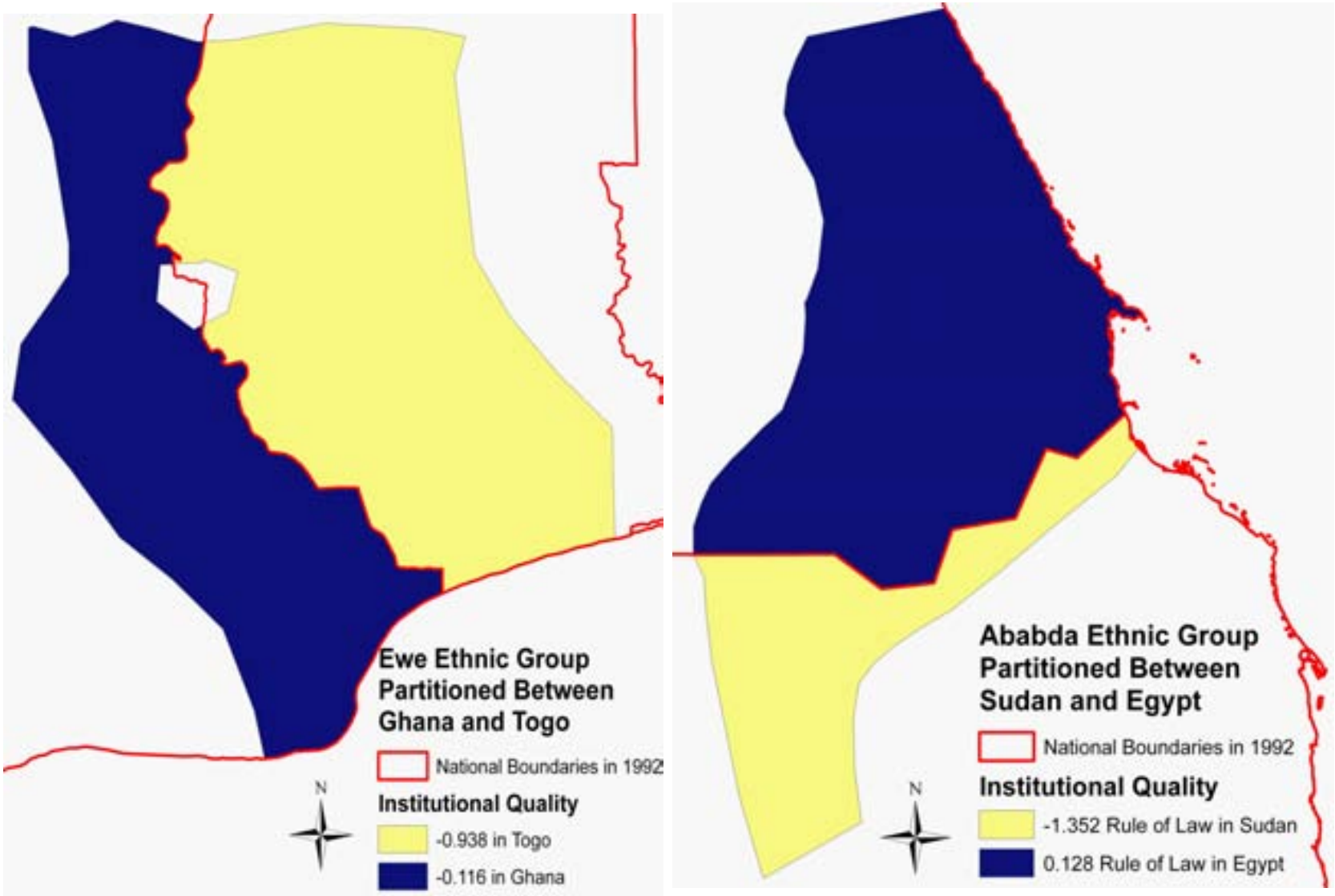
- African borders were decided in Berlin in 1884/1885 and 1890s
  - Colonizers had not even explored most of Africa when borders were agreed.
  - No ethnicity-specific measure predicts which ethnicities were partitioned
  - Drawing involved protectorates, large (free-trade) areas, and spheres of in‡uence rather than potential states.

African Borders and National Institutions



Courtesy of Stelios Michalopoulos and Elias Papaioannou. "Divide and Rule or the Rule of the Divided? Evidence from Africa." NBER WP 17184. Available here. http://www.nber.org/papers/w17184 Used with permission.

They examine partitioned ethnic groups



Courtesy of Stelios Michalopoulos and Elias Papaioannou. Divide and Rule or the Rule of the Divided? Evidence from Africa. NBER WP 17184. Available here. Used with permission.

Results show that national instittuions matter much less within ethnicities

Panel A: Global Polynomial Control Function Method

	(1)	(2)	(3)	(4)	(5)	(6)
Rule of Law	0.8153***	0.0644	0.6432**	0.0349		
	(0.2645)	(0.2795)	(0.2591)	(0.3294)		
Control of Corruption					0.9522***	-0.1235
					(0.2990)	(0.3214)
Adjusted R-squared	0.301	0.843	0.403	0.846	0.298	0.841
Ethnicity Fixed Effects	No	Yes	No	Yes	No	Yes
Population Density	Yes	Yes	Yes	Yes	Yes	Yes
RD Polynomial	Yes	Yes	Yes	Yes	Yes	Yes
Location Controls	No	No	Yes	Yes	No	No
Geographic Controls	No	No	Yes	Yes	No	No
Observations	454	454	454	454	454	454

Conclusions

- What have we learned from this?
  - Long-lasting effects of institutions – colonial and ethnic
  - Visible within countries, not just between countries

14.75 Political Economy and Economic Development

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