TSE M2 PPD Institutions and Long-Run Development (2022-2023)

Victor Gay

Institutions and Long-Run Development

Victor Gay

University of Toulouse 1 Capitole

Toulouse School of Economics

Institute for Advanced Study in Toulouse

M2 PPD, Semester 2, 2023

Topic 1
Introduction

The Big Question

Why are some countries so much richer than others?

Plan of Session

1. Cross-country differences in income.
2. GDP: definition, measurement, issues.
3. Economic growth and income differences.
4. Origins of current income differences.
5. Neoclassical growth theory: the Solow growth model.
6. Correlates of economic growth.
7. Fundamental causes of long-run growth.

Current cross-country differences in income

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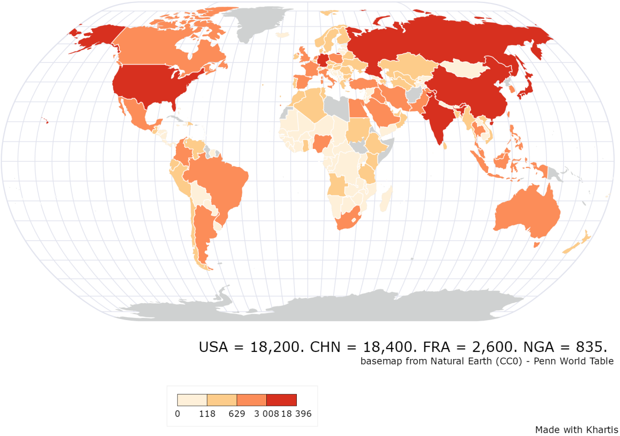
2017 PPP-adjusted GDP in bil. 2011 US $

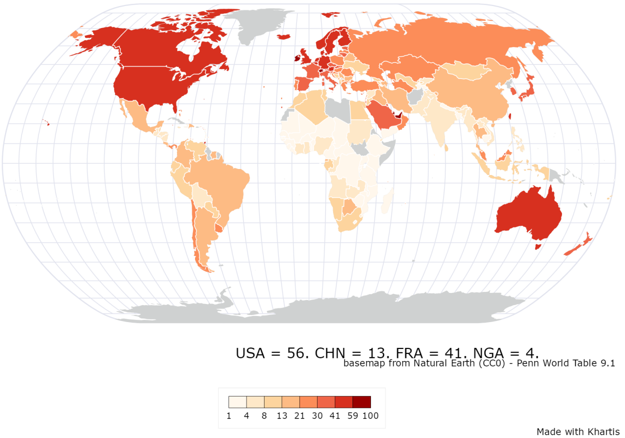


USA = 18,200. CHN = 18,400. FRA = 2,600. NGA = 835.

basemap from Natural Earth (CC0) - Penn World Table

Current cross-country differences in income

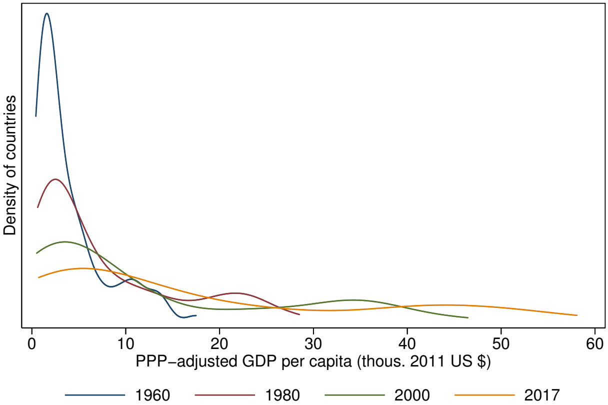
2017 PPP-adjusted GDP per Capita in thous. 2011 US $



USA = 56. CHN = 13. FRA = 41. NGA = 4.

Evolution of cross-country differences in income

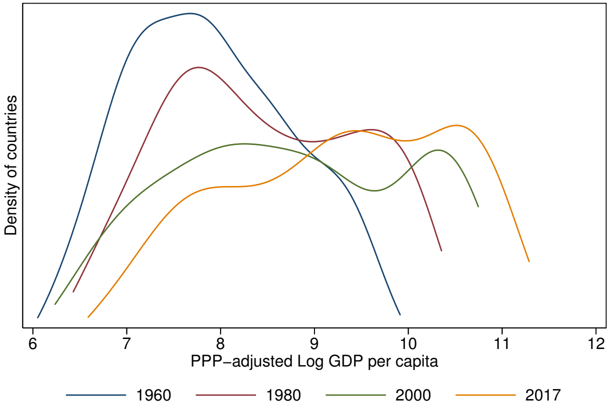
Distribution of Countries: GDP per Capita



Source: Penn World Table 9.1, 110 countries.

Evolution of cross-country differences in income

Distribution of Countries: Log GDP per Capita



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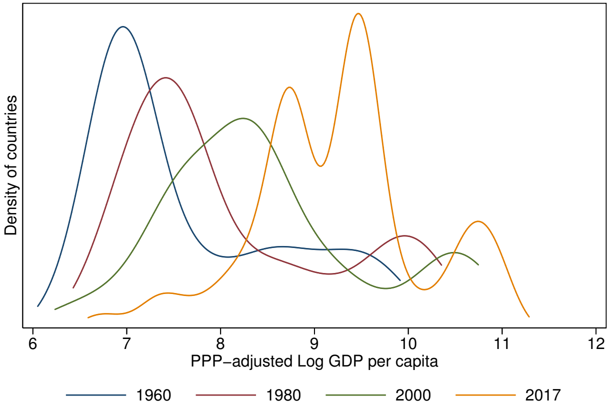
Evolution of cross-country differences in income

Population-Weighted Distribution of Countries: Log GDP per Capita



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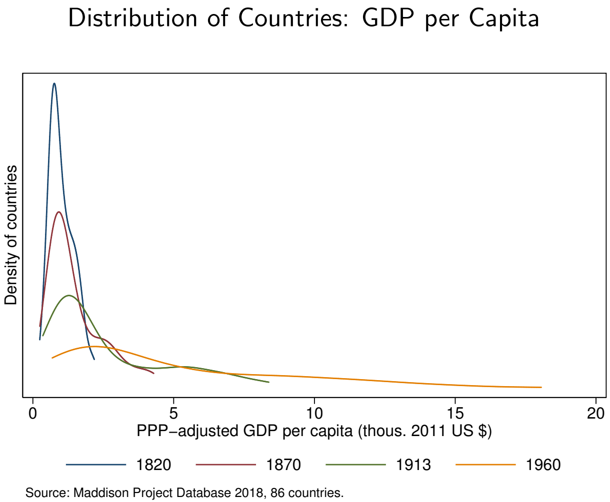

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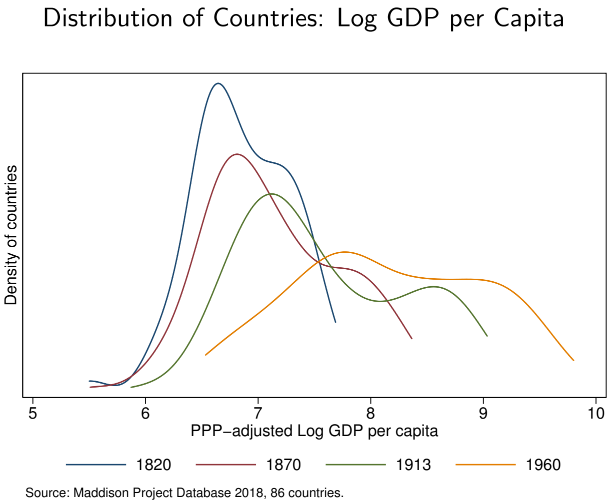

Data Source: Penn World Table

- Best cross-country GDP modern data: Penn World Tables 10.0.
- Reference paper: Feenstra, Inklaar and Timmer (2015).
- GDP, consumption, TFP measures.
- PPP-adjusted, constant prices (2011 US \$) $\Longrightarrow$ comparability.
- 183 countries, 1950–2019, yearly.

Data Source: Maddison Project Database

- Best cross-country pre-1950 GDP data source: Maddison Project.
- Reference paper: Bolt, Inklaar, de Jong and van Zanden (2018).
- New version: GDP per capita based on PWT methodology.
- 80 countries pre-1950, starting 1800s (even before).
- Lower data availability than PWT.

GDP: definition and measurement

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- Definition
- A distorted picture
- Income and welfare
- Measuring historical GDP

Definition

Definition (Gross Domestic Product)

GDP is the market value of final goods and services newly produced in a country during a given period of time

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- GDP is the most commonly used indicator of economic activity.
- GDP is measured in a currency at **current** prices.
- GDP measures **final** goods and services.
- GDP measures goods newly **produced** during the period considered.

Three equivalent approaches

1. **Product approach**
   - Highlights **value-added** of domestic output.
   - Most common definition, used in economic history.

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$\implies$ Production = Expenditure = Income.

Components

$$\underbrace{Y}_{\text{Final Product}} = \underbrace{C + I + G + (X - M)}_{\text{Expenditure on Final Goods and Services}}$$

- Y: final product (or total income earned by domestic factors).
- C: consumption spendings on goods and services.
- I: investment spendings on capital (and changes in inventories)
- G: government expenditures on goods and services.
- $X - M$: net exports of goods and services.

A distorted picture of reality

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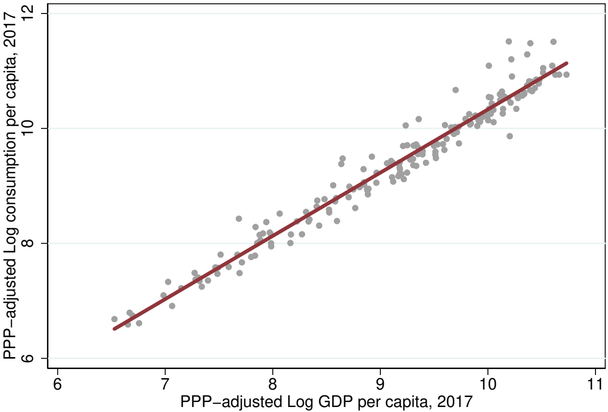
A distorted picture of reality

1. GDP per capita matters.
2. GDP is a constructed measure, subject to revisions.
3. Many things that contribute to wealth are not measured:
    - Goods and services not sold on a market: e.g. home production, child care, clean air.
    - Illegal activities: e.g. drugs, prostitution.
    - Natural resource depletion.
    - Welfare: e.g. leisure, health, inequality, happiness.
    - Digital goods.
    - Changes in quality.

Income and welfare

Income per Capita and Consumption per Capita, 2017



Source: Penn World Table 9.1, 182 countries.

Income and welfare

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- Compute a new welfare measure that combines consumption, leisure, inequality and mortality.

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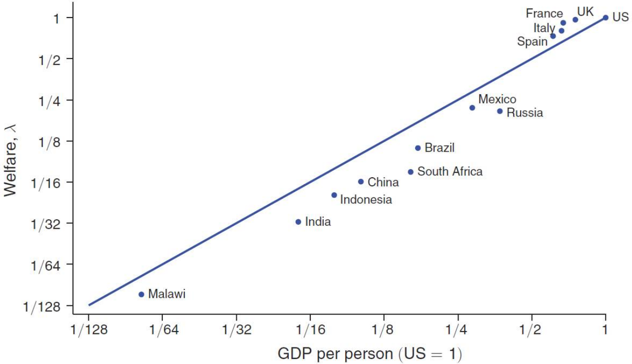
France vs USA in 2005

Indicator	France	USA
GDP per Capita	67	100
Consumption per Capita	60	100
Life Expectancy	80	77
Leisure (h. work)	535	877
Inequality (Gini)	0.261	0.369
Welfare	92	100

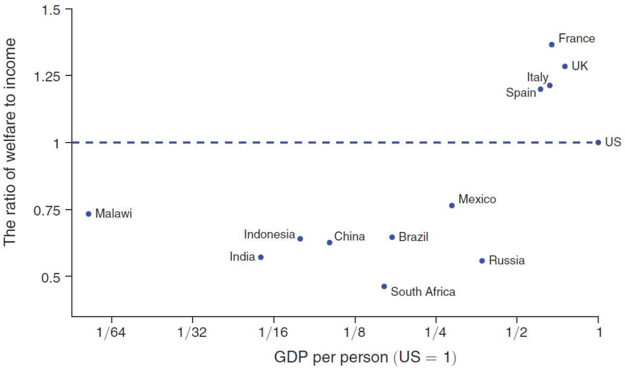
Income and welfare

Welfare and income are correlated at 98%



Income and welfare

Welfare differs from income by about 35%



Measuring historical GDP

de Jong and Palma (2018) Broadberry (2021)

- Historical national accounting
- Comparisons over time and space

Historical national accounting

- Potential value of growth accounting in long-run development:
  - Benchmarking growth performance over the long run.
  - Quantification of contributions to growth of particular sectors or new technology.
  - Understand nature of TFP growth.
- Potential weaknesses of growth accounting in long-run development:
  - Highly sensitive to methodology and data quality.
  - Does not tell anything about causality from factor input growth to TFP growth.

Historical national accounting

- Central question: relationship between inputs and outputs.
- Typically, Cobb-Douglas production function:

$$Y = AL^{1-\alpha}K^{\alpha}$$

  - α and $1-\alpha$: output elasticities of capital and labor.
  - A: total factor productivity (TFP).
  - Diminishing returns to factor accumulation.

Historical national accounting

- Basic growth accounting equation in growth rates:

$$\Delta \log (Y/L) = \alpha \Delta \log (K/L) + \Delta \log A$$

  - Factor share α constant $\simeq 1/3$.
  - Issues measuring L and K, but feasible.
  - Once estimate Y, get estimate of A.

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- For comparisons across time and space: proper price levels.

$\Longrightarrow$ How to estimate Y and convert into PPP?

Historical national accounting

- Maddison's (2001) *The World Economy: A Millennial Perspective*.
- Result of 50 years of research.
- Maddison (2010) Online database.
- Maddison Project: extends Maddison work.

Four types of GDP data

- Official estimates by national statistical offices (1870–1950).
- Historical estimates based on same methods (pre-1870).
- Historical estimates based on proxy variables (pre-1870).
- "Guesstimates."

Methods for data-abundant nations

- Most common for pre-1870: output approach.
- Broadberry et al. (2015) *British Economic Growth, 1270–1870*
- Sectors estimated separately with auxiliary data for 1270–1700:
  - Agricultural output.
  - Industrial output.
  - Service sector output.

Britain agricultural output

- Three databases across different periods:
  - Medieval Accounts Database: manorial accounts for land use, crops, animals, livestock products. Campbell (2000, 2007)
  - Early Modern Probate Inventories Database: inventories of Church for same information. Overton (1991, 2000) Overton et al. (2004)
  - Modern Farm Accounts Database: sample of farmers accounts. Turner et al. (2001)

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- Yields: trends from microdata in databases.
- Total output: apply to total acreage of country.

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- Total output: apply to total acreage of country.
- Convert output into current prices, weights for real output index.

Britain industrial output

- Many databases for the main industrial sectors up to 1700:
  - Wool and woolen cloth: detailed export records. Carus-Wilson and Coleman (1963)
  - Iron: capacity of blast furnaces and periods of activity. King (2005)
  - Tin: receipts of coinage dues. Hatcher (1973)
  - Leather and food processing: reconstruction of agricultural sector. Broadberry et al. (2015)
  - Construction: cathedral building, housebuilding (population).
  - Book production: titles listed by British Library.

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  - Book production: titles listed by British Library.
- Use series to build industrial production index.

Britain services sector output

- Method from Deane and Cole (1962).
- Broken down into subsectors:
  - Commerce: trade, freight transport, financial services.
  - Housing and domestic services: rate of population.
  - Government: revenues. O'Brien and Hunt (1999)

Britain GDP

- Putting it together:
  - Combine output series with sectoral weights based on input-output tables for 1841. Horrell et al. (1994)
  - Use price series to convert into nominal series. Clark (2004, 2005, 2006) Beveridge (1939)
  - Create a chained index of GDP.
  - Divide by population to estimate GDP per capita.

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- Attempts from income side, but changes in working hours ("industrious revolution" 1700–1820).

Methods for data-scarce nations

- Rely on modelling and proxies.

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- Instead of measuring agricultural output, derive it from demand for food. Allen (2000)

$$Q^A = rcN$$

  - Q^A: real agricultural output.
  - r: ratio of production to consumption (often $r = 1$).
  - c: per capita consumption.
  - N: population.

Methods for data-scarce nations

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- In log-linear form:

$$\ln c = \alpha_0 + \alpha_1 \ln\left(P^A/P\right) + \alpha_2 \ln\left(P^{NA}/P\right) + \beta \ln y$$

  - P^A/P: agricultural product prices in real terms.
  - P^{NA}/P: non-agricultural product prices in real terms.
  - y: real income per capita.
  - α_0: constant.
  - α_1: own-price elasticity of demand.
  - α_2: cross-price elasticity of demand.
  - β: income elasticity of demand.

Methods for data-scarce nations

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- Values from developing countries:
  - $\alpha_1 = -0.6$.
  - $\alpha_2 = 0.1$.
  - $\implies \beta = 0.5$.

Methods for data-scarce nations

- Estimate non-agricultural output Q^{NA}:

$$Q = Q^A + Q^{NA} \iff Q = \frac{Q^A}{1 - (Q^{NA}/Q)}$$

  - Q^{NA}/Q: share non-agricultural output.

$\Longrightarrow$ Proxied by urbanization rate, e.g., Bairoch (1988).

Data reliability

- Many use long-run estimate inappropriately.
- Careful to distinguish direct and indirect approaches.
- Same series can mix both e.g. Netherlands pre-1510 vs 1510–1807. van Zanden and van Leeuwen (2012)

Data reliability grades

A. Data reliability grades		
Reliability grade	**Margin of error**	**Average margin of error**
A. Firm figures	± less than 5%	± 2.5%
B. Good figures	± 5% to 15%	± 10%
C. Rough estimates	± 15% to 25%	± 20%
D. Conjectures	± more than 25%	± 40%

Source: Broadberry (2021) based on Feinstein (1972)

Data reliability grades

B. Reliability assessments for GDP in the Netherlands, China, and Japan	
	Grade
Netherlands	
1347-1510	C
1510-1650	B
1650-1750	A
1750-1807	B
China	
Northern Song (980-1120)	B
Ming (1400-1620)	B
Qing (1690-1840)	A
Japan	
Ancient (730-1150)	D
Medieval (1250-1450)	C
Tokugawa (1600-1846)	B

Source: Broadberry (2021) based on van Zanden and van Leeuwen (2012) and Broadberry, Guan and Li (2018)

Comparisons over time and space

- Comparisons over time:
  - Inflation rates make output value change.
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  - Nominal exchange rates fluctuate independently of local prices.
  - Purchasing power parity (PPP) between two currencies: ratio of prices of same basket of goods.
  - Accounts for price and expenditure weights differences across countries

$\Longrightarrow$ International weights: 1990 Geary-Khamis international dollars

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- Benchmark: 1990 GKI$ 400 $\simeq$ subsistence level.

Issues with historical GDP estimates

Blum and Clovin (2018) chap 46

- Within countries:
  - Deflation issues: changing baskets of goods over time.
  - Heterogeneous sources: systematic and changing biases.

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$\Longrightarrow$ Current issues with measurement relevant for HGDP estimates.

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$\Longrightarrow$ Current issues with measurement relevant for HGDP estimates.

- Main point of HGDP is not precision but order of magnitude.
- Still: need reliable comparative picture of living standards.

$\Longrightarrow$ Don't take Maddison at face value, check underlying sources.

Economic growth and income differences

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- Let g: growth rate, T = time, $GDP_0 = 1$. Then

$$GDP_T = (1+g)^T$$

- Suppose $g_A = 2\%$ and $g_B = 0\%$.
  - After 100 years, A 7 times richer than B.
  - After 200 years, A 52 times richer than B.

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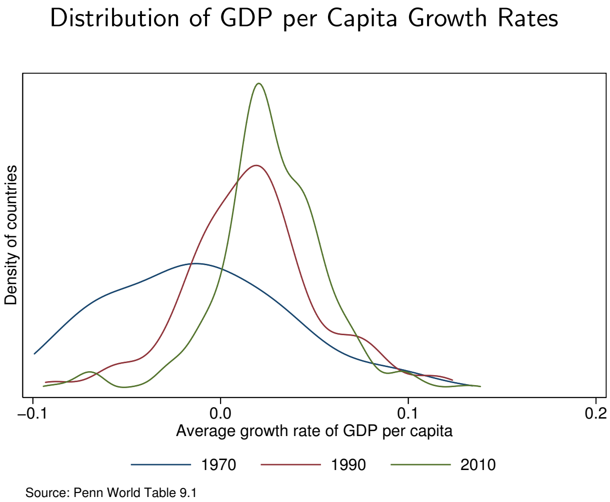
- Suppose $g_A = 2\%$ and $g_B = 0\%$.
  - After 100 years, A 7 times richer than B.
  - After 200 years, A 52 times richer than B.
- How long to:
  - double GDP? $\log 2 / \log(1+g)$. If $g = 2\%$, then 35 years.
  - decuple GDP? $\log 10 / \log(1+g)$. If $g = 2\%$, then 116 years.

Economic growth and income differences



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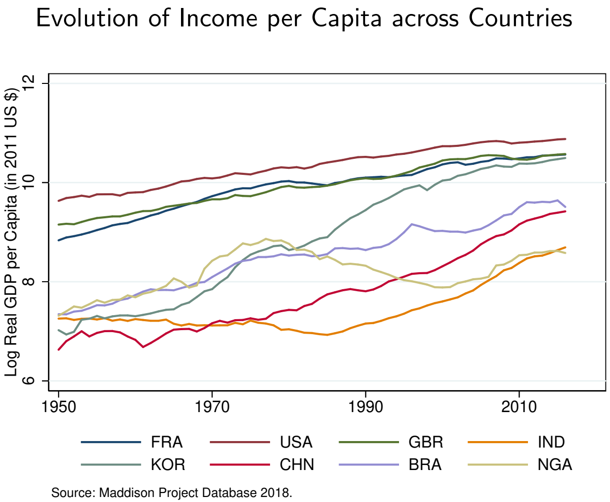
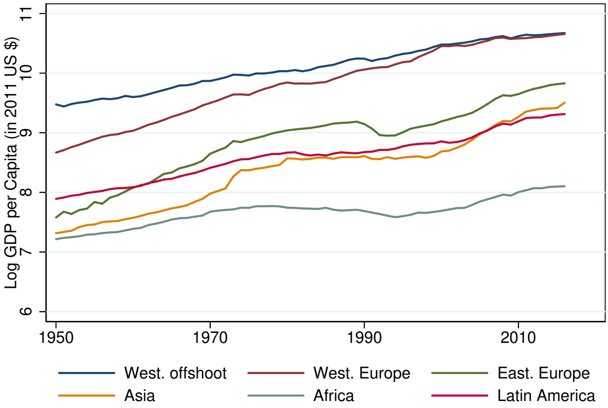


Economic growth and income differences

Evolution of Income per Capita across Continents



Source: Maddison Project Database 2018.

Long-run growth: the Great and the Little Divergences

Long-run growth

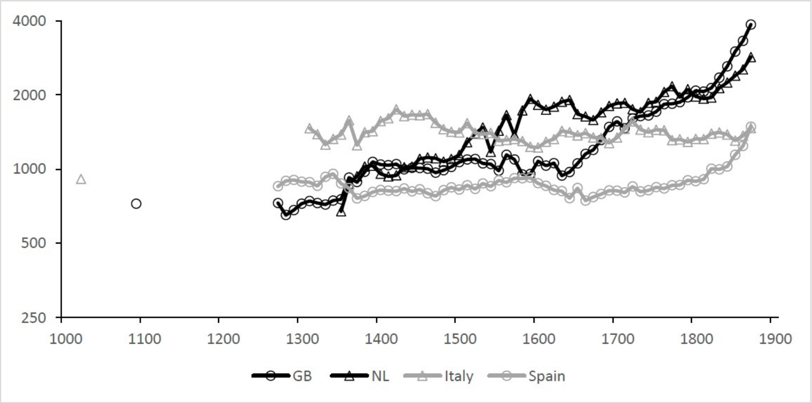
Broadberry (2021) Court (2020)

- Europe's Little Divergence
- Asia's Little Divergence
- The Great Divergence

$\Longrightarrow$ New estimates enable to revise past views from e.g., Maddison (2001)

Europe's Little Divergence

GDP per Capita in Europe, 1270–1870 (1990 GKI$, Log scale)



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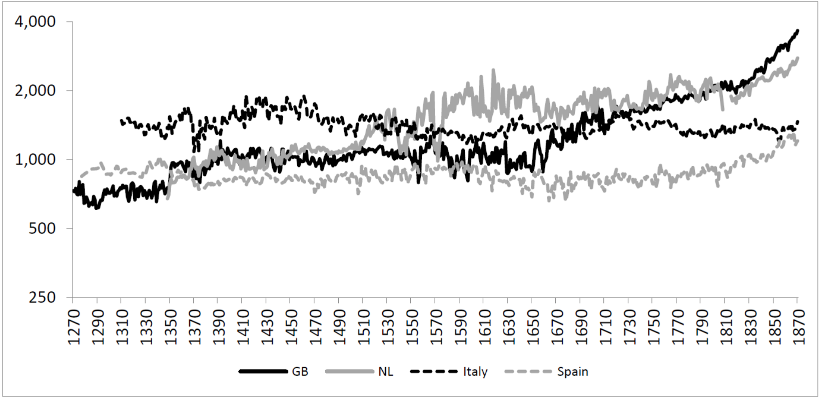

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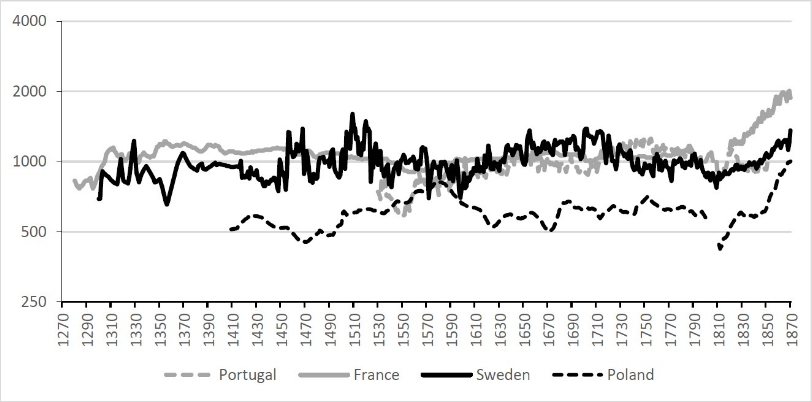

Source: Broadberry (2020) based on Palma and Reis (2019), Ridolfi (2016), Krantz (2017), Schon and Krantz (2012), Malinowski and van Zanden (2017).

Europe's Little Divergence

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  - Before: Italy and Spain richer than GB and NL.
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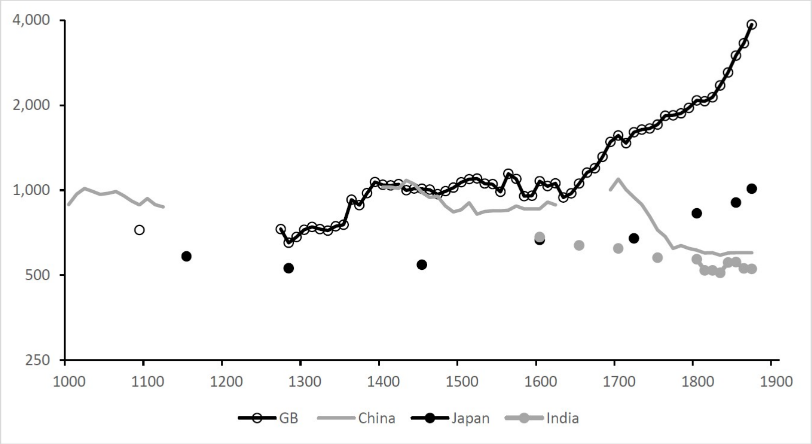
$\Longrightarrow$ Europe's Little Divergence (North-West vs rest) circa 1500

Asia's Little Divergence

GDP per Capita in Asia, 1000–1870 (1990 GKI$, Log scale)



Source: Broadberry (2020) based on Broadberry et al. (2015), Broadberry, Guan and Li (2018), Bassino, Broadberry, Fukao, Gupta and Takashima (2015), Broadberry, Custodis and Gupta (2015)

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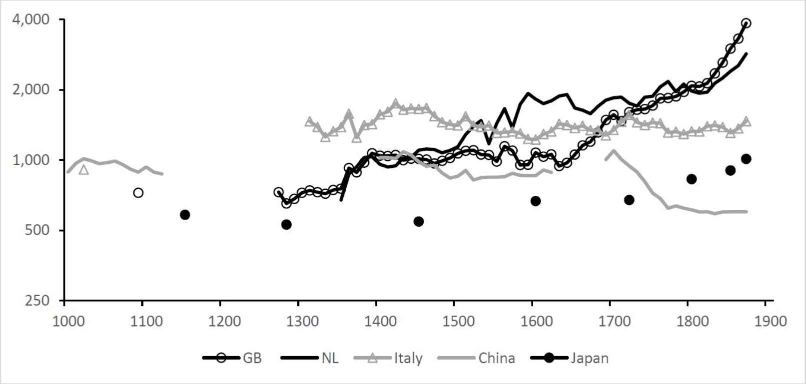
- India: stagnation and declining trend since 15th century.

$\Longrightarrow$ Asia's Little Divergence (Japan vs China) circa 1700

The Great Divergence

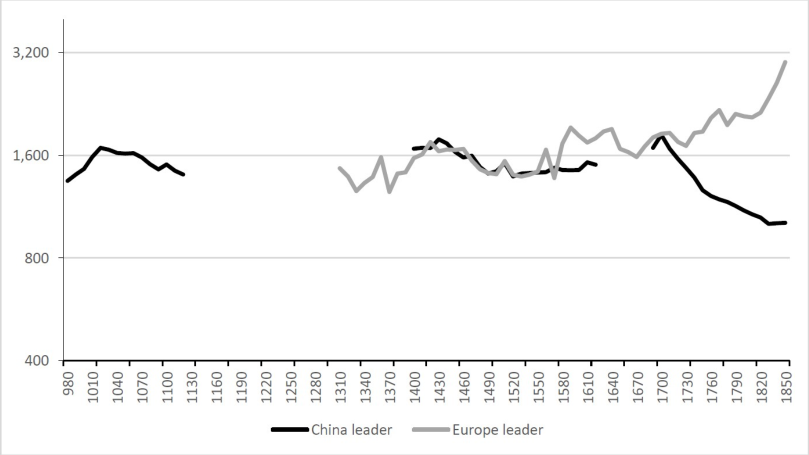
GDP per Capita in Europe and Asia, 1000–1870 (1990 GKI$, Log scale)



Source: Broadberry (2020) based on Broadberry et al. (2015), van Zanden and van Leeuwen (2012), Malanima (2011), Broadberry, Guan and Li (2018), Bassino, Broadberry, Fukao, Gupta and Takashima (2015).

The Great Divergence

GDP per Capita in Leading Regions of China and Europe, 980–1850 (1990 GKI$, Log scale)



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The Great Divergence

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  - Leadership of China at \$1,000.
  - Italy $\simeq$ \$ 911; Britain $\simeq$ \$ 723.

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$\Longrightarrow$ The Great Divergence (Europe vs Asia) circa 1700

The Great Divergence

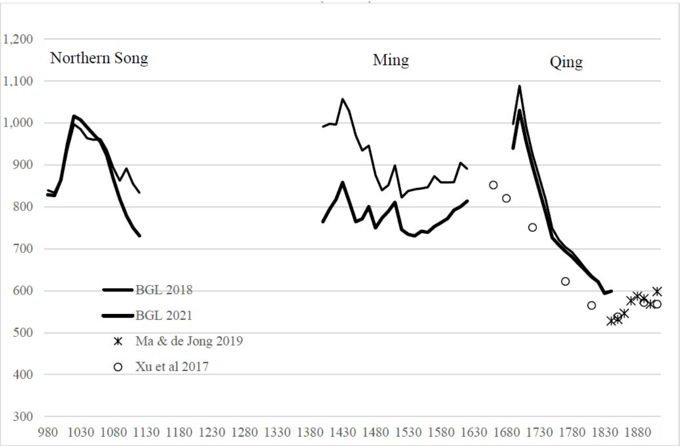
- Important questions:
  - Was China ever really wealthy?
  - When did China fall behind?
  - Was it the result of positive growth in Europe or negative growth in China?
- Estimates for China 980–1840 by Broadberry et al. (2018):
  - Britain caught up with China as a whole by 1400.
  - The Great Divergence with the richest parts of China circa 1700.
  - Due to both rising incomes in Europe and falling incomes in China.

The Great Divergence

- Issues in Broadberry et al. (2018) pointed out by Solar (2021):
  - Constructed based on only 2 series: grain output and population.
  - Government sector share too high (e.g., 30% of GDP in 1400), requiring downward correction for Ming (1368–1644)
  - Benchmark to anchor series in 1840 was too high.
  - China leader estimated with constant upward adjustment of 75% based on 1820s benchmark when textile booming there (perhaps relative income different in other periods).

The Great Divergence

Estimates of China's GDP per capita, 980–1910



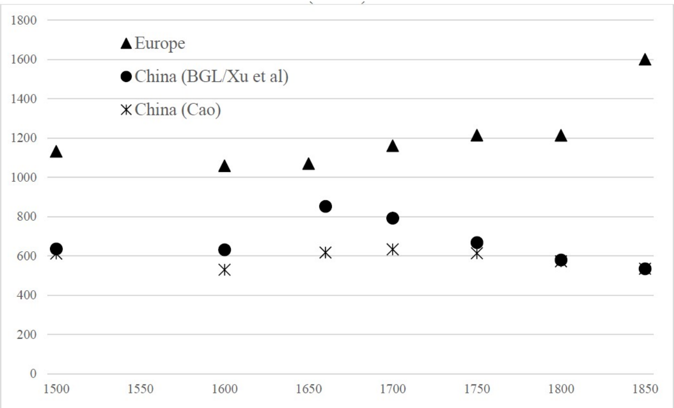
Source: Solar (2021) based on Broadberry et al. (2018, 2021), Ma and de Jong (2019), and Xu et al. (2017).

The Great Divergence

- Alternative: compare Western Europe to China.
  - Use series from Britain, Holland, France, Spain Italy, Germany (80% of Europe population).
  - With revised estimates, from 1500 on, Europe always richer than China.
  - Perhaps divergence in trends from 1650s.
  - High degree of uncertainty remains.

The Great Divergence

GDP per capita in "Europe" and China, 1500–1850



Source: Solar (2021) based on Palma and Reis (2019), Ridolfi and Nuvolari (2021), de Vries (1994), Malanima (2010), Broadberry et al. (2018, 2021), Ma and de Jong (2019), and Xu et al. (2017).

The Big Questions

- Why are some countries so much richer than others?
- Why do some countries grow so much faster?
- What sustains growth over the long run?

Neoclassical growth theory

Neoclassical Growth Theory

$\Longrightarrow$ Explanation: differences in preferences and endowments.

- Traditional growth theory (50s, 60s): Sollow and Cass-Koopmans.
  - Paths of factor accumulation.
  - Differences in saving rates (Sollow) or preferences (Cass-Koopmans).
- Modern growth theory (80s, 90s): Lucas and Romer.
  - Externalities from physical and human capital.
  - Endogenous steady-state growth and technical progress.

The Solow Growth Model

- Based on Solow (1956).
- Micro foundations: neoclassical aggregate production function.
- Dynamic general equilibrium model.
- Simple and abstract representation of complex reality.

Households and Production

- Closed economy, unique final good, infinite horizon.
- Many identical households, saving $s \in [0, 1]$ of disposable income.
- Many identical firms with representative production function:

$$Y = F(K, L, A) \ \text{ e.g. } \ Y = AK^{\alpha}L^{1-\alpha}, \ \alpha \in (0, 1)$$

- Y: production. K: capital. L: labor. A: technology.
- $F_K, F_L > 0$, $F_{KK}, F_{LL} < 0$. Decreasing returns to scale.
- A is free: nonexcludable and nonrival.

Endowments, Market Structure, Market Clearing

- Competitive markets:
  - Households and firms are price-takers.
  - Prices clear markets.
  - Private ownership of endowments.
- Firms rent labor at rate w and capital at rate R.
- Market clearing conditions (demand = supply): $L = \overline{L}$ and $K = \overline{K}$.
- Capital depreciates are rate $\delta \in (0, 1)$.

Firm Optimization and Equilibrium

- Firms solve this optimization problem:

$$\max_{K,L} F(K, L, A) - RK - wL$$

Firm Optimization and Equilibrium

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$$\max_{K,L} F(K, L, A) - RK - wL$$

- In equilibrium:
  - Markets clear.
  - Marginal products equal marginal costs: $w = F_L$ and $R = F_K$.
  - Firms make zero profits: $Y = wL + RK$

Fundamental Law of Motion of Capital

- Because of depreciation: $K(t+1) = (1-\delta)K(t) + I(t)$.

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- Closed economy: $S(t) = I(t) = Y(t) - C(t)$.
- Household save a fraction of income: $S(t) = sY(t)$.
- Fundamental law of motion of the Solow growth model:

$$K(t+1) = sF\left(K(t), L(t), A(t)\right) + (1-\delta)K(t)$$

Equilibrium

Definition

An equilibrium is a sequence of allocations and prices such that:

$$\{K(t), Y(t), C(t), w(t), R(t)\}_{t=0}^{\infty}$$

- Markets clear.
- Marginal products equal marginal costs.
- The law of motion of capital holds.

Output per Capita

- No population growth: $L(t) = L$.
- No technological progress: $A(t) = A$.
- Define capital-labor ratio: $k(t) = K(t)/L$.

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- Law of motion becomes: $k(t+1) = sf\left(k(t)\right) + (1-\delta)k(t)$.

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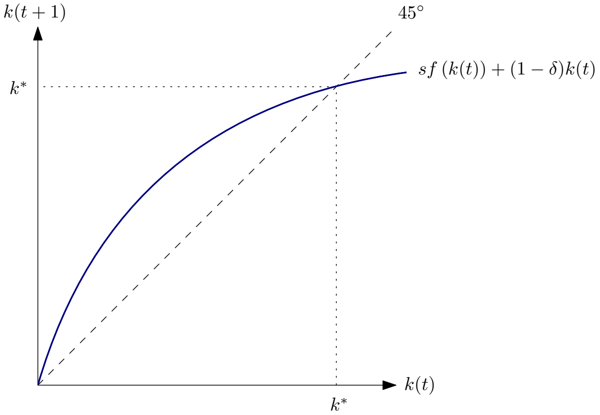
- With the law of motion: $sf\left(k^*\right) = \delta k^*$.
- In equilibrium, investment per capita replenishes depreciated capital.

Steady-State Equilibrium



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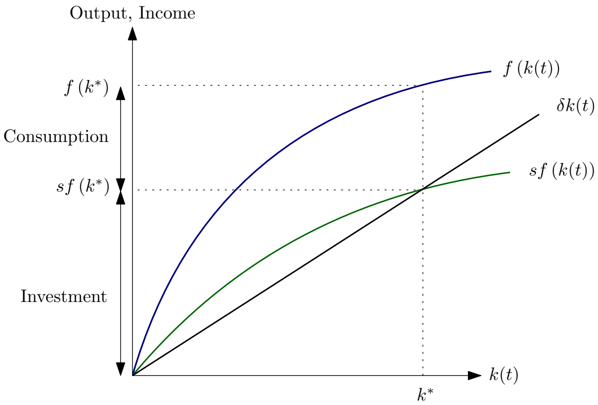


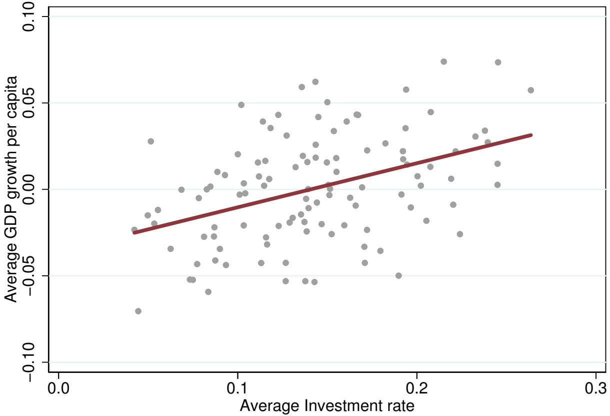
Economic Growth in a Solow World

- Once steady-state is reached, no growth.
- Additional growth achieved by shifting steady-state:
  - More investment: $\uparrow s$.
  - Improved technology: $\uparrow A$ (exogenous).
  - Larger population: $\uparrow L$ (exogenous).
- Straightforward to include human capital.
- Source of growth: physical and human capital accumulation.

Correlates of economic growth

Correlates of Economic Growth

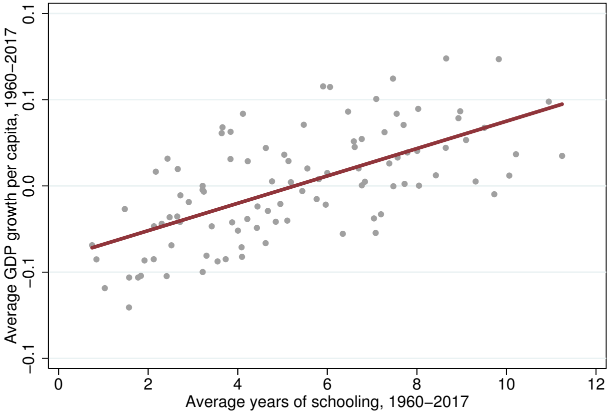
Average GDP per Capita Growth and Capital Investment, 1960–2017



Source: Penn World Table 9.1, 111 countries.

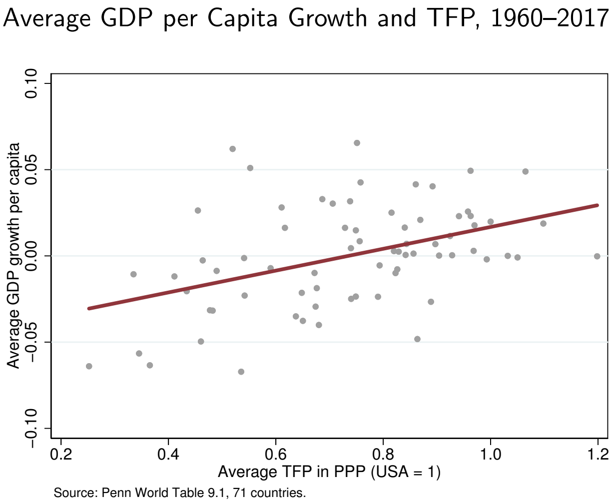
Correlates of Economic Growth

Average GDP per Capita Growth and Human Capital, 1960–2017



Source: Maddison Project Database 2018, Barro–Lee Dataset, 100 countries.

Correlates of Economic Growth



Data Source: Barro-Lee Dataset

- Best cross-country Educational Attainment data source: Barro-Lee.
- Reference paper: Barro and Lee (2013).
- Educational attainment measures by sex and age.
- 146 countries, 1950–2010, 5-year intervals.

Correlates of Economic Growth

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  "The factors we have listed (innovation, economies of scale, education, capital accumulation, etc.) are not causes of growth; they are growth." North and Thomas (1973)

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- Correlation $\neq$ causality.

- Why different choices of investment?

- What are the *fundamental* causes of economic growth?

Fundamental causes of long-run growth

The Fundamental Causes of Growth

Four common hypotheses:

- Luck: multiple equilibria and path dependence.
- Geography and climate
- Cultural norms of behavior.
- Domestic institutions.

Luck: Multiple Equilibria

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- Prisoner's dilemma type game (e.g. technological complementarities)

		Everybody else	
		High investment	Low investment
Individual	High investment	y^H, y^H	$y^L - \varepsilon, y^L$
	Low investment	$y^L, y^L - \varepsilon'$	y^L, y^L

- $y^H > y^L$ and ε, $\varepsilon' > 0$.

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- Two symmetric (pure-strategy) equilibria.

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  - Hundred years of divergence.
  - Why some countries can have very rapid growth.

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  - Why some countries can have very rapid growth.
- Institutions as coordination device for equilibrium selection.
  Myerson (2009)

Geography and Climate

- Geography hypothesis 1: Montesquieu (1748).
- Climate (heat) shape efforts and attitudes:

  "The heat of the climate can be so excessive that the body there will be absolutely without strength. So, prostration will pass even to the spirit; no curiosity, no noble enterprise, no generous sentiment; inclinations will all be passive there; laziness there will be happiness. People are [...] more vigorous in cold climates. The inhabitants of warm countries are like old men, timourous; the people in cold countries are like young men, brave."

Geography and Climate

- Very borderline...

- Some serious economists were still convinced in late 19th century:

  "[V]igor depends partly on race qualities: but these, so far as they can be explained at all, seem to be chiefly due to climate." *Marshall (1890)*

- Non-credible hypothesis.

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  "[S]erious study of the problems of underdevelopment [. . .] should take into account the climate and its impacts on soil, vegetation, animals, humans and physical assets—in short, on living conditions in economic development." Myrdal (1968)

- Geographical differences $\Longrightarrow$ timing and nature of neolithic revolution $\Longrightarrow$ social organization and development. Diamond (1997)

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- But potentially large complementarities with institutions.

Cultural Norms of Behavior

- Values, preferences, beliefs matter for economic performance.

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- Famous example: Protestant origins of capitalism. Weber 1930

"Montesquieu says of the English that they 'had progressed the farthest of all peoples in the world in three important things: in piety, in commerce, and in freedom.' Is it not possible that their commercial superiority and their adaptation to the free political institutions are connected in some ways with that record of piety which Montesquieu ascribes to them?"

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- Complementarities between culture and institutions.

Domestic Institutions

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- Key elements:
  - Humanly devised.
  - Place constraints on individual behavior.
  - Shape human interaction and affect incentives.

- Institutions influence economic, political and social relations among households, individuals and firms.

Economic Institutions

- Examples:
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- What economic institutions do:
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  - Determine distribution of economic revenues.
- "Good" economic institutions stimulate proximate causes of growth:
  - Physical capital accumulation.
  - Human capital accumulation.
  - Development of better technologies.
- Usually: enforcement of property rights and equality of opportunity.

Economic Institutions

- Why societies not adopt all "good" economic institutions?
  - Coordination failures and multiple equilibria.
  - Conflicts of interest within society (Schumpeterian creative destruction).
- Distribution and conflict shape institutions.

Topic 2

The impact of institutions on long-run development

The Big Question

Do institutions matter for long-run development?

Plan of Session

- Correlations between institutions and development.
- Reversal of fortune. Acemoglu, Johnson and Robinson (2002)
- Colonial origins of comparative development.
  Acemoglu, Johnson and Robinson (2001)
- Unbundling institutions. Acemoglu and Johnson (2005)

Correlations between Institutions and Development

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- Best current source: V-Dem.
- Some measures of quality of formal institutions (see codebook):
  - Access to justice.
  - Property rights.
  - Rule of law.

Data Source: Varieties of Democracy

- Best cross-country institutions data source: V-Dem.
- 450+ indicators, 81 indices, 202 countries, 1789–2018.
- Consistent coding, extremely complete.
- Vastly superior to alternatives.

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- Property rights (`v2xcl_prpty`).
  - Question: Do citizens enjoy the right to private property?
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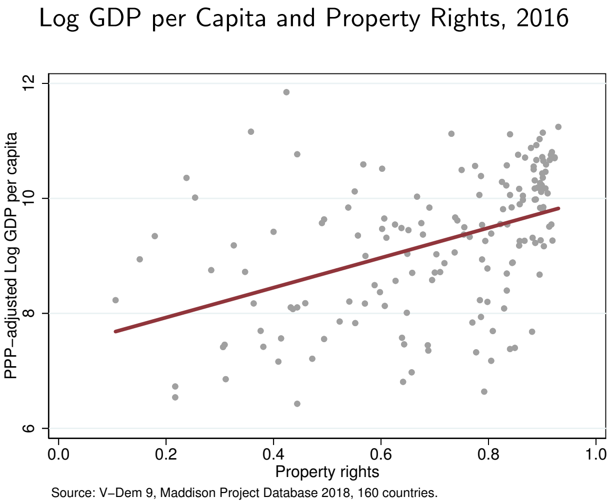
- Rule of Law (`v2x_rule`).
  - Question: To what extent are laws transparently, independently, predictably, impartially, and equally enforced, and to what extent do the actions of government officials comply with the law?
  - Scale: Interval, from low to high (0–1). Index combining 15 indicators.

Data Source: Other Institutions Datasets

- Polity IV Project (1800–2015).
- Freedom House (1973–2018).
- Political Regimes (1800–2015). Boix et al. (2012)
- Word bank governance indicators (1996–2017). Kaufmann et al. (2010)
- Lexical Index of Electoral Democracy (1800–2013). Skaaning et al. (2015)
- Unified Democracy Score (1946–2012). Penstein et al. (2010)
- Political Institutions and Events (1917–2013). Przeworski et al. (2013)

Correlations between Institutions and Development



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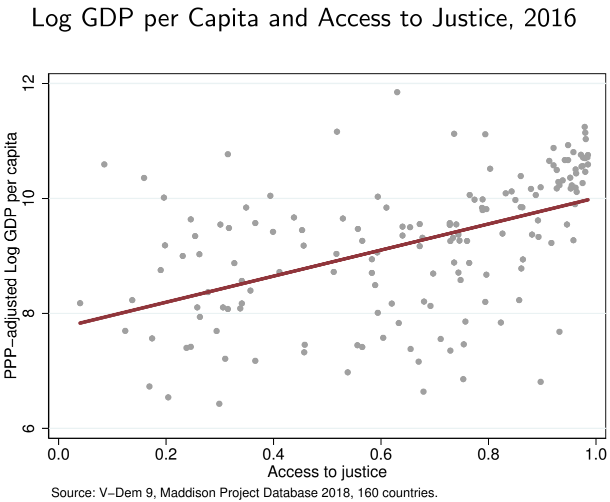

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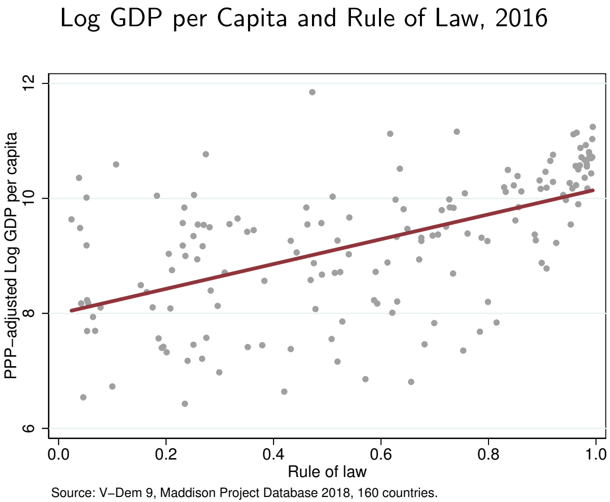

Correlations between Institutions and Development

$$Y_{cy} = \alpha + \beta\, X_{cy} + \varepsilon_{cy}$$

Year	Property	Justice	Law	Countries
1960	1.64***	1.73***	1.78***	133
1980	1.84***	1.81***	1.83***	140
2000	2.78***	2.77***	2.66***	162
2016	2.60***	2.27***	2.16***	160

Source: V-Dem 9, Maddison Project Database 2018.
Dependent variable: *log* GDP per capita.
*** Significant at the 1 percent level.

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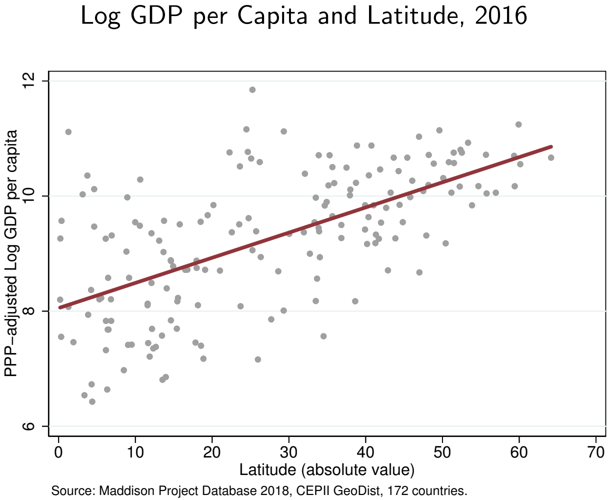
- General solution: find exogenous source of variation.

Identification Issues: Geography as a Source of OVB



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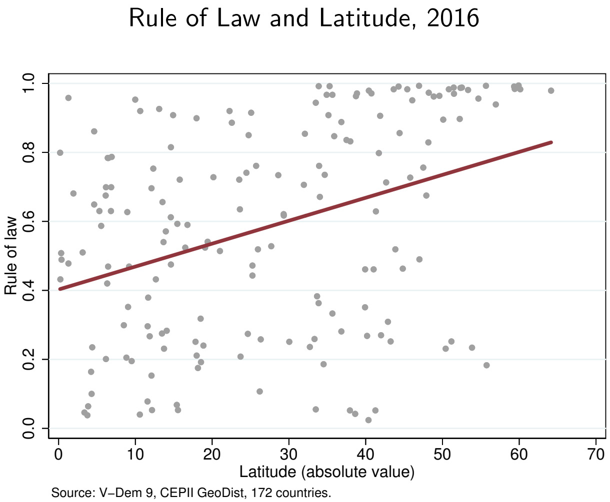
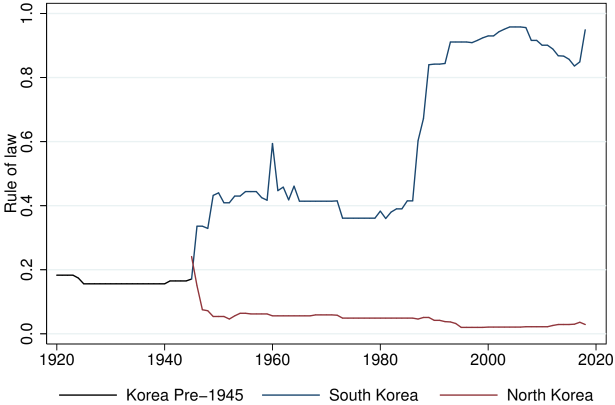


Data Source: Geography

- Best cross-country geographical data source: CEPII-GeoDist.
- Geographical variables: continent, landlocked, official language, area, latitude, longitude, identity of colonizers.
- Diadic dataset: bilateral distance.
- Reference paper: Mayer and Zigago (2011)

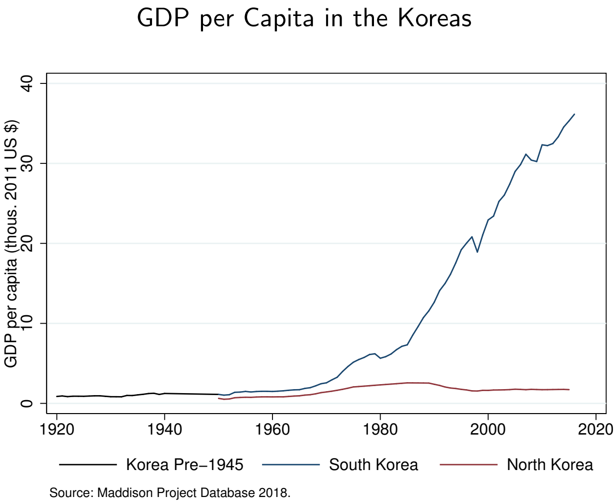
The Korean Experiment

Rule of Law in the Koreas



Source: V−Dem 9.

The Korean Experiment



Reversal of Fortune

- Acemoglu, Johnson and Robinson (2002)
- Use colonization as a quasi-natural experiment to assess the causal impact of institutions on long-run economic development.

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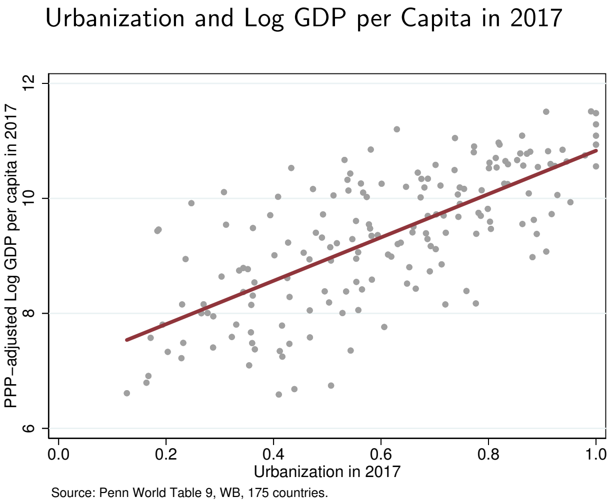
- Use colonization as a quasi-natural experiment to assess the causal impact of institutions on long-run economic development.
- Question: richest ancient civilizations are today among poorest nations. Why?
- Document reversal of relative income among former colonies.
- Evidence that institutions matter for long-run economic development.
- Geography, culture, luck cannot account for the reversal.

Measurement

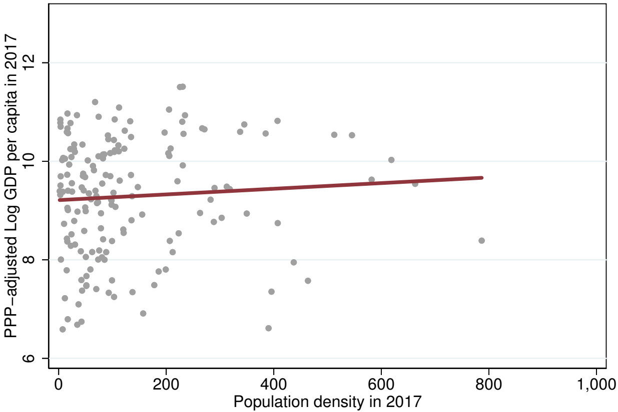
- Which countries in this experiment?
  - Colonized by Europeans between 15th and 19th centuries.
  - Excludes Ireland, Russia, Middle East.
- How to capture prosperity before colonization (1500)?
  - Maddison data: too little sample size.
  - Urbanization: captures high agricultural productivity. Bairoch (1998)
  - Population density.
  - Sample sizes small when paper written.

Measurement



Measurement

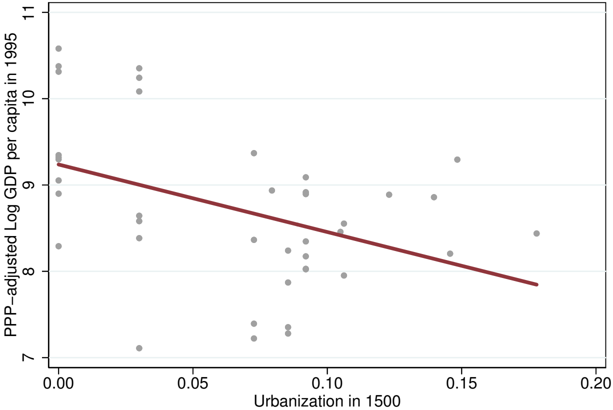
Population Density and Log GDP per Capita in 2017



Source: Penn World Table 9, CEPII GeoDist, 175 countries.

Reversal of Fortune: Main Result

Urbanization in 1500 and Log GDP per Capita in 1995
Former European Colonies



Source: Penn World Table 9, CEPII GeoDist, AJR (2002), 40 countries.

Reversal of Fortune: Main Result

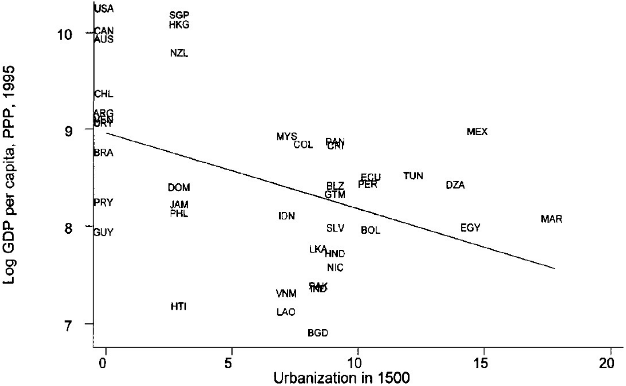


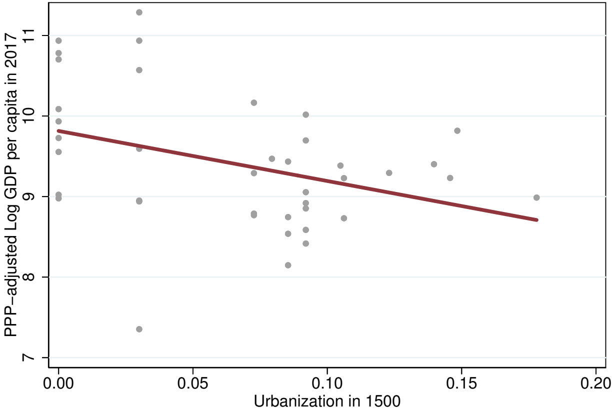
FIGURE I

Log GDP per Capita (PPP) in 1995 against Urbanization Rate in 1500

Note. GDP per capita is from the World Bank [1999]; urbanization in 1500 is people living in towns with more than 5000 inhabitants divided by total population, from Bairoch [1988] and Eggimann [1999]. Details are in Appendices 1 and 2.

Reversal of Fortune: Main Result

Urbanization in 1500 and Log GDP per Capita in 2017
Former European Colonies



Source: Penn World Table 9, CEPII GeoDist, AJR (2002), 40 countries.

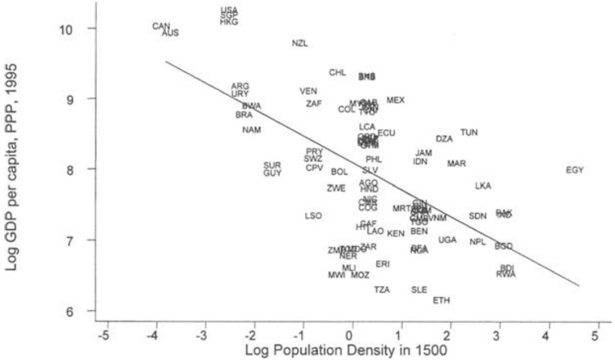


FIGURE II

Log GDP per Capita (PPP) against Log Population Density in 1500

Note. GDP per capita from the World Bank [1999]; log population density in 1500 from McEvedy and Jones [1978]. Details are in Appendix 2.

Reversal of Fortune: Robustness

- Potential confounding factors:
  - Geography: continent, latitude, landlocked, island, temperature.
  - Natural resources: gold, iron, silver, zinc, oil, coal.
  - Colonizer: French, Spanish, British.
  - Religion: Catholicism, Islam.

Reversal of Fortune: Robustness

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  - Geography: continent, latitude, landlocked, island, temperature.
  - Natural resources: gold, iron, silver, zinc, oil, coal.
  - Colonizer: French, Spanish, British.
  - Religion: Catholicism, Islam.
- Robust relationship:
  - Higher urbanization in 1500 $\Longrightarrow$ lower income in 1995.
  - In former European colonies.

Reversal of Fortune: Robustness

Dependent variable:	log GDP per capita (PPP) in 1995			
	(1)	(2)	(3)	(4)
Urbanization 1500	-8.56***	-11.79**	-8.41***	-10.59**
	[2.35]	[4.74]	[3.04]	[4.71]
Geography	No	Yes	No	Yes
Natural resources	No	Yes	No	Yes
Colonizer	No	No	Yes	Yes
Religion	No	No	Yes	Yes
R2	0.22	0.70	0.31	0.79
Countries	40	40	40	40

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

Reversal of Fortune: Interpretation

- Interpreting a coefficient of -10.
  - 10 pp lower urbanization 1500 $\Longrightarrow$ 1 log higher income 1995.
  - Taking exp, means 2-3 times richer.

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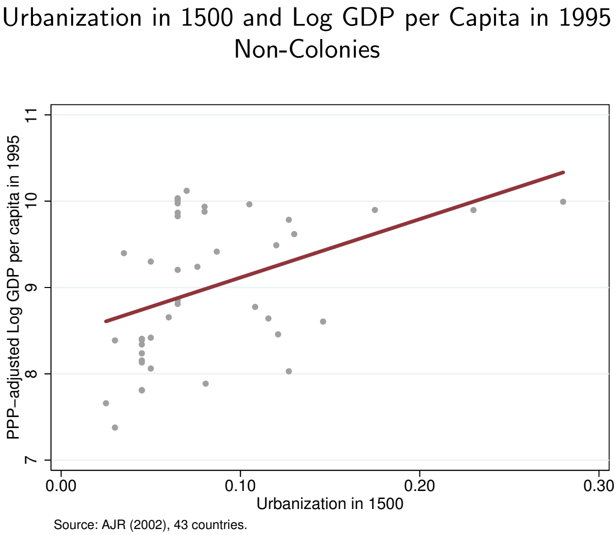
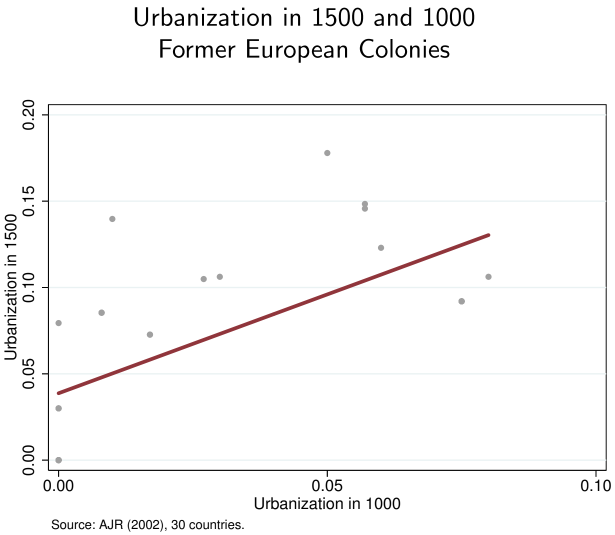
- Not reversion to mean: specific to former colonies.

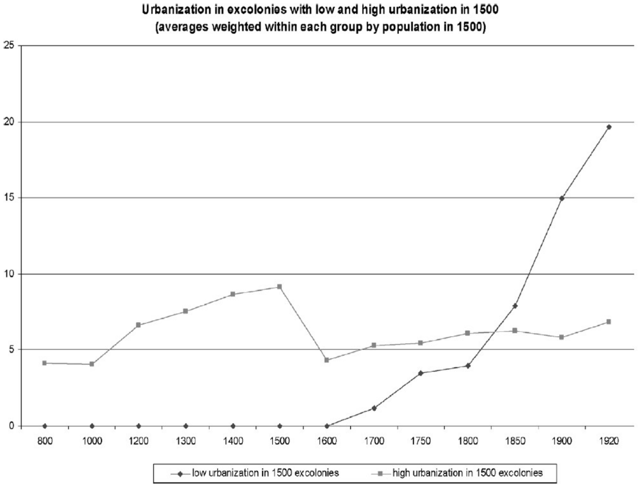
Reversal of Fortune: Non-Colonies



Reversal of Fortune: Timing



Reversal of Fortune: Timing



Reversal of Fortune: Interpretation

- Facts compatible with which theory?

Reversal of Fortune: Interpretation

- Facts compatible with which theory?
  - Geography hypotheses.
  - Culture.
  - Institutions.

Reversal of Fortune: Geography

- Simple geography hypothesis.
    - Permanent effects of geography (α_1) $\Longrightarrow$ prosperity.

$$Y_{it} = \alpha_0 + \alpha_1 \cdot G_i + \nu_t + \varepsilon_{it}$$

Reversal of Fortune: Geography

- Simple geography hypothesis.
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$$Y_{it} = \alpha_0 + \alpha_1 \cdot G_i + \nu_t + \varepsilon_{it}$$

  - Inconsistent: rich countries in 1500 are poor today.

Reversal of Fortune: Geography

- Sophisticated geography hypothesis.
  - Time-varying effects of geography (α_{2t}) $\Longrightarrow$ prosperity.

$$Y_{it} = \alpha_0 + \alpha_1 \cdot G_i + \sum_t \alpha_{2t} \cdot \nu_t \cdot G_i + \nu_t + \varepsilon_{it}$$

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  - "Latitude-specific" agricultural technologies: reversal is industry based.

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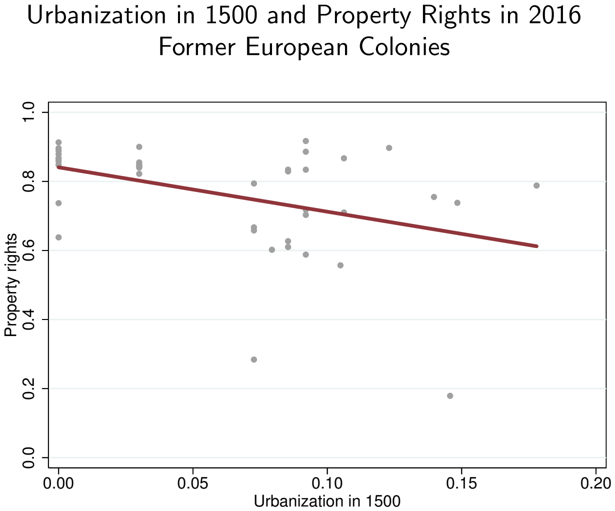
  - "Latitude-specific" agricultural technologies: reversal is industry based.
  - Lack resources endowment for industrialization: not correlated.

Reversal of Fortune: Culture

- Culture hypothesis.
  - Colonialism might have changed culture, created new ones.
  - But has nothing to say about timing.

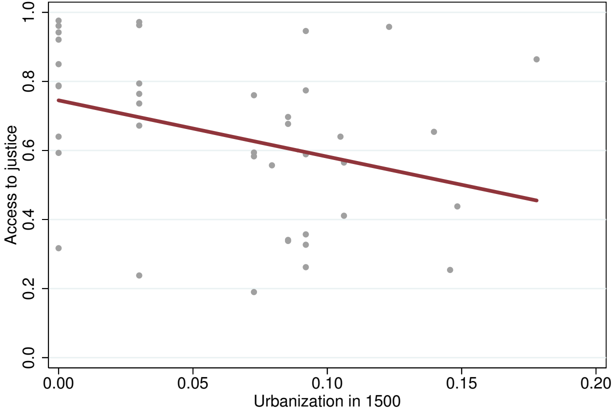
Reversal of Fortune: Institutions



Source: V–Dem 9, AJR (2002), 40 countries.

Reversal of Fortune: Institutions

Urbanization in 1500 and Access to Justice in 2016
Former European Colonies



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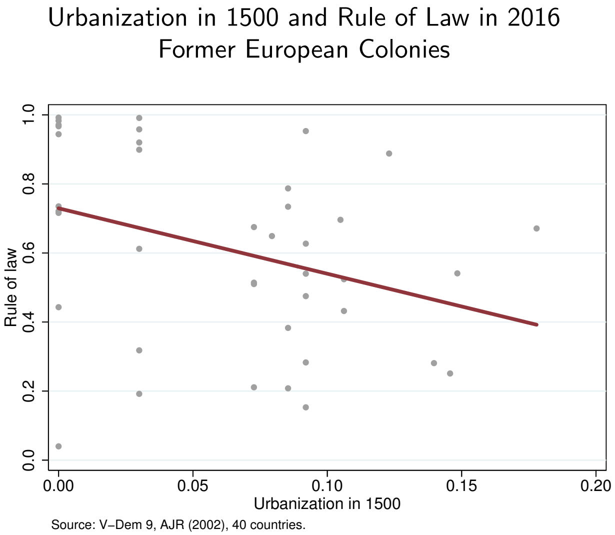
Reversal of Fortune: Institutions



Reversal of Fortune: Institutions

- Evidence of institutional reversal.
  - High urbanization in 1500 $\Longrightarrow$ "extractive institutions."
  - Low urbanization in 1500 $\Longrightarrow$ "inclusive institutions."

Reversal of Fortune: Institutions

- Evidence of institutional reversal.
  - High urbanization in 1500 $\Longrightarrow$ "extractive institutions."
  - Low urbanization in 1500 $\Longrightarrow$ "inclusive institutions."
- Explains also the timing:
  - "Good institutions" $\Longrightarrow$ incentives for K and HK accumulation.
  - Institutions are more important when opportunity to industrialize.

Reversal of Fortune: Institutions

- Factors for choice of colonial institutions:

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    - Economic profitability of extractive institutions.
        - Dense population $\Longrightarrow$ large supply of labor.
        - Pre-existing system of tax administration $\Longrightarrow$ continue.

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- Factors for choice of colonial institutions:
  - Economic profitability of extractive institutions.
    - Dense population $\Longrightarrow$ large supply of labor.
    - Pre-existing system of tax administration $\Longrightarrow$ continue.
  - Whether Europeans could settle.
    - Low density $\Longrightarrow$ Europeans settle $\Longrightarrow$ protect property through inclusive institutions.
    - Same institutions as home $\Longrightarrow$ incentives for Europeans to settle.

Colonial Origins

- Acemoglu, Johnson and Robinson (2001)
- Show that disease environment shaped incentives to settle.
- Use settler mortality as an IV for current institutions.
- Show causal impact of current institutions on current development.

Colonial Origins

Causal chain in "Colonial Origins""

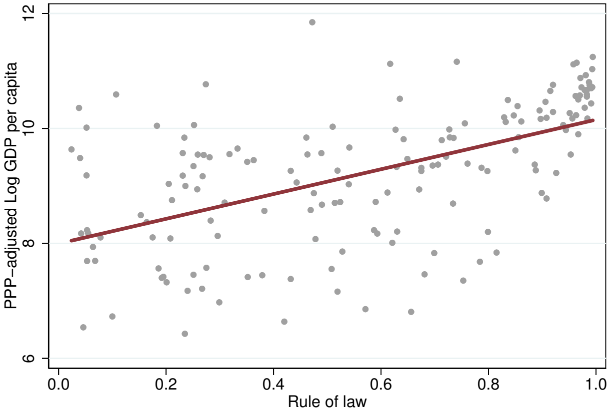
(potential) settler mortality $\Rightarrow$ settlements

$\Rightarrow$ early institutions $\Rightarrow$ current institutions

$\Rightarrow$ current performance.

Colonial Origins

Log GDP per Capita and Rule of Law, 2016. Causal?



Source: V–Dem 9, Maddison Project Database 2018, 160 countries.

Colonial Origins

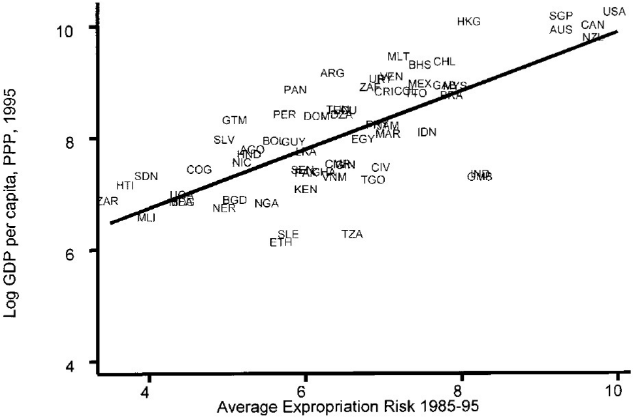


FIGURE 2. OLS RELATIONSHIP BETWEEN EXPROPRIATION RISK AND INCOME

Colonial Origins

- Impact of current institutions on current economic performance:

$$\log y_i = \mu + \alpha R_i + \mathbf{X}_i'\gamma + \varepsilon_i$$

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$$\log y_i = \mu + \alpha R_i + \mathbf{X}_i'\gamma + \varepsilon_i$$

- First stage: impact of settler mortality on current institutions.

$$R_i = \zeta + \beta \log M_i + \mathbf{X}_i'\delta + \nu_i$$

  - y: income per capita.
  - R: measure of institutions.
  - $\mathbf{X}$: controls.
  - M: settler mortality rate.

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  - $\mathbf{X}$: controls.
  - M: settler mortality rate.

- Exclusion restriction: settler mortality only affect development through institutions.

Colonial Origins: First Stage

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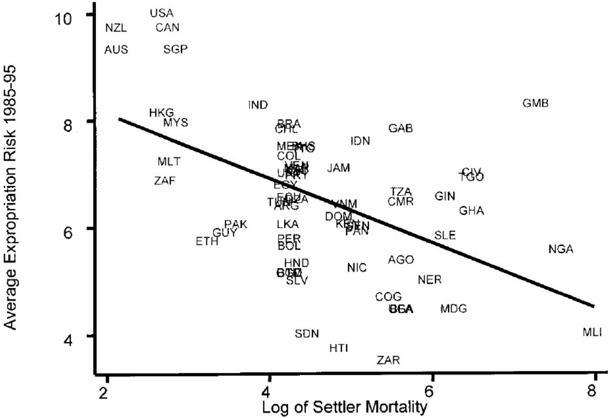


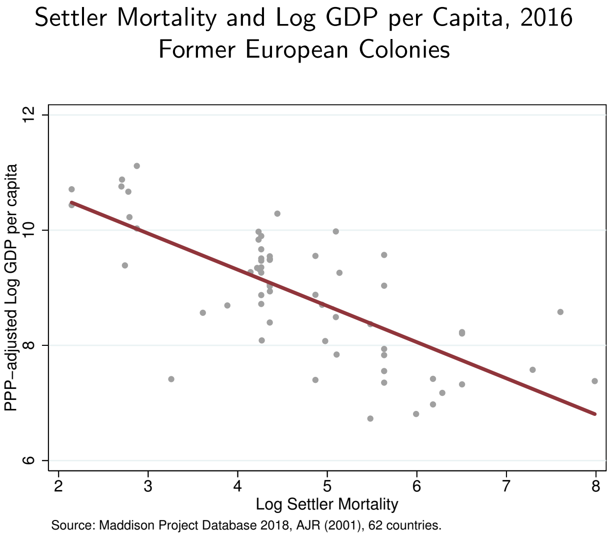
Figure 3. First-Stage Relationship Between Settler Mortality and Expropriation Risk

Colonial Origins: First Stage

Dependent variable:	Rule of Law in 2016			
	(1)	(2)	(3)	(4)
Log settler mortality	-0.11***	-0.05*	-0.10***	-0.05*
	[0.02]	[0.03]	[0.02]	[0.03]
Geography	No	Yes	No	Yes
Colonizer	No	No	Yes	Yes
R2	0.23	0.29	0.28	0.35
Countries	62	62	62	62

*** Significant at the 1 percent level. * Significant at the 1 percent level.

Colonial Origins: Reduced Form



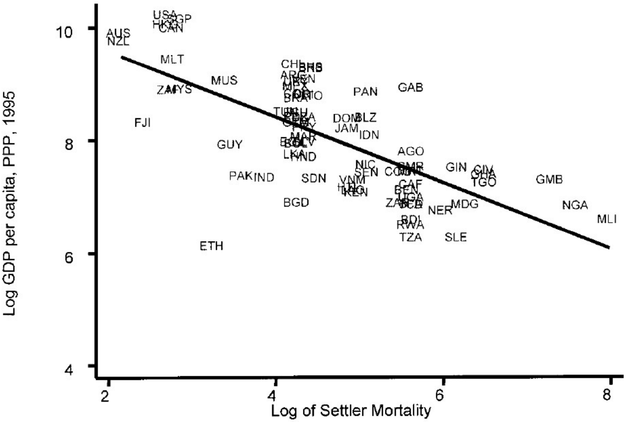


Figure 1. Reduced-Form Relationship Between Income and Settler Mortality

Colonial Origins: Reduced Form

Dependent variable:	Log GDP per Capita in 2016			
	(1)	(2)	(3)	(4)
Log settler mortality	-0.63***	-0.42*	-0.58***	-0.44***
	[0.08]	[0.13]	[0.09]	[0.13]
Geography	No	Yes	No	Yes
Colonizer	No	No	Yes	Yes
R2	0.52	0.64	0.57	0.67
Countries	61	61	61	61

*** Significant at the 1 percent level. * Significant at the 1 percent level.

Colonial Origins: IV Regressions

Dependent variable:	Log GDP per Capita in 2016			
	(1)	(2)	(3)	(4)
Rule of Law in 2016	5.80***	6.88*	5.84***	7.17***
	[0.84]	[2.28]	[0.92]	[2.57]
Geography	No	Yes	No	Yes
Colonizer	No	No	Yes	Yes
Countries	61	61	61	61

*** Significant at the 1 percent level. * Significant at the 1 percent level.

Colonial Origins: Interpretation

- Once institutions purged, little role of geography.
- Rationale for raw correlation between development and geography:
  - Europeans had little immunity to tropical diseases.
  - They tended to settle in temperate latitudes.
  - Explains how geography partly shaped historical institutions.
  - Geography matters only through institutions.

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  - Europeans had little immunity to tropical diseases.
  - They tended to settle in temperate latitudes.
  - Explains how geography partly shaped historical institutions.
  - Geography matters only through institutions.
- Colonial culture? No effect of identity of colonizer.

Colonial Origins: Criticisms

- Large literature resulting from these two papers.
- Criticisms, e.g. Albouy (2012) (after 5 unpublished comments).
  - Reliability and comparability of European settler mortality rates.
  - Procedure of clustering standard errors.
  - Weak instrument problem.
- Responses in AJR (2012) (after 3 unpublished replies).
- Big picture is robust.

Contract Theory vs Predatory Theory

- North (1981) distinguishes:
  - Contract theory of the state: legal framework $\Longrightarrow$ private contracts.
  - Predatory theory of the state: instrument for transferring resources.

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- Empirical importance of each institutional feature?

Property Rights and Contracting Institutions

- Contracting institutions (horizontal).
  - Rules governing contracting between ordinary citizens.
  - Main component: functioning of legal system.
  - Affects cost of enforcing contracts.
  - Implications for equilibrium contracts and transactions.

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- Contracting institutions (horizontal).
  - Rules governing contracting between ordinary citizens.
  - Main component: functioning of legal system.
  - Affects cost of enforcing contracts.
  - Implications for equilibrium contracts and transactions.
- Property rights institutions (vertical).
  - Rules protecting citizens against government and elites power.
  - Relate to interactions between state and society.
  - Affects returns to investment.
  - Implications for equilibrium capital accumulation.

Measurement: Outcomes

- Log GDP per capita. PWT
- Investment to GDP. PWT
- Private credit to GDP. WB
- Stock market capitalization to GDP. Beck et al. (2001)

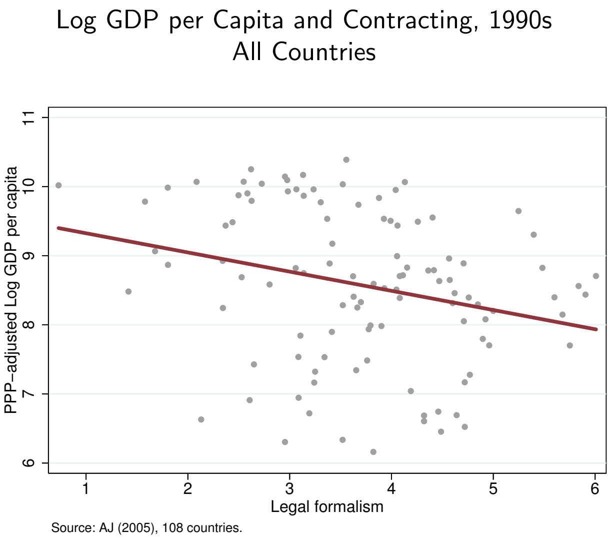
Measurement: Contracting Institutions

- Index of legal formalism (1–7). Djankov et al. (2003)
- Overall procedural complexity of resolving court case (0–10). WB
- Number of procedures for resolving court case. WB

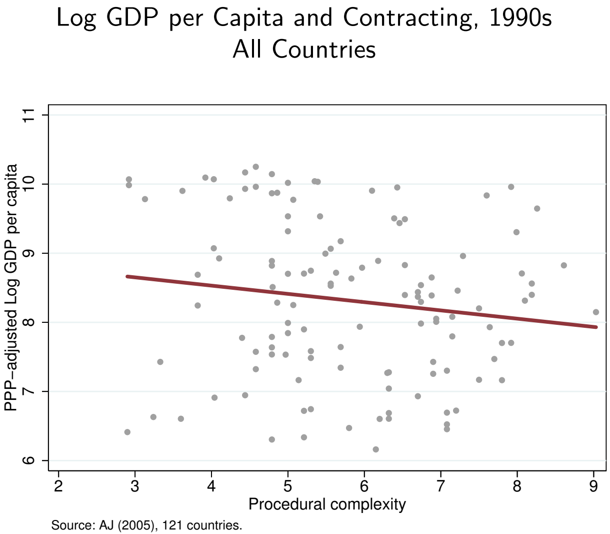
Measurement: Property Rights Institutions

- Constraint on executive (1–7). Polity IV
- Protection against expropriation (1–10). Political Risk Services
- Private property index (1–5). Heritage Foundation
- Property rights (0–1). V-Dem

Correlations: Income and Contracting



Correlations: Income and Contracting



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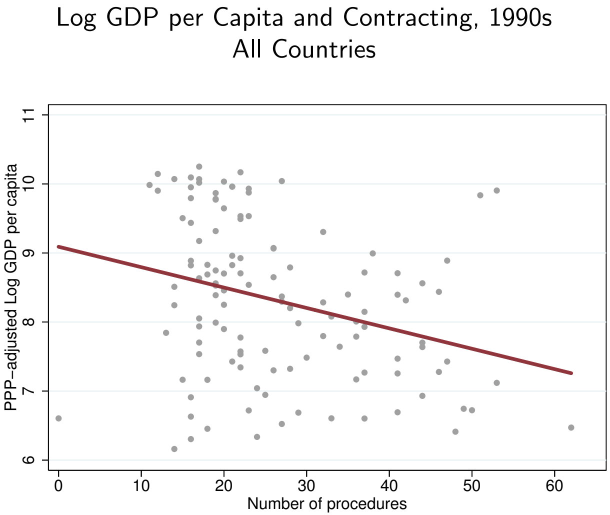


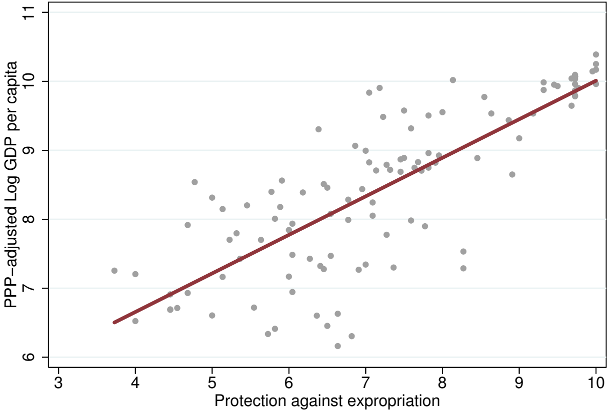
Source: AJ (2005), 122 countries.

Correlations: Income and Property Rights

Source: AJ (2005), 145 countries.

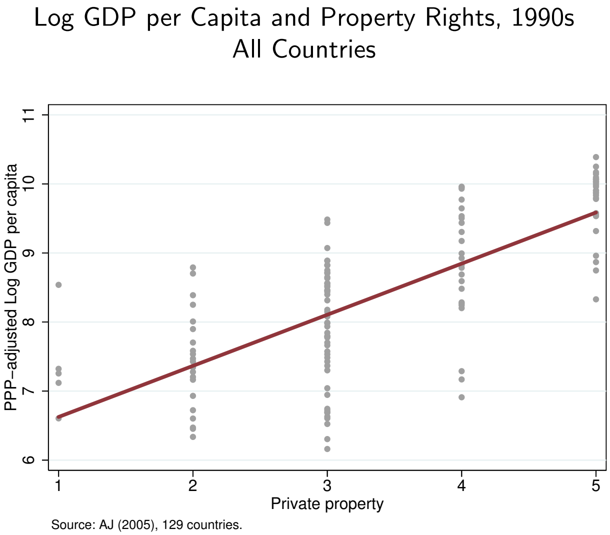
Correlations: Income and Property Rights

Log GDP per Capita and Property Rights, 1990s
All Countries

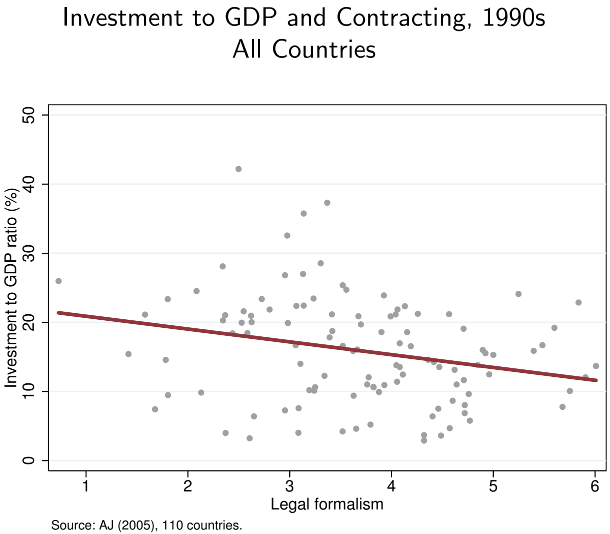


Source: AJ (2005), 110 countries.

Correlations: Income and Property Rights



Correlations: Investment and Contracting



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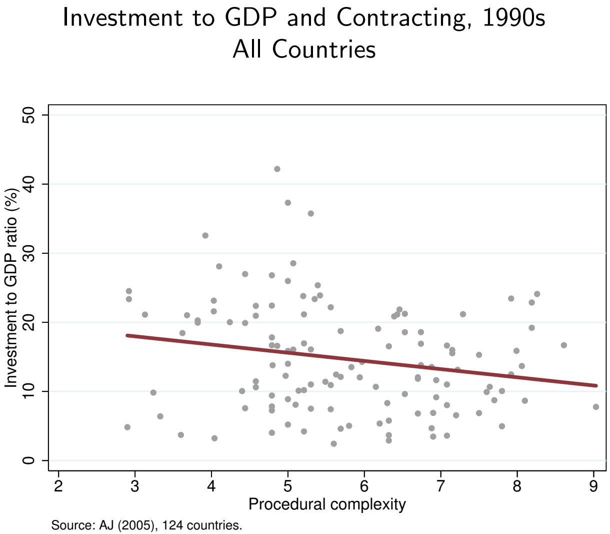

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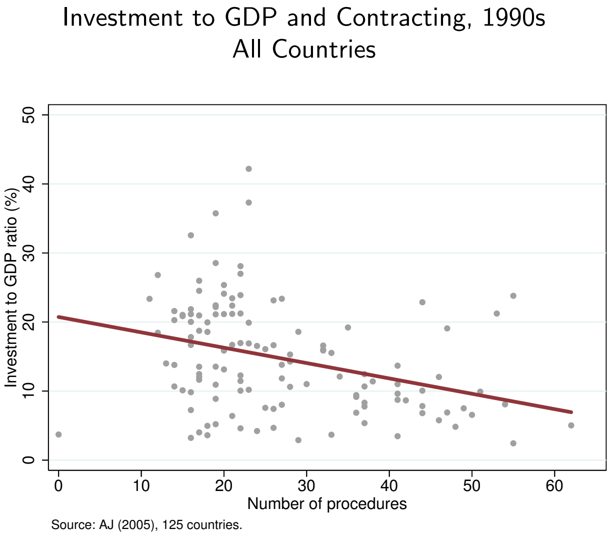

Correlations: Investment and Property Rights

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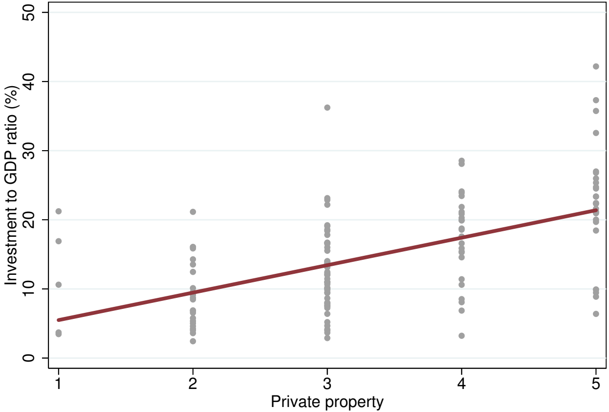
Source: AJ (2005), 113 countries.

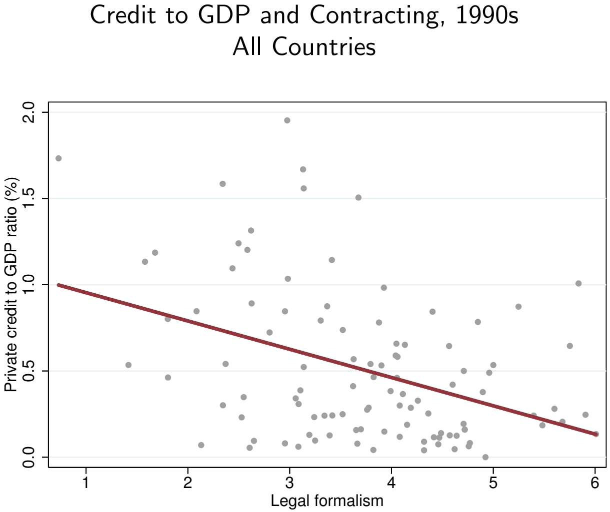
Correlations: Investment and Property Rights

Investment to GDP and Property Rights, 1990s
All Countries



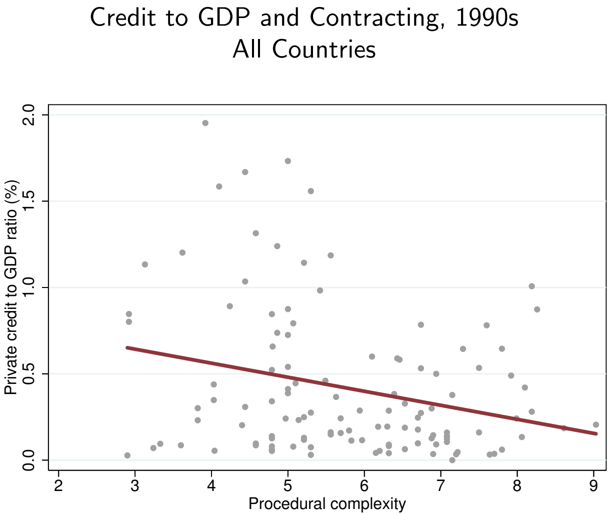
Source: AJ (2005), 131 countries.

Correlations: Credit and Contracting



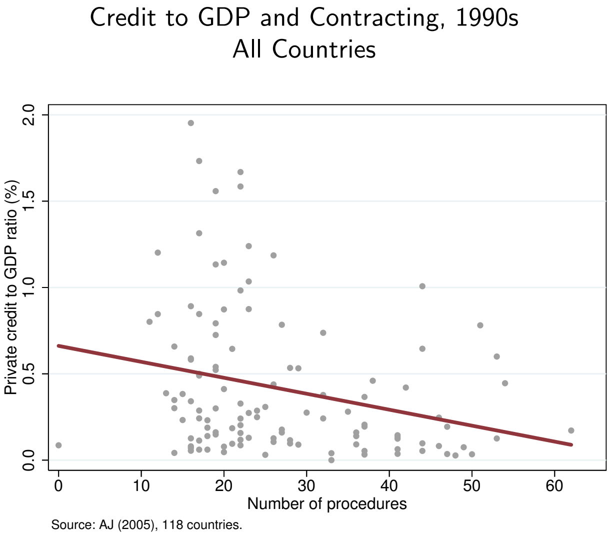
Source: AJ (2005), 103 countries.

Correlations: Credit and Contracting

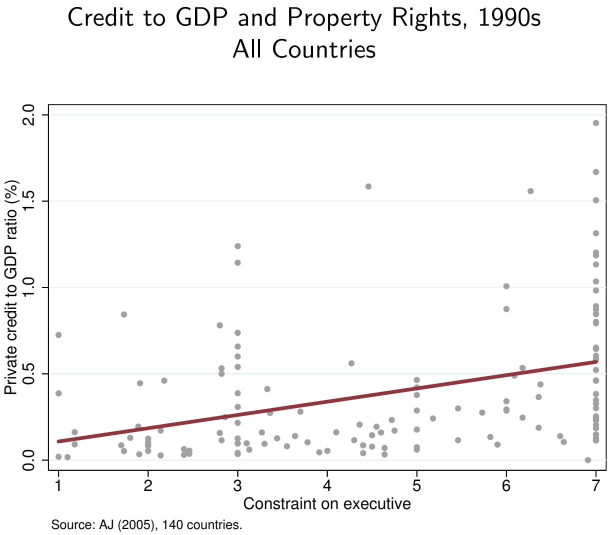


Source: AJ (2005), 117 countries.

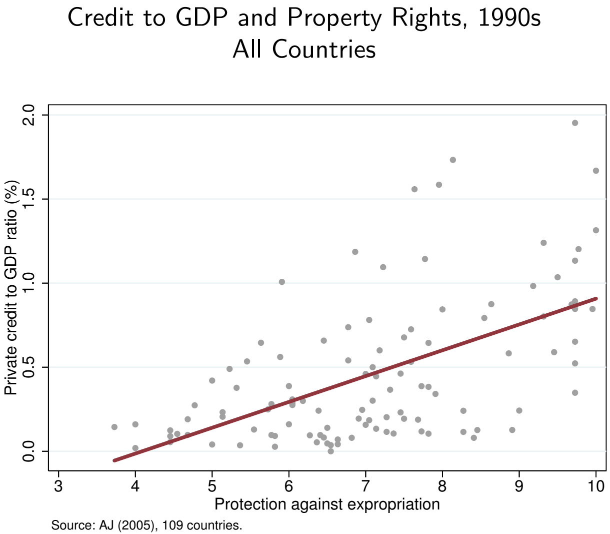
Correlations: Credit and Contracting



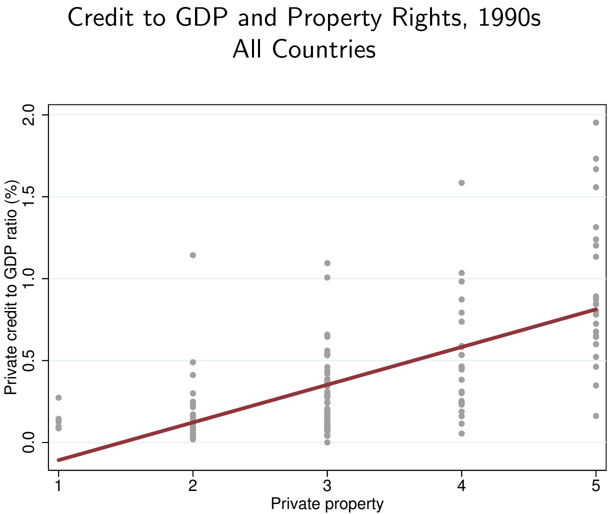
Correlations: Credit and Property Rights



Correlations: Credit and Property Rights



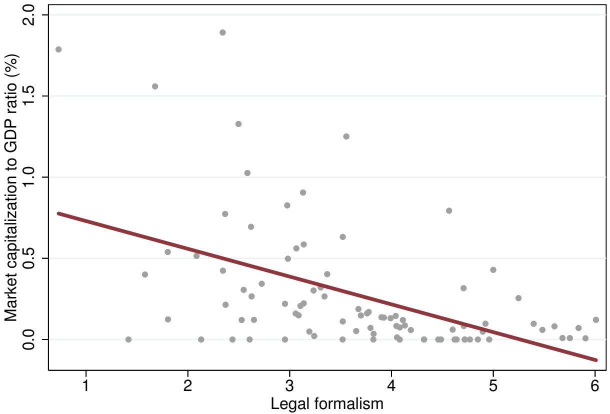
Correlations: Credit and Property Rights



Source: AJ (2005), 126 countries.

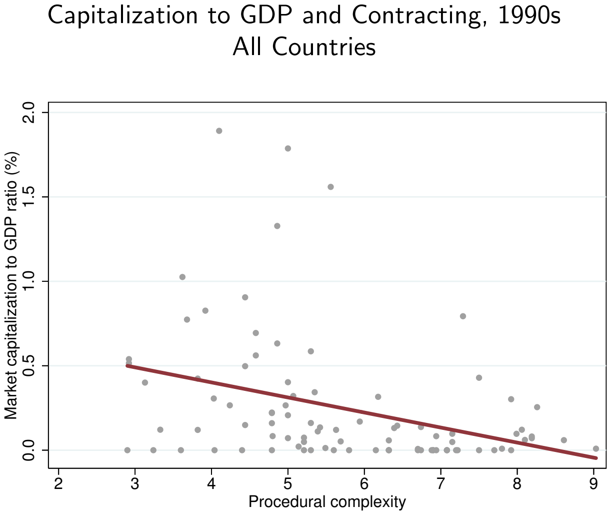
Correlations: Capitalization and Contracting

Capitalization to GDP and Contracting, 1990s
All Countries



Source: AJ (2005), 89 countries.

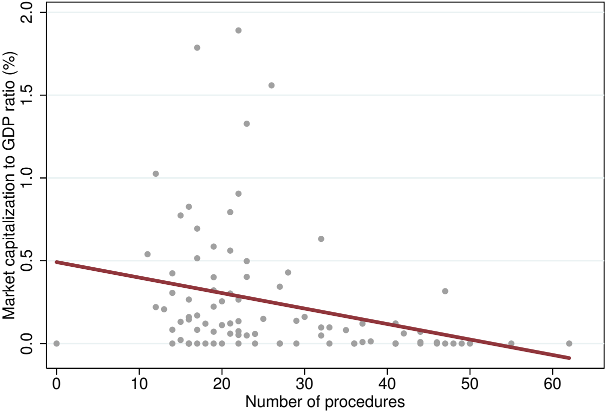
Correlations: Capitalization and Contracting



Source: AJ (2005), 91 countries.

Correlations: Capitalization and Contracting

Capitalization to GDP and Contracting, 1990s
All Countries



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Correlations: Capitalization and Property Rights

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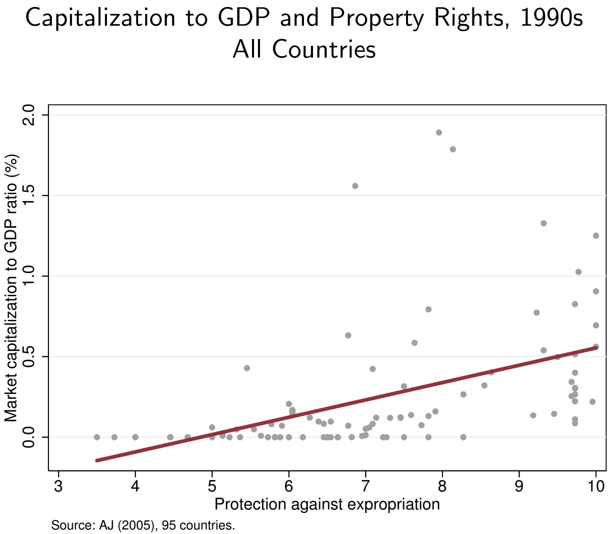

Correlations: Capitalization and Property Rights

Restrict Outcomes and Institutions

- Outcome: focus on Log GDP per capita.
- Contracting institutions: focus on legal formalism.
- Property rights institutions: focus on constraint on executive.
- Variables measured in the 1990s.

Baseline Empirical Strategy

$$Y_c = \alpha F_c + \beta I_c + \mathbf{Z}_c' \gamma + \varepsilon_c$$

- Y_c: outcome of interest in country c.
- F_c: measure of contracting institutions.
- I_c: measure of property rights institutions.
- $\mathbf{Z}_c$: vector of controls (geography, religion...).

Univariate OLS Coefficients

Dependent variable:	Log GDP per capita			
	(1)	(2)	(3)	(4)
Legal formalism	-0.28***	-0.21**		
	[0.08]	[0.11]		
Constraint on executive			0.33***	0.30***
			[0.04]	[0.05]
Sample	All	FEC	All	FEC
Countries	108	65	145	86

Source: AJ (2005). *FEC*: Former European Colonies.
*** Significant at the 1 percent level. ** Significant at the 5 percent level.

Identification Strategy

- Threats to identification.

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    - Reverse causality.
    - Omitted variable bias (e.g. geography).

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  - Reverse causality.
  - Omitted variable bias (e.g. geography).
- Measurement error.
  - Downward attenuation bias.
  - Correlated measurement error.

Identification Strategy: 2SLS

- Solution: two-stage least squares (2SLS).
- Two instruments:

Identification Strategy: 2SLS

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- Solution: two-stage least squares (2SLS).
- Two instruments:
    - Contracting IV: British legal origins. La Porta et al. (1997, 1998)
    - Property rights IV: European settlers mortality. AJR (2001)

Identification Strategy: First Stage

$$F_c = \delta_1 L_c + \eta_1 M_c + \mathbf{Z}_c' \gamma_1 + u_{1c}$$
$$I_c = \delta_2 L_c + \eta_2 M_c + \mathbf{Z}_c' \gamma_2 + u_{2c}$$

- F_c: measure of contracting institutions.
- I_c: measure of property rights institutions.
- L_c: British colony indicator.
- M_c: log European settlers mortality.
- $\mathbf{Z}_c$: vector of controls (geography, religion...).

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$$F_c = \delta_1 L_c + \eta_1 M_c + \mathbf{Z}_c' \gamma_1 + u_{1c}$$

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- I_c: measure of property rights institutions.
- L_c: British colony indicator.
- M_c: log European settlers mortality.
- $\mathbf{Z}_c$: vector of controls (geography, religion. . .).

- Exclusion restriction: $Cov\left(\varepsilon_c, L_c\right) = Cov\left(\varepsilon_c, I_c\right) = 0$.
- ε_c: error term from second-stage.

Instrument 1: Settlers Mortality

- Log settler mortality in former European colonies. AJR (2001)
- European colonization strategy $\Longrightarrow$ historical property rights institutions $\Longrightarrow$ current property rights institutions.
- Disease environment $\Longrightarrow$ settlers mortality $\Longrightarrow$ colonization strategy.

Instrument 2: Legal Origin

- British legal origin. La Porta et al. (1997, 1998)
- Two great legal traditions:
  - Common-law countries (British): low formalism.
  - Civil-law countries (French, German, Scandinavian): high formalism.

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  - Civil-law countries (French, German, Scandinavian): high formalism.
- Exogenous to countries colonized by Europeans.
- Exclusion restriction:
  - Might affects Y_c through channels other than contracting.
  - Expect $Cov\left(\varepsilon_c, L_c\right) \geq 0 \Longrightarrow$ upper bound.

First Stage: Contracting Institutions

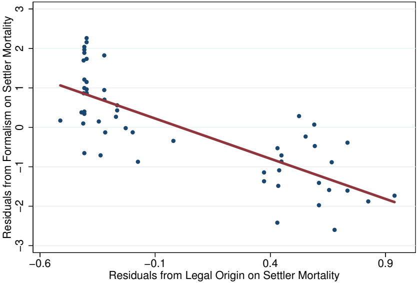
Dependent variable:	Legal Formalism		
	(1)	(2)	(3)
English legal origin	-2.13***		-2.04***
	[0.23]		[0.23]
Log settler mortality		0.36**	0.12
		[0.14]	[0.08]
R2	0.64	0.11	0.65
Countries	54	54	54

Source: AJ (2005).

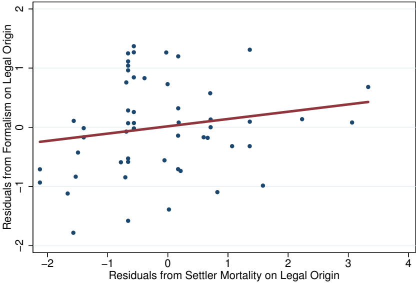
*** Significant at the 1 percent level. ** Significant at the 5 percent level.

First Stage: Contracting Institutions

Partial Correlations



Source: AJ (2005), 54 countries.



Source: AJ (2005), 54 countries.

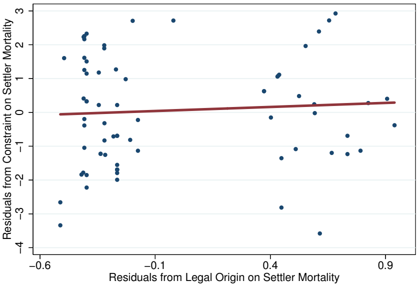
First Stage: Property Rights Institutions

Dependent variable:	Constraint on Executive		
	(1)	(2)	(3)
English legal origin	0.65		0.15
	[0.49]		[0.42]
Log settler mortality		-0.77***	-0.75***
		[0.15]	[0.16]
R2	0.03	0.25	0.26
Countries	72	72	72

Source: AJ (2005).
*** Significant at the 1 percent level. ** Significant at the 5 percent level.

First Stage: Property Rights Institutions

Partial Correlations



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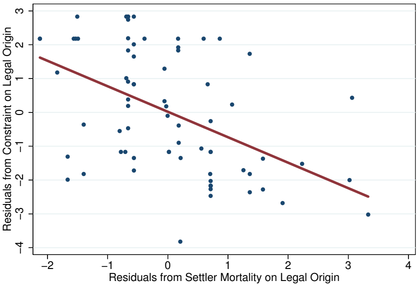

Source: AJ (2005), 72 countries.

2SLS Estimates (FEC)

Dependent variable:	Log GDP per capita	
	(1)	(2)
Legal formalism	-0.16*	0.05
	[0.10]	[0.23]
Constraint on executive	0.31***	0.99***
	[0.07]	[0.27]
Estimator	OLS	2SLS
Countries	51	51

Source: AJ (2005).

*** Significant at the 1 percent level. * Significant at the 1 percent level.

Other Results

- Similar results with other measures of institutions.

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Other Results

- Similar results with other measures of institutions.
- Investment: property rights matter but not contracting.
- Credit: property rights matter but not contracting.
- Stock market: contracting matters but not property rights.

Robustness

- Robust to semi-reduced form: legal origin enters second stage directly.

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Robustness

- Robust to semi-reduced form: legal origin enters second stage directly.
- Robust to alternative samples.
- Robust to controls (geography, religion, macro variables. . .).
- Robust to alternative measurement of institutions: firms surveys.

Interpretation

- Contracting institutions have limited consequences (flexibility).
- Property rights institutions matter much more (necessary condition).

The Big Question

Long-term economic impact of colonial rule?

Motivation

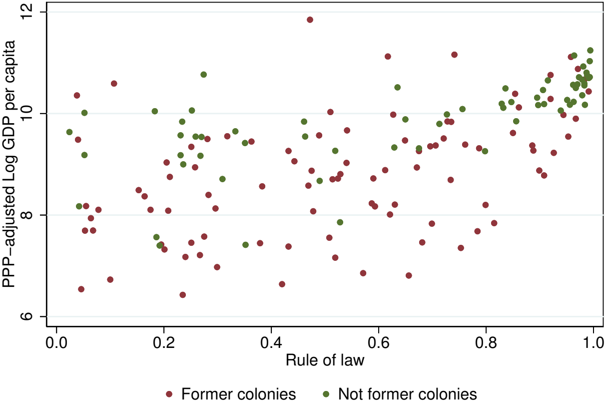
- Many aspects to this question:
  - Excessive exploitation of resources $(-)$.
  - Growth dependence $(-)$.
  - Labor coercion $(-)$.
  - Schooling systems $(+)$.
  - Capital movements $(+)$.
  - Not even major force: geography hypotheses.

Motivation

- Many aspects to this question:
  - Excessive exploitation of resources ($-$).
  - Growth dependence ($-$).
  - Labor coercion ($-$).
  - Schooling systems ($+$).
  - Capital movements ($+$).
  - Not even major force: geography hypotheses.
- Focus on important aspect:
  - Persistent role of (extractive) colonial institutions.

Differences in Outcomes across Colonial Status

Log GDP per Capita and Rule of Law across Colonial Status in 2016



Source: V–Dem 9, GeoDist, 160 countries.

Differences in Outcomes across Colonial Status

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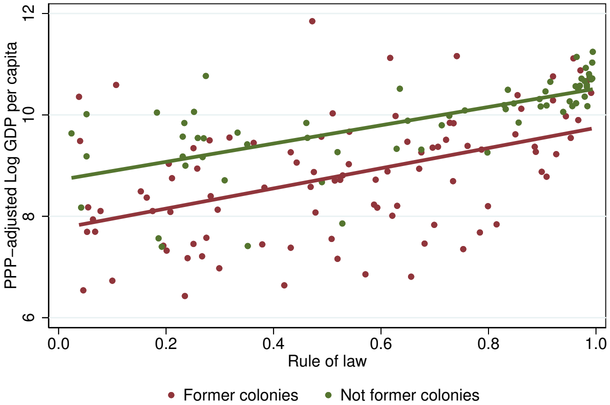

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Differences in Outcomes across Colonial Status

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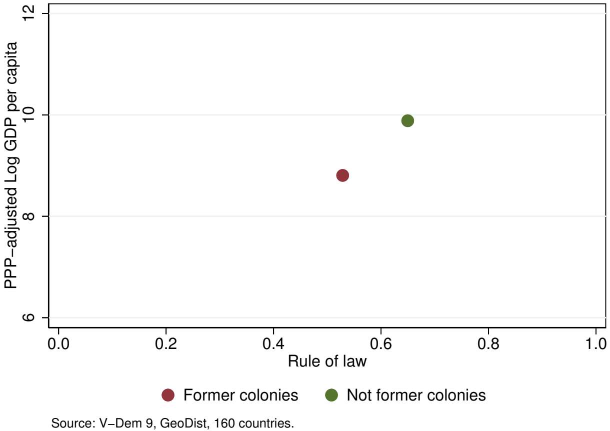
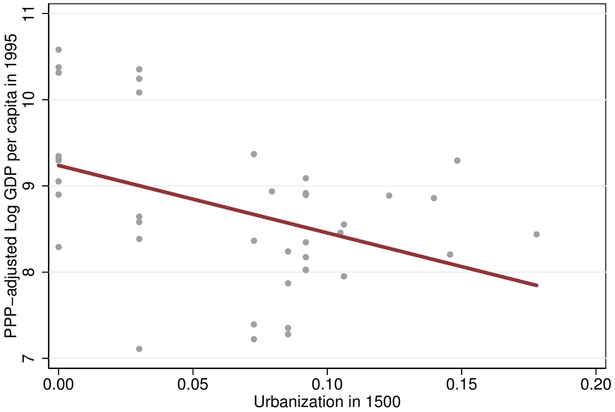


Reversal of Fortune

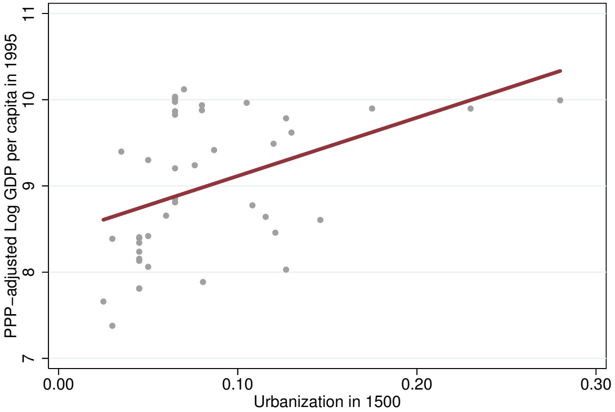
Reversal of Fortune among Former Colonies (AJR 2002)



Source: Penn World Table 9, CEPII GeoDist, AJR (2002), 40 countries.

Reversal of Fortune

No Reversal of Fortune among Non-Colonies (AJR 2002)



Source: AJR (2002), 43 countries.

Beyond Colonial Origins

- AJR 2001 $\Longrightarrow$ extractive colonial institutions (in high mortality areas) $\Longrightarrow$ persistence of weak institutions

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Beyond Colonial Origins

- AJR 2001 $\Longrightarrow$ extractive colonial institutions (in high mortality areas) $\Longrightarrow$ persistence of weak institutions
- But AJR 2001 does not settle the debate.
  1. Unwarranted cross-country comparisons?
  2. Black box of institutions: what are the mechanisms?
- Iyer (2010), Dell (2010), and Dell and Olken (2020)
  1. Use within-country variation in colonial institutions.
  2. Precise exploration of mechanisms.

$\Longrightarrow$ Better and more subtle answer to the question.

Colonial Institutions in India

The Review *of* Economics *and* Statistics

VOL. XCII | NOVEMBER 2010 | NUMBER 4

DIRECT VERSUS INDIRECT COLONIAL RULE IN INDIA: LONG-TERM CONSEQUENCES

Lakshmi Iyer*

Colonial Institutions in India

- Iyer (2010)
- What are the long-term economic consequences of British colonial rule in India?

Colonial Institutions in India

- Iyer (2010)
- What are the long-term economic consequences of British colonial rule in India?
- Do Indian districts that were under direct colonial rule have better agricultural productivity and public goods provision today than those that were under indirect colonial rule?

Historical Context: British Conquest of India

Three periods of British conquest of India.

1. The Ring Fence (1765–1818).
   East India Company annexed 192 districts through wars.

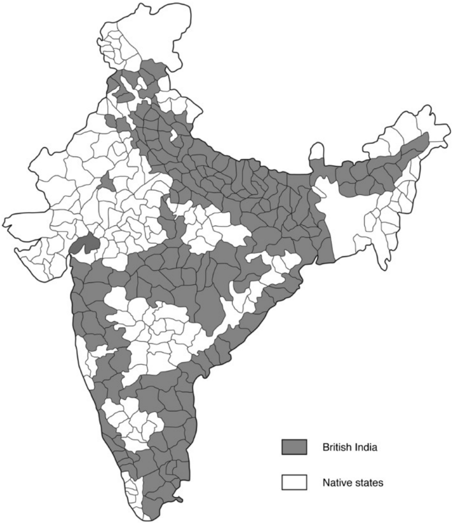
2. Subordinate Isolation (1818–1858).
   Native states subordinate to British. 79 districts annexed.

3. End of Annexation (1857–1947).
   British Crown takes over. 1 district annexed.

$\Longrightarrow$ In 1947, 260 districts (65%) under direct British rule.

British India and Native Districts

FIGURE 1.—BRITISH INDIA AND NATIVE STATES



Data

- Level of aggregation: Indian districts.
- Treatment: district $\in$ British Empire or native state in 1947.
- Main issue: no income or consumption data at district level.
- Main outcomes:
    - Agricultural investment and productivity (1956–1987).
    - Public goods: schools, health centers, roads (1981–1991).
    - Development outcomes: literacy, infant mortality, poverty, inequality (1960s–1990s).
- Geographic controls: latitude, rainfall, coast, soil type.

Empirical Strategy

$$y_i = \alpha + \beta \mathrm{Brit}_i + \gamma X_i + \varepsilon_i$$

Empirical Strategy

$$y_i = \alpha + \beta \mathrm{Brit}_i + \gamma X_i + \varepsilon_i$$

- Main issue: selection.
  - British annexed most agriculturally productive areas.
  - Estimates biased upward.

Empirical Strategy

- Instrumental variable strategy.
  - 1848–1856: annexation rule.
  - Annex state when ruler dies without natural heir.

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  - 1848–1856: annexation rule.
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- Variable and sample:
  - *Lapse*: indicator for native state not annexed before 1848 and ruler died without heir 1848–1856.
  - Sample: native states never annexed + annexed due to lapse after 1847 + annexed by other means after 1847.

Empirical Strategy

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- Variable and sample:
  - *Lapse*: indicator for native state not annexed before 1848 and ruler died without heir 1848–1856.
  - Sample: native states never annexed + annexed due to lapse after 1847 + annexed by other means after 1847.
- First stage:

$$\mathrm{Brit}_i = \pi_0 + \pi_1 \mathtt{Lapse}_i + \pi_2 X_i + u_i$$

First Stage

Dependent variable:	Brit			
	(1)	(2)	(3)	(4)
Ruler died without natural heir in 1848–1856	0.682***	0.673***	0.669***	0.953***
	[0.159]	[0.155]	[0.162]	[0.176]
Ruler died without heir				-0.231*
				[0.126]
Ruler died in 1848–1856				-0.161
				[0.101]
Geography	No	Yes	Yes	Yes
Soils	No	No	Yes	No
R2	0.29	0.35	0.37	0.42
Districts	181	163	152	163
Native states	73	71	67	71

Standard errors clustered at the native state level.

Main Results

- Agricultural investment and productivity: no correlation.

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- Public goods provision:
  - Education: 37% fewer villages with middle schools.
  - Health: 70% fewer villages with primary health centers.
  - Roads: 46% fewer villages with access to good roads.

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- Public goods provision:
  - Education: 37% fewer villages with middle schools.
  - Health: 70% fewer villages with primary health centers.
  - Roads: 46% fewer villages with access to good roads.
- Development:
  - Poverty rates: 40% higher in 1990s.
  - Infant mortality: 33% higher in 1990s.

Mechanisms

- Post-colonial policies?
  - Gap between areas narrowing over time.
  - Differences in human capital already present in colonial period.

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- Post-colonial policies?
  - Gap between areas narrowing over time.
  - Differences in human capital already present in colonial period.
- Colonial policies: extractive institutions under direct colonial rule.
  - Excessive taxation from the British, draining resources?
    No: native states extracted more.
  - Landlord-based land revenue system in directly ruled area.
  - Poor incentives for good colonial governance.

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

THE PERSISTENT EFFECTS OF PERU'S MINING *MITA*

BY MELISSA DELL[1]

Colonial Institutions in Peru

- Dell (2010)
- What are the long-term economic consequences of Spanish colonial rule in Peru?

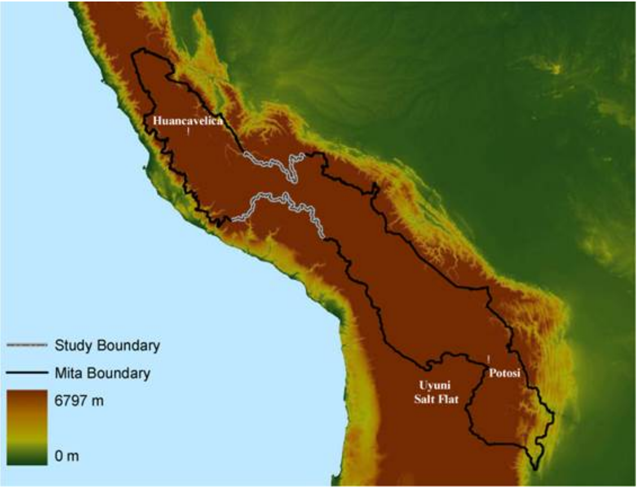
Colonial Institutions in Peru

- Dell (2010)
- What are the long-term economic consequences of Spanish colonial rule in Peru?
- Do districts under *mita* forced labor system (1573–1812) have worse economic outcomes today?

Historical Context: the Mita

- 1573–1812 (240 years): 200 indigenous communities required to send $1/7$ of adult males to silver and mercury mines.
- 3% of adult males in Peru were conscripted to the *mita* at any given point.
- Very precise geographical boundaries: forced within, exempt outside.
- Determinants of *mita* zone: distance to mines and elevation.

Historical Context: the Mita



Data

- Level of aggregation: households in Peru districts around boundary.
- Treatment: household in district $\in$ mita between 1573 and 1812.
- Main outcomes:
    - Household consumption (2001).
    - Health: children stunting (2005).
- Geographic controls: elevation, slope.

Empirical Strategy

- Geographical regression discontinuity design.
- Compare very close ($<$ 100 km) locations on either side of border.
- Main idea: identical along (un)observed characteristics.

$$y_{id} = \alpha + \beta \mathrm{mita}_d + \gamma X_{id} + f(\mathrm{location}_d) + \varepsilon_{id}$$

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- Main idea: identical along (un)observed characteristics.

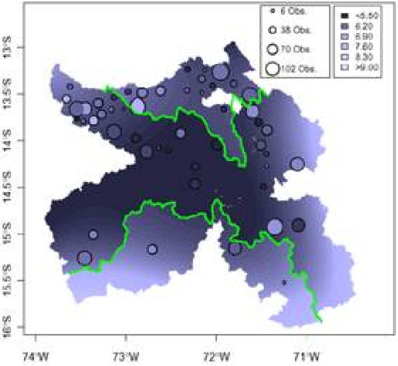
$$y_{id} = \alpha + \beta \text{mita}_d + \gamma X_{id} + f(\text{location}_d) + \varepsilon_{id}$$

- Identical geography across border.
- Colonial outcomes similar across border.

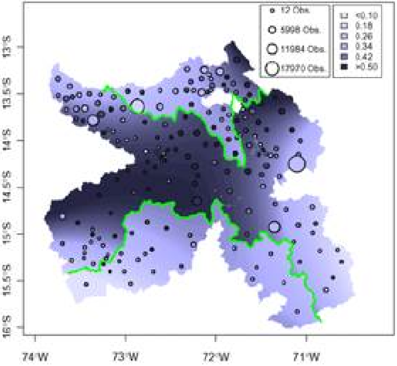
Main Results

- Household consumption: 25% lower in mita districts.
- Health: stunting 6pp more prevalent in mita districts.

Main Results



(a) Consumption (2001)



(b) Stunting (2005)

Mechanisms

- Land tenure and labor systems:
  - Spanish limited large haciendas in *mita* districts.
  - Less haciendas even in 1940.

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- Public goods.
  - *Mita* lowered access to education historically, though not today.
  - *Mita* districts less integrated into road network.
  - Large landowners in non-*mita* districts have more secured property rights $\Longrightarrow$ incentives for public goods provision.

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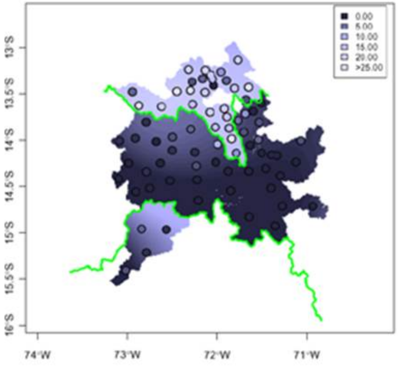
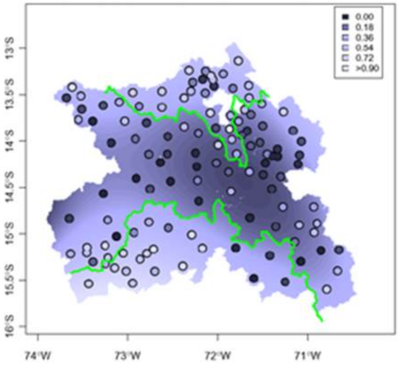
  - *Mita* districts less integrated into road network.
  - Large landowners in non-*mita* districts have more secured property rights $\Longrightarrow$ incentives for public goods provision.
- Agricultural market participation.
  - Lower access to markets, reducing household income.

Mechanisms

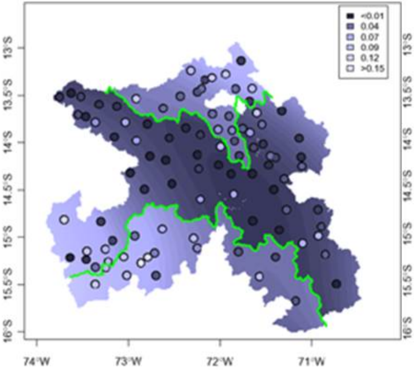


(c) *Haciendas* (1689)

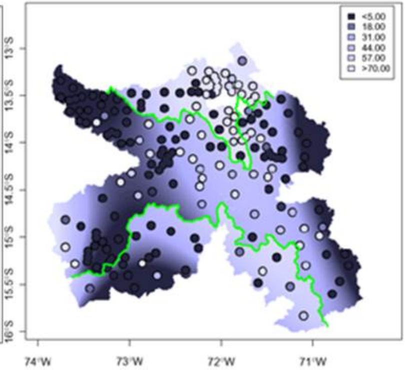


(e) *Haciendas* (1940)

Mechanisms

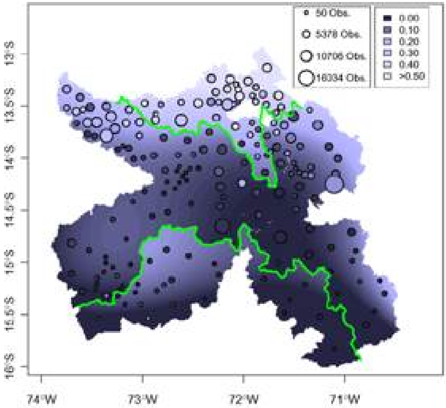


(f) Education (1876)



(g) Road Density (2006)

Mechanisms



(h) Ag. Market Participation (1994)

Colonial Institutions in Java

Review of Economic Studies (2020) **87**, 164–203 doi:10.1093/restud/rdz017

Advance access publication 18 March 2019

The Development Effects of the Extractive Colonial Economy: The Dutch Cultivation System in Java

MELISSA DELL
Harvard University

and

BENJAMIN A. OLKEN
MIT

Colonial Institutions in Java

- Della and Olken (2020)
- What are the long-term economic consequences of Dutch colonial rule in Java?

Colonial Institutions in Java

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- What are the long-term economic consequences of Dutch colonial rule in Java?
- Did places subjected to more intensive colonial extraction through Dutch Cultivation System have different development trajectories?

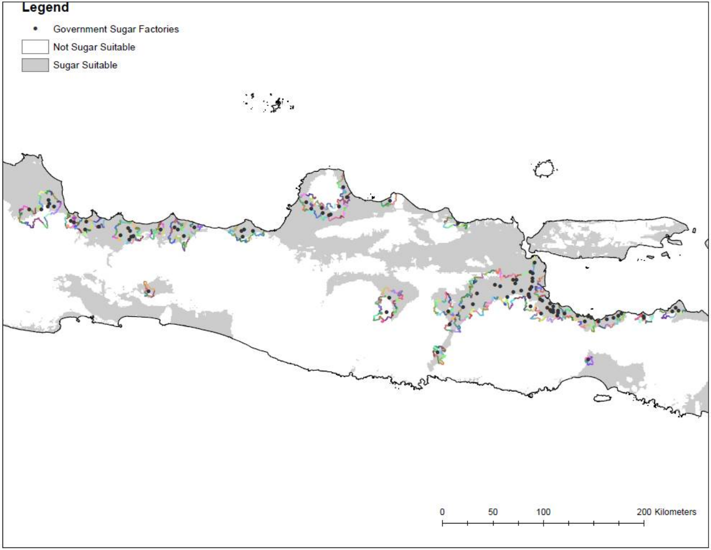
Historical Context: the Dutch Cultivation System

- 1830s–1870s: peasants along northern coast forced to cultivate sugar (25% of Javanese native population).

Historical Context: the Dutch Cultivation System

- 1830s–1870s: peasants along northern coast forced to cultivate sugar (25% of Javanese native population).
- Vast reorganization of economic structures:
  - Before Cultivation System: Java heavily specialized in rice cultivation for local consumption.
  - Dutch built 94 water-powered sugar factories to process cane into sugar.
  - Sugar had to be grown nearby (4–7 km around factory).

Historical Context: the Dutch Cultivation System



Data

- Level of aggregation: villages in Java.
- Treatment: village close to historical sugar factory.
- Main outcomes (1980 census, 2001–2011 household surveys):
  - Economic structure.
  - Population density.
  - Household consumption.

Empirical Strategy

- Location of historical factories not random.
- Determinants of factory implantation:
  - Land suitability for growing sugar.
  - Proximity to river.
  - Proximity to routes, population, firewood.
  - Sufficient spacing between factories.

$\Longrightarrow$ Many potential factory configurations.

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    - Proximity to routes, population, firewood.
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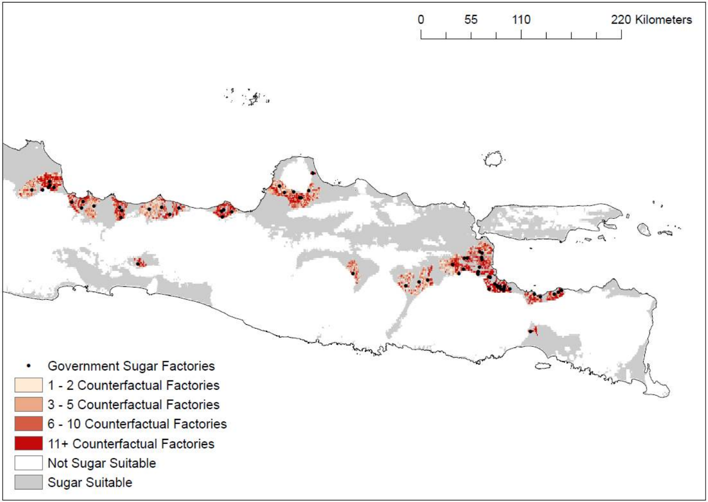
$\Longrightarrow$ Many potential factory configurations.

- Build a set of counterfactual factory locations.
- Counterfactual locations have with similar characteristics as actual.

Counterfactual Factory Locations



Empirical Strategy

$$y_v = \alpha + \beta \mathrm{Factory}_v + \gamma X_v + \mathbf{fact_v} + \varepsilon_v$$

- $\mathrm{Factory}_v$: indicator for factory close ($<$ 10 km).
- X_v: geographical controls.
- $\mathbf{fact_v}$: nearest factory FE $\implies$ compare villages same factory.

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- Factory_v: indicator for factory close (< 10 km).
- X_v: geographical controls.
- $\mathbf{fact_v}$: nearest factory FE $\Longrightarrow$ compare villages same factory.
- Estimate separately for both actual and 1000 counterfactual factory locations.
- Coefficient of interest: difference between coefficient on actual factory vs average of 1,000 counterfactual factories.
- Focus on colonial factories without modern sugar factories nearby.

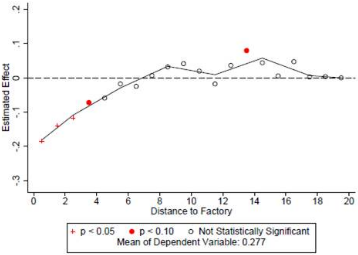
Main Results

In places without modern factories, but within 10km of historical factory:

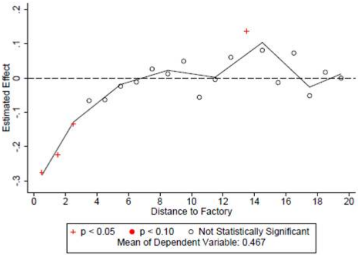
- Males aged 18–55 in 2001–2011 are:
    - 18pp less likely to work in agriculture.
    - 6pp more likely to work in industry.
    - 9pp more likely to work in retail.
- Villages are more densely populated today.
- Household have higher consumption today.

Main Results: Agriculture

(a) Agriculture (Susenas 2001-11)

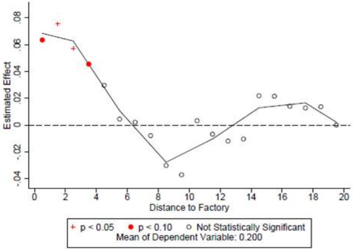


(b) Agriculture (Census 1980)

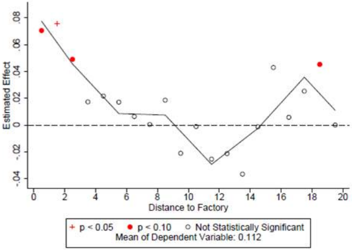


Main Results: Industry

(c) Manufacturing (Susenas 2001-11)

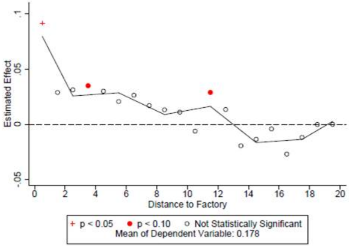


(d) Manufacturing (Census 1980)

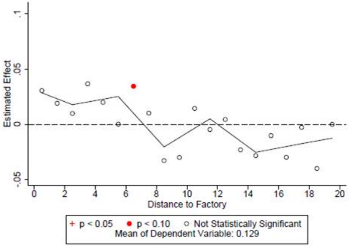


Main Results: Retail

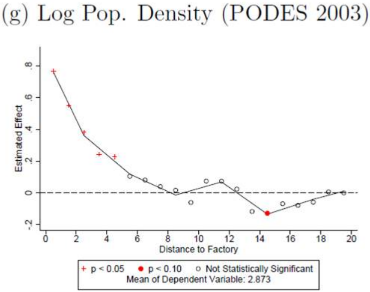
(e) Retail (Susenas 2001-11)

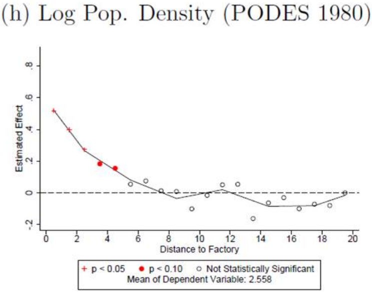


(f) Retail (Census 1980)



Main Results: Population Density





Mechanisms

- Input-output linkages.
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  - Downstream centers persisted near historical factories.

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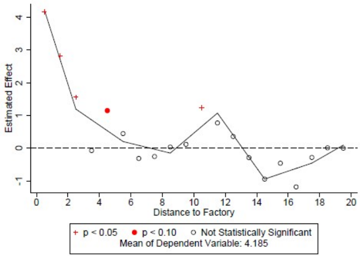
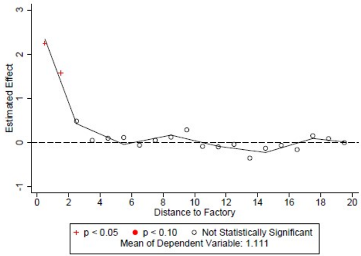
  - Road infrastructures built to support Cultivation System.
  - Better roads and railroads network near historical factories today.
- Human capital accumulation.
  - More industrialized and connected $\Longrightarrow$ access to public goods.
  - More electricity and high schools near historical factories in 1980.
  - Better education outcomes near historical factories today.

Infrastructures

(a) Colonial Road Density (1900)

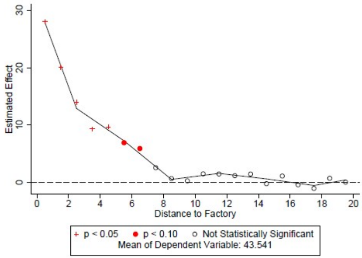


(b) Colonial Railroad Density (1900)

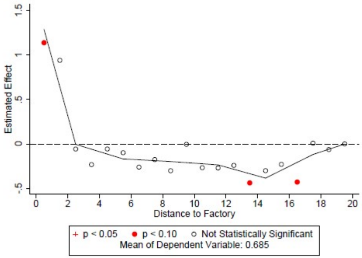


Infrastructures

(e) Local Road Density (2017)

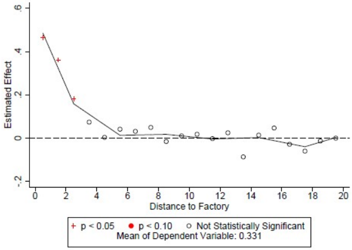


(f) Railroad Density (2017)

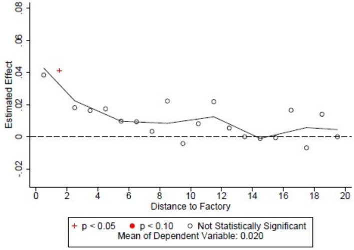


Other Public Goods

(a) Village Has Electricity (PODES 1980)

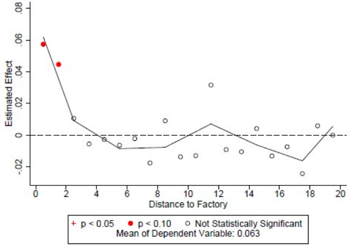


(b) High Schools (PODES 1980)

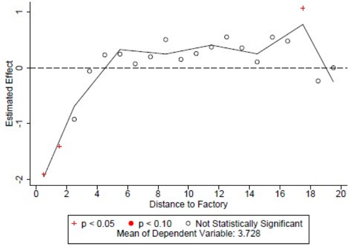


Other Public Goods

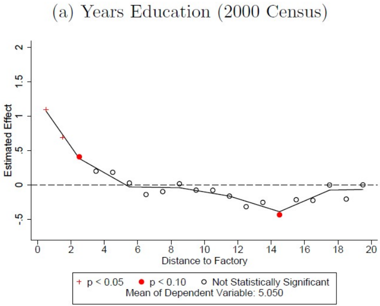
(c) High Schools (PODES 1996-2011)



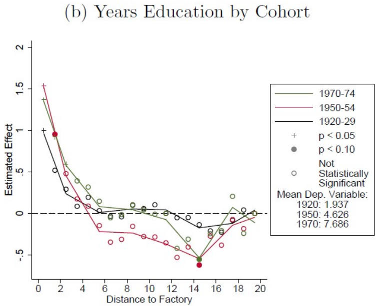
(d) Distance to Subdistrict Capital (2011 PODES)



Education



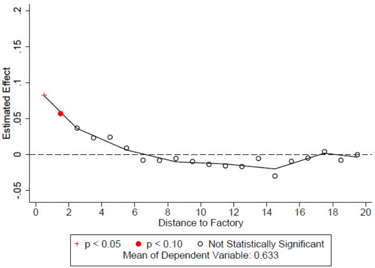
(a) Years Education (2000 Census)
Estimated Effect
Distance to Factory
p < 0.05
p < 0.10
Not Statistically Significant
Mean of Dependent Variable: 5.050



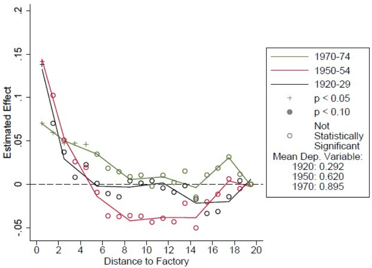
(b) Years Education by Cohort
Estimated Effect
Distance to Factory
1970-74
1950-54
1920-29
p < 0.05
p < 0.10
Not Statistically Significant
Mean Dep. Variable:
1920: 1.937
1950: 4.626
1970: 7.686

Education

(c) Primary (2000 Census)

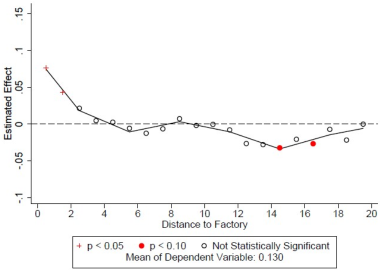


(d) Primary by Cohort

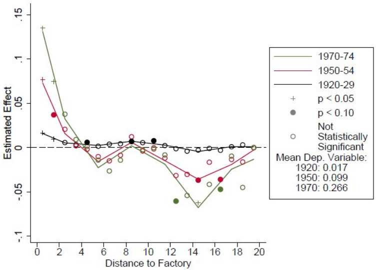


Education

(e) High School (2000 Census)



(f) High School by Cohort



The Big Question

Long-term economic impact of colonial rule?

What Have We Learned?

- Credible link between current development and colonial institutions.

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- AJR (2001): persistence of institutions.
- Iyer (2010): convergence after colonial institutions disappear.
- Dell (2010): persistence through concentration of wealth and power $\Longrightarrow$ public goods provision.
- Dell and Olken (2020): if colonial institutions created manufacturing and infrastructures locally $\Longrightarrow$ fosters industrialization in long run.

What Have We Learned?

- More credible identification: very local answer.

  $\Longrightarrow$ low external validity.

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- More credible identification: very local answer.

  $\Longrightarrow$ low external validity.

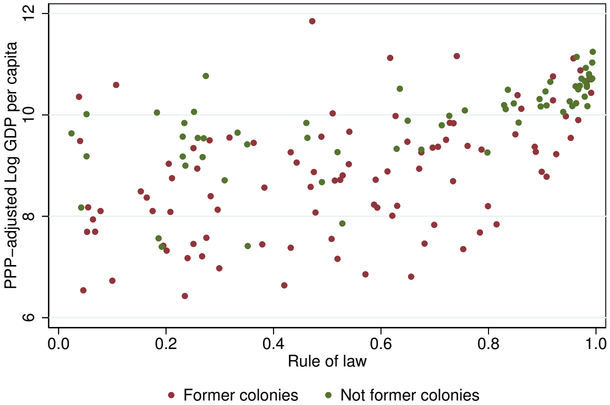
- No simple answer: depends on details and context.

The Big Question

Long-term economic consequences of “colonial” institutions within Western Europe?

Motivation

Log GDP per Capita and Rule of Law across Colonial Status in 2016



Source: V−Dem 9, GeoDist, 160 countries.

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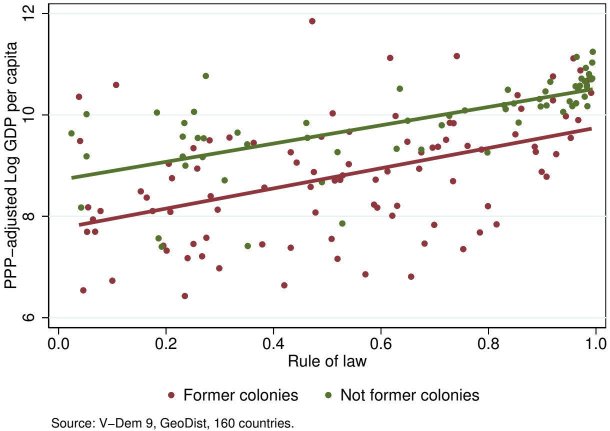
Log GDP per Capita and Rule of Law across Colonial Status in 2016



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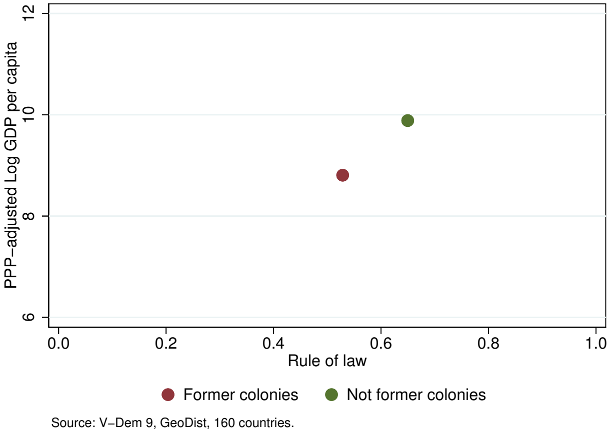

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- From AJR 2001: extractive colonial institutions (in former European colonies) $\Longrightarrow$ persistence of weak institutions $\Longrightarrow$ lower long-run economic growth.
- But unwarranted cross-country comparisons, and unclear mechanisms.

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- But unwarranted cross-country comparisons, and unclear mechanisms.
- Within-country studies show under which conditions extractive colonial institutions are detrimental:
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  - Spanish rule in Peru (Dell 2010).
  - Dutch rule in Java (Dell and Olken 2020).

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- But how externally valid? Is it true even in Western Europe?

French Institutions in Germany

American Economic Review 101 (December 2011): 3286–3307
http://www.aeaweb.org/articles.php?doi=10.1257/aer.101.7.3286

The Consequences of Radical Reform:
The French Revolution[†]

By DARON ACEMOGLU, DAVIDE CANTONI,
SIMON JOHNSON, AND JAMES A. ROBINSON[*]

French Institutions in Germany

- Acemoglu et al. (2011)
- What are the economic consequences of externally imposed institutions?
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- What are the economic consequences of externally imposed institutions?
- Were French institutional reforms early 19th century in Germany detrimental for long-run economic growth?
- Were restrictions to trade and labor entry by small powerful groups an impediment for European growth during the 19th century?

Historical Context

- Before the French revolution, Europe (incl. Germany) dominated by 2 types of oligarchies:
  - Landed nobility in agriculture.
  - Urban-based oligarchy controlling commerce and occupations.
- These groups restricted entry and adoption of new technologies.

Historical Context

- French invasions:
  - 1792–1795: the French army takes control of Belgium, Netherlands, Switzerland, and Rhineland.
  - 1801-1810: Napoléon takes control of Northern Germany, Saxony, Westphalia, Frankfurt...

Historical Context

- French invasions:
  - 1792–1795: the French army takes control of Belgium, Netherlands, Switzerland, and Rhineland.
  - 1801-1810: Napoléon takes control of Northern Germany, Saxony, Westphalia, Frankfurt...
- Institutional changes in Rhineland:
  - 1795–1798: abolition of seigneurial regime and guilds, creation commercial courts, imposition of civil code.
  - After collapse in 1815: Rhineland keeps reforms, the rest reverts back.

Data

- Level of aggregation: 19 preunitary polities in Germany.
- Treatment: number of years in 1792–1815 under French occupation.
- Main outcome: urbanization rate (population in cities of 5,000+) 1700–1900 as proxy for economic prosperity.
- Other outcome: sectoral shares, index of reforms (number of years since reform / 4).
- Controls:

Data

Table 1—Territories and Reforms

Territory	Years of French presence (1)	Civil code (2)	Abolition of serfdom (3)	Agrarian reform (4)	Abolition of guilds (5)	Reforms index as of 1850 (6)	Reforms index as of 1900 (7)	Pop. weights (1750) (8)
Panel A. Treatment								
Rhineland (Prussia)	19	1802	1798	1804	1795	50.25	100.25	1,439
Palatinate (Bavaria)	19	1802	1798	1804	1795	50.25	100.25	239
Mark/Ruhr (Prussia)	6	1810–15, 1900	1808	1825	1809	28.25	65.75	150
Westphalia (Prussia)	6	1810–15, 1900	1808	1825	1809	28.25	65.75	529
Brunswick	6	1808–14, 1900	1808–18, 1834	1809–18, 1834	1808–15, 1864	16	50	155
Province of Saxony (Prussia)	6	1808–15, 1900	1808	1809	1809	32.75	70.25	763
Hessen-Kassel	6	1808–14, 1900	1808–14, 1832	1809–14, 1832	1808–16, 1869	15.25	48	294
Hanover	3	1808–13, 1900	1808–14, 1833	1809–14, 1833	1808–15, 1869	14.25	47	1,090
Average	*9.98*					*32.41*	*72.88*	
Panel B. Control								
Baden	0	1810	1783	1820	1862	34.25	81.25	609
Bavaria, southern half	0	1900	1808	1826	1868	16.5	49.5	1,163
Hessen-Darmstadt	0	1900	1811	1816	1866	18.25	51.75	264
Saxony	0	1865	1832	1832	1862	9	52.25	1,020
Württemberg	0	1900	1817	1836	1862	11.75	46.25	925
Average	*0*					*16.31*	*54.46*	
Panel C. Control (east of the Elbe)								
Brandenburg (Prussia)	0	1900	1811	1821	1810	27	64.5	797
East Prussia (Prussia)	0	1900	1811	1821	1810	27	64.5	554
Pomerania (Prussia)	0	1900	1811	1821	1810	27	64.5	342
Silesia (Prussia)	0	1900	1811	1821	1810	27	64.5	1,053
Mecklenburg-Schwerin	0	1900	1820	1862	1869	7.5	37.25	217
Schleswig-Holstein	0	1900	1805	1805	1867	22.5	55.75	541
Average	*0*					*25.1*	*61.46*	

Data

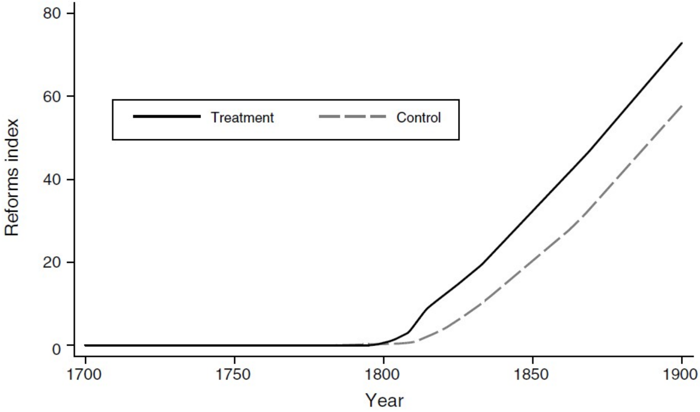


Figure 1. Reforms Index, by Treatment Group

Data

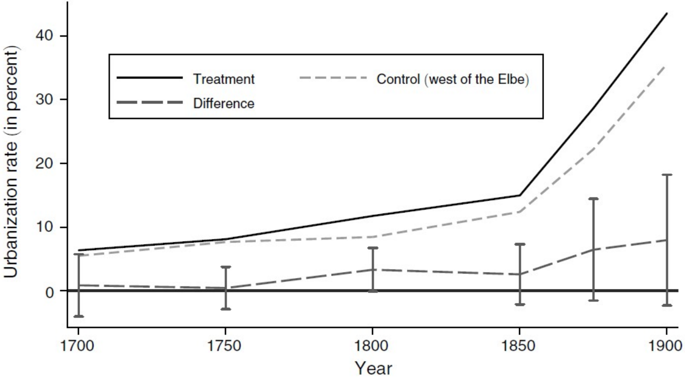


Figure 2A. Urbanization Rates, by Treatment Group

Data

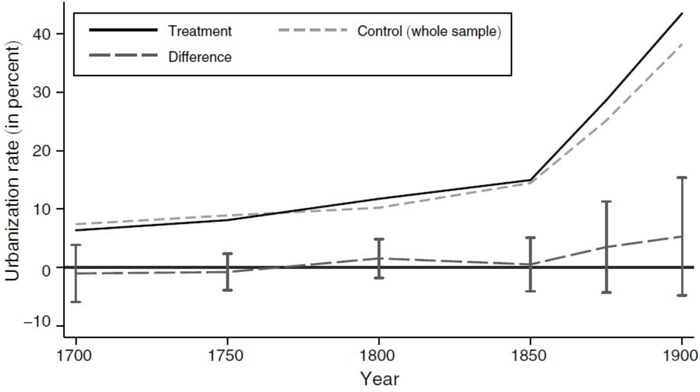


FIGURE 2B. URBANIZATION RATES, BY TREATMENT GROUP

Empirical Strategy

$$(1) \quad u_{jt} = d_t + \delta_j + \sum_{\tau \in T^{pre}} \alpha_\tau \times d_\tau \times I_j + \sum_{\tau \in T^{post}} \alpha_\tau \times d_\tau \times I_j + \mathbf{X}'_{jt} \times \gamma + \varepsilon_{jt},$$

- d: year fixed effects.
- I: number of years treated.
- α: coefficients of interest.
- Year-specific difference-in-difference estimates.
- Clustering: polity level.

Main Results

TABLE 3—URBANIZATION IN GERMANY

	Dependent variable: urbanization rate			
	West of the Elbe		All	
	Weighted (1)	Unweighted (2)	Weighted (3)	Unweighted (4)
Years French presence × 1750	−0.491	−0.252	−0.488	−0.197
	[0.249]	[0.172]	[0.235]	[0.164]
Years French presence × 1800	−0.247	−0.0425	−0.268	−0.0471
	[0.225]	[0.153]	[0.227]	[0.178]
Years French presence × 1850	−0.160	0.0332	−0.221	−0.0235
	[0.250]	[0.153]	[0.249]	[0.181]
Years French presence × 1875	0.402	0.354	0.266	0.252
	[0.326]	[0.295]	[0.303]	[0.299]
Years French presence × 1900	0.634	0.529	0.503	0.506
	[0.408]	[0.401]	[0.376]	[0.423]
Observations	74	74	109	109
Number of states	13	13	19	19
p-value for joint significance after 1800	0.0532	0.463	0.0205	0.214

Notes: All regressions have full set of territory and year dummies. Robust standard errors clustered by territory. Weighted regressions are weighted by territories' total population in 1750.

No negative destructive implications, even positive ones.

Main Results

TABLE 5—OCCUPATIONAL SHARES IN GERMANY

	Dependent variable: share of population employed in agriculture			Dependent variable: share of population employed in industry		
	West of the Elbe		All	West of the Elbe		All
	Weighted (1)	Unweighted (2)	Weighted (3)	Weighted (4)	Unweighted (5)	Weighted (6)
Years French presence, 1849	−0.430 [0.468]	−0.411 [0.460]	−0.508 [0.346]	0.055 [0.376]	0.061 [0.342]	0.374 [0.369]
Years French presence, 1882	−0.450 [0.285]	−0.486 [0.244]	−0.585 [0.253]	0.420 [0.256]	0.386 [0.240]	0.594 [0.267]
Years French presence, 1895	−0.570 [0.266]	−0.601 [0.242]	−0.658 [0.182]	0.472 [0.248]	0.449 [0.231]	0.640 [0.222]
Years French presence, 1907	−0.554 [0.281]	−0.585 [0.264]	−0.724 [0.237]	0.350 [0.284]	0.321 [0.251]	0.570 [0.237]

Notes: Each cell corresponds to one cross-sectional regression. District level data. Robust standard errors clustered at the state level. All regressions weighted by the districts' total population in 1849. Number of observations (baseline/west of Elbe): 39/23 (1849), 62/44 (other years).

Faster structural transformation.

Mechanisms

$$(3) \qquad R_{jt} = d_t + \delta_j + \psi \times t \times T_{t>1800} \times I_j + \eta_{jt},$$

- R: reform index.
- Linear time trend post reform to account for mechanical increase in reform index over time.
- Use it as first stage in 2SLS approach.

$$(4) \qquad u_{jt} = d_t + \delta_j + \phi \times R_{jt} + \upsilon_{jt},$$

Main Results

TABLE 6—URBANIZATION IN GERMANY, IMPACT OF REFORMS

	Dependent variable: urbanization rate				
	West of the Elbe			All	
	Weighted (1)	Weighted, overid (2)	Unweighted (3)	Weighted (4)	Unweighted (5)
Panel A. OLS estimation					
Reforms index	0.281	0.281	0.220	0.268	0.191
	[0.114]	[0.114]	[0.122]	[0.110]	[0.105]
Panel B. First stage					
French presence × post1800	1.166		1.116	1.006	0.960
× trend	[0.107]		[0.143]	[0.108]	[0.145]
F-statistic excluded instruments	119.7	121.6	61.85	87.57	43.71
p-value *F*-statistic	0.000	0.000	0.000	0.000	0.000
Panel C. 2SLS estimation					
Reforms index	0.291	0.321	0.204	0.284	0.193
	[0.102]	[0.112]	[0.124]	[0.112]	[0.143]
Observations	74	74	69	109	109
Number of states	13	13	12	19	19
p-value overidentified test		0.328			

Notes: All regressions have full set of territory and year dummies. Robust standard errors clustered by territory. Weighted regressions are weighted by territories' total population in 1750. The overidentified regression in column 2 uses a full set of interactions of "Years of French presence" and year dummies as excluded instruments.

Positive effects on reforms and growth through induced reforms (little bias in OLS).

J Econ Growth
DOI 10.1007/s10887-016-9132-9

CrossMark

The economic consequences of the Spanish Reconquest: the long-term effects of Medieval conquest and colonization

Daniel Oto-Peralías[1] · Diego Romero-Ávila[2]

The Spanish Reconquista

- Oto-Peralias and Romero-Avila (2016)
- What were the economic consequences of Spanish (re)-colonization in Spain?
- Was the extractive nature of Spanish colonization detrimental to long-run growth?

Historical Context

- 711: Spain invaded by Muslims (al-Andalus).
- Fosters positive economic and cultural development.
- Reconquista from the Christians that lasted until 1492.
- Nature of colonization repopulation of new lands differed with speed of reconquista:
    - Where slow process: more complete and balanced population, with participation of individual settlers and preservation of Muslim agricultural technology.
    - Where fast process: insufficient resources, administrative difficulties to control: favors nobility and military orders to organize and defend land, dispersed settlements in large jurisdictional areas.

Historical Context

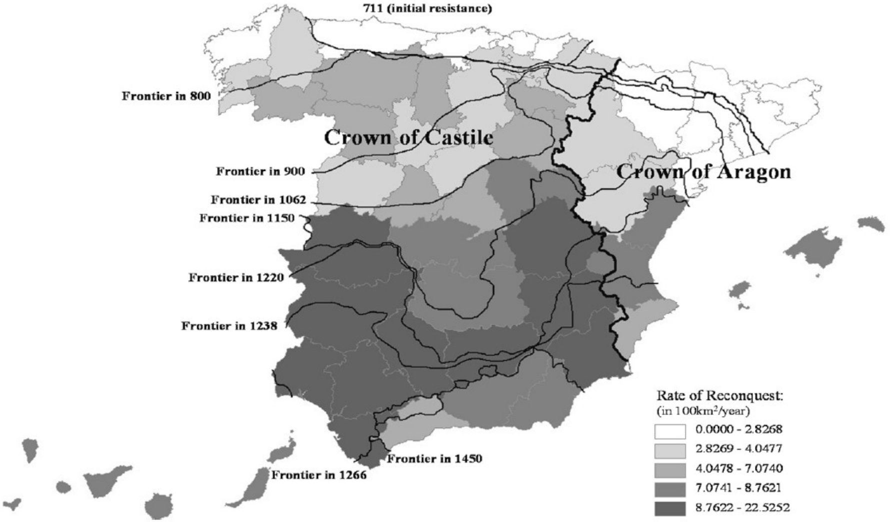


Fig. 1 The Spanish Reconquest (711–1492)

Data

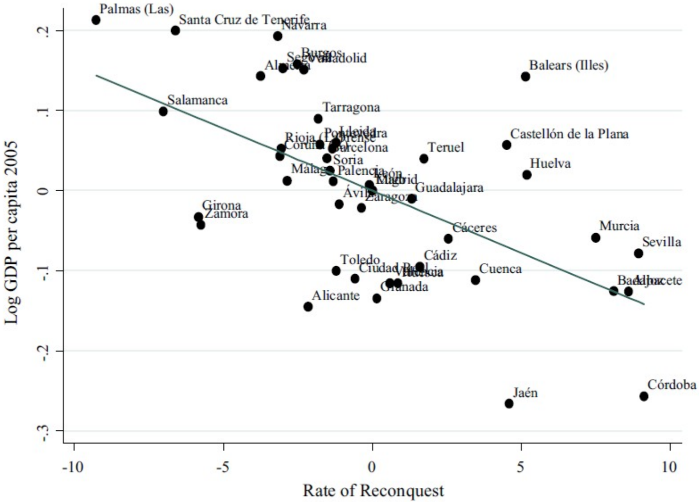
- Level of aggregation: 50 Spanish provinces (45 never occupied by Muslims).
- Treatment: rate of Reconquest (total area of Reconquest / years of stage) in km2 per year, based on 16 Reconquest stages.
- Main outcomes: GDP per capita in 2005.
- Controls: array of climatic, geographic, topographic, and historical controls (years since agriculture, Roman roads density, urban density 800, Muslim domination years, rainfall, soil quality, land suitability, distance to coast,...).

Empirical Strategy

$$Y_i = \alpha + \beta_1 \cdot Reconquest_i + \beta_2 \cdot X_i + \omega_i \tag{1}$$

- Simple OLS regression at province level.
- Issue: "Column 1 in Table 2 includes in the same specification all the controls that are individually significant at the 10 % level or better. This is our paper's baseline specification."
- Process correlated with North-South gradient: excludes Basque country, Madrid, Barcelona, control for latitude, tun a municipality-level analysis with province fixed effects on 8,000 municipalities.
- Territories conquested before might have different characteristics: falsification test with pre-Reconquest development.

Main Results



coef = -.01553735, (robust) se = .0037798, t = -4.11

Fig. 2 Conditional relationship between current GDP per capita and rate of Reconquest

Main Results

Table 3 Municipality-level analysis: province fixed-effects regressions

	Dependent variable								
	Average socioeconomic condition			Average number of vehicles per household			Labor force activity rate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A:									
Rate of Reconquest	−0.157** (0.071)			−0.004* (0.002)			−0.139** (0.053)		
High rate of Reconquest (> provincial average)		−0.987** (0.374)			−0.039*** (0.01)			−0.641** (0.24)	
High rate of Reconquest (> 1.25*provincial average)			−1.467*** (0.382)			−0.043*** (0.013)			−0.789*** (0.219)
Geo-climatic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standardized beta	−0.055	−0.033	−0.039	−0.075	−0.069	−0.062	−0.103	−0.045	−0.045
R^2	0.60	0.60	0.60	0.53	0.53	0.53	0.24	0.24	0.24
Number of observations	7,590	7,590	7,590	7,590	7,590	7,590	7,590	7,590	7,590
Panel B:									
Rate of Reconquest	−0.197** (0.07)			−0.004** (0.001)			−0.171*** (0.04)		

Main Results

Table 4 Falsification test: the effect of the Reconquest on pre-Reconquest development

Dependent variable	City population in 800	Density of urban population in 800	Years since transition to agriculture	Ancient settlements over surface area	Roman roads density	Roman roads density: Main roads	Coinage of imperial Roman coins over surface area	Roman villas over surface area	Number of bishoprics circa 600 over surface area
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Conditional relationship between rate of Reconquest and pre-Reconquest economic development									
Rate of Reconquest	1.826	0.13	−1.943	0.021	0.449	0.158	0.00	0.002	−0.001
	(1.197)	(0.087)	(1.491)	(0.022)	(0.292)	(0.2)	(0.002)	(0.01)	(0.002)
Rainfall	0.024	0.002	−0.025	0.00	0.046***	0.002	0.00	0.001**	0.0002**
	(0.02)	(0.001)	(0.032)	(0.001)	(0.01)	(0.007)	(0.00)	(0.00)	(0.00)
Soil quality	18.271	1.289	−26.626	2.064**	23.158	7.886	0.121	0.825***	0.144
	(14.544)	(1.042)	(40.256)	(0.939)	(15.205)	(7.24)	(0.088)	(0.209)	(0.098)
Ruggedness	−12.723	−0.762	−5.768	1.539**	−17.708***	1.193	0.064	0.203	0.025
	(11.852)	(0.869)	(15.967)	(0.731)	(6.234)	(4.111)	(0.061)	(0.223)	(0.058)
Mediterranean Sea	1.851	0.113	6.298	−0.294	17.48***	6.127	−0.011	−0.022	0.114**
	(5.439)	(0.411)	(15.701)	(0.512)	(6.136)	(3.805)	(0.047)	(0.16)	(0.055)
Cantabrian Sea	−2.304	−0.159	2.944	−0.136	−17.266***	−2.328	−0.008	−0.232**	0.06*
	(4.294)	(0.313)	(13.451)	(0.361)	(5.309)	(2.187)	(0.029)	(0.104)	(0.03)
Standardized beta	0.426	0.420	−0.318	0.129	0.199	0.130	0.000	0.039	−0.055
R^2	0.18	0.17	0.14	0.40	0.37	0.25	0.11	0.27	0.37
Number of observations	45	45	45	43	45	45	45	43	45

Main Results

Table 6 The timing of the effect of the Reconquest: regression results

Dependent variable is relative economic development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rate of Reconquest x D_{1500}	−5.909	−6.235	−6.003	−5.788	−5.977	−7.553*	−6.444*
	(3.714)	(3.976)	(3.775)	(3.581)	(3.731)	(4.243)	(3.711)
Rate of Reconquest x D_{1600}	−3.066	−3.506	−3.107	−2.959	−3.316	−3.354	−2.543
	(4.35)	(4.553)	(4.418)	(4.221)	(4.272)	(4.75)	(4.145)
Rate of Reconquest x D_{1700}	−2.969	−3.496	−2.994	−2.831	−3.078	−8.95**	−8.67**
	(3.963)	(4.092)	(4.023)	(3.794)	(3.984)	(4.295)	(3.799)
Rate of Reconquest x D_{1800}	−4.852	−5.531	−4.779	−4.764	−4.843	−7.169*	−6.383*
	(4.114)	(4.296)	(4.179)	(4.07)	(4.03)	(4.314)	(3.761)
Rate of Reconquest x D_{1860}	−8.772**	−9.015**	−8.807**	−8.694**	−8.985**	−9.558**	−8.992**
	(4.219)	(4.41)	(4.283)	(4.199)	(4.272)	(4.605)	(4.209)
Rate of Reconquest x D_{1930}	−10.704**	−10.602**	−10.568**	−10.647**	−10.893**	−10.729**	−10.126**
	(4.388)	(4.587)	(4.45)	(4.359)	(4.455)	(4.876)	(4.516)
Rate of Reconquest x D_{1971}	−11.427**	−11.345**	−11.333**	−11.37**	−11.65**	−11.749**	−11.222**
	(4.432)	(4.632)	(4.498)	(4.405)	(4.523)	(4.938)	(4.623)
Rate of Reconquest x D_{2005}	−11.578**	−11.392**	−11.438**	−11.517**	−11.825**	−11.809**	−11.201**
	(4.504)	(4.709)	(4.571)	(4.483)	(4.599)	(4.989)	(4.69)

Mechanisms

- Rate of Reconquest affected who gained control over new territories: settlers or nobility and military.
- Rapid frontier expansion favors initial political equilibrium toward nobility, leading to concentration of political and economic power.
- This enabled the nobility to run de facto extractive institutions and exploit the peasantry through restrictions on land and grain transactions, labor contracts with restrictions on wages, land tenure systems.
- Generated high level of social and political inequality, no equal opportunity and property rights access, leading to failure to industrialize and adopt new technology.
- Use a 2SLS strategy (not in IV spirit) to assess explanatory power of each channel.

Mechanisms

Table 7 Mechanisms at work

The channel variable →	Percentage of landless workers 1797	Percentage of landless workers 1956	Percentage of population entities under seigneurial jurisdiction in 1787	Family types	Moorish ancestry	Market fragmentation (Road density in 1760)	Percentage of population entities under Church jurisdiction in 1787	Religiosity (Clerical population in 1797)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Second stage (Log GDP pc 2005 regressed on the predicted values of the channel variable)								
The channel variable	−0.009***	−0.008***	−0.010**	25.689	0.014	−78.654	0.034**	−85.605
	(0.003)	(0.002)	(0.004)	(44.709)	(0.011)	(158.623)	(0.015)	(64.005)
Geo-climatic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standardized beta	−0.770	−0.694	−0.750	8.385	0.506	−4.057	1.687	−1.536
Panel B: First stage (The channel variable regressed on rate of Reconquest)								
Rate of Reconquest	1.683***	1.915***	1.58**	−0.001	−0.456	0.000	−0.461**	0.000
	(0.402)	(0.473)	(0.696)	(0.001)	(0.277)	(0.000)	(0.181)	(0.000)
F-statistic	17.53	16.41	5.15	0.37	2.71	0.24	6.47	1.67
Partial R^2	0.327	0.355	0.116	0.006	0.077	0.006	0.074	0.077
Geo-climatic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standardized beta	0.514	0.567	0.393	−0.084	−0.334	0.000	−0.231	0.000
R^2	0.70	0.68	0.36	0.78	0.60	0.47	0.64	0.61
Number of observations	45	45	45	45	43	45	45	45

Mechanisms

Table 7 continued

The channel variable →	Percentage of landless workers 1797	Percentage of landless workers 1956	Percentage of population entities under seigneurial jurisdiction in 1787	Family types	Moorish ancestry	Market fragmentation (Road density in 1760)	Percentage of population entities under Church jurisdiction in 1787	Religiosity (Clerical population in 1797)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel C: OLS regressions of Log GDP pc 2005 on the channel variable								
The channel variable	−0.004**	−0.006***	−0.003***	−0.178	0.005*	−1.814	0.003	−9.355
	(0.002)	(0.001)	(0.001)	(0.565)	(0.003)	(2.162)	(0.002)	(7.905)
Geo-climatic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standardized beta	−0.408	−0.631	−0.375	−0.066	0.213	−0.137	0.186	−0.215
R^2	0.72	0.80	0.74	0.63	0.82	0.64	0.65	0.65
Number of observations	45	45	45	45	43	45	45	45

Variables descriptions are provided in Table 9. All the estimations include the control set employed in the baseline specification (column 1, Table 2) and a constant term, which are omitted for space considerations. Robust standard errors are in parentheses. Small-sample correction for standard errors is applied in 2SLS regressions. The respective standardized beta coefficients are reported in the bottom part of each panel

*, ** and *** denote statistical significance at the 10, 5 and 1 % level, respectively

Mechanisms

Table 8 Outcomes indicators in the 1860s

The outcome indicator in the 1860s →	Literacy rate	School enrollment	Infant mortality	Life expectancy	Percentage of electors	Percentage of voters	Crimes	Convicts
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: 2SLS results (The outcome indicator regressed on the predicted value of the percentage of landless workers in 1797)								
Percentage of landless workers 1797	−0.32**	−0.002*	0.64	−0.15**	−0.001***	−0.001*	0.037***	0.03***
	(0.141)	(0.001)	(0.64)	(0.064)	(0.00)	(0.00)	(0.013)	(0.01)
Geo-climatic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standardized beta	−0.515	−0.398	0.229	−0.488	−0.549	−0.764	0.656	0.712
Panel B: Reduced-form effect (The outcome indicator regressed on rate of Reconquest)								
Rate of Reconquest	−0.539***	−0.003**	1.078	−0.253**	−0.002***	−0.001*	0.062***	0.05***
	(0.182)	(0.001)	(1.074)	(0.111)	(0.00)	(0.00)	(0.022)	(0.013)
Geo-climatic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standardized beta	−0.316	−0.218	0.140	−0.299	−0.400	−0.278	0.400	0.432
R^2	0.77	0.74	0.58	0.66	0.64	0.51	0.57	0.63
Number of observations	45	45	45	45	45	45	45	45

Variables descriptions are provided in Table 9. All the estimations include the control set employed in the baseline specification (column 1, Table 2) and a constant term, which are omitted for space considerations. Robust standard errors are in parentheses. Small-sample correction for standard errors is applied in 2SLS regressions. The respective standardized beta coefficients are reported in the bottom part of each panel

*, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively

Napoleonic Reforms in Italy

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Institutions and literacy rates: the legacy of Napoleonic reforms in Italy

M. POSTIGLIOLA* AND M. ROTA**
* *Sapienza University of Rome, Department MEMOTEF, via del Castro Laurenziano 9, 00161 Rome, michele.postigliola@uniroma1.it*
** *Sapienza University of Rome, Department MEMOTEF, via del Castro Laurenziano 9, 00161 Rome, mauro.rota@uniroma1.it*

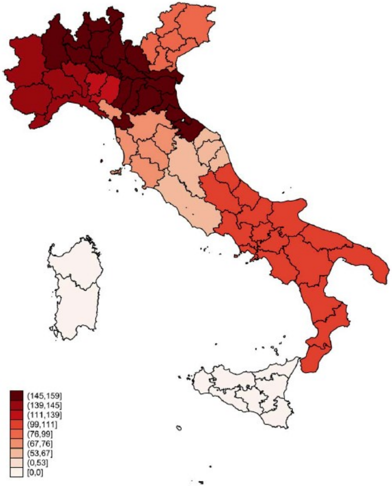
Napoleonic Reforms in Italy

- Postigliola and Rota (2020)
- Were the Napoleonic reforms at the roots of the North-South divide in human capital in Italy?
- Were inclusive "colonial" institutions beneficial to long-run literacy?

Historical Context

- Two phases of French presence in Italy:
  - 1796–1799: short lived dominance of military.
  - 1799–1815: political control with territorial reorganization and reforms.
- French reforms in education:
  - Supply of education: opening new primary schools, recruiting teachers, reviewing curriculum, secularizing the system (conditioned on administrative capacity).
  - Demand of education: introduction of Code Napoléon promoted idea of social equality, greater protection of property rights and efforts to create inclusive society (eg abolition of guilds). All created economic opportunities which increased demand for education.
- Post-Napoleon pre-unitary reforms (1815–1861): pursued efforts but less marked, and in some locations control of clergy.

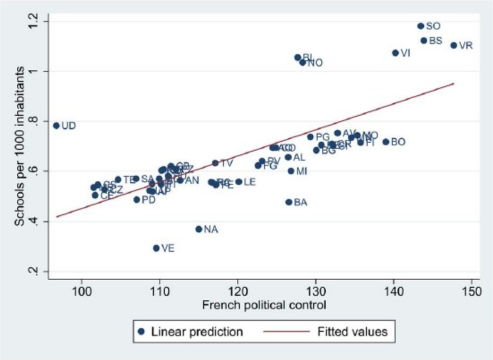
Historical Context



Note: For definition and sources, see text.

Figure 1. Duration of French political control in Italy (1801–1815).

Historical Context



Source: see text and Appendixes A1 and A2.1. Scatterplot is conditional to a set of controls used in the regressions below.

Figure 2. Schools per 1,000 inhabitants in 1814 ca. and French political control.

Historical Context

Table 1. *Primary schools (public) per 1,000 inhabitants*

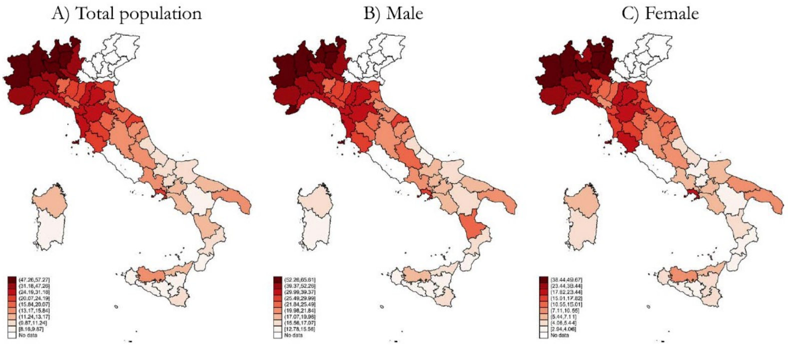
	1790 ca.	1810–1814	1818–1822	1831–1835	1841–1844	1855–1858
Kingdom of Sardinia		0.63[a]				1.47
Lombardy	0.31	0.63				
Lombardy (incl. Bergamo and Brescia)		0.91	1.18		1.57	1.56
Veneto		0.64		0.71	0.78	0.77
Duchy of Parma and Piacenza	0.07			0.83		
Duchy of Modena and Reggio[b]	0.17	0.56				
Granduchy of Tuscany[c]	0.35	0.23[d]			0.54[d]	
Papal States[e]	0.12	0.51				0.68
Kingdom of Two Sicilies[f]	0.03	0.55	0.50[g]			0.40
Sicily			0.22[h]			0.15

Notes: a = only Novara; b = excluding Garfagnana; c = Massa is not included; d = number of teachers; e = Legazioni of Romagna; f = mainland; g = Sicily included; h = excluding cities of Palermo, Catania, and Caltanissetta. Sources: see Appendix A1.

Data

- Level of aggregation: 59 provinces.
- Treatment: months of the political influence of Napoléon.
- Main outcomes: male and female literacy rates in 1861 census.
- Controls: literacy before 1801, institutional profile pre-unity, urbanization before French rule, geographical controls (access to see, trade openness, rainfall).

Data



Source: Our computation on 1861 census data. For definition, see text.

Figure 3. Literacy rates at the time of unification (1861).

Empirical Strategy

- Simple OLS regression with controls.
- Issue: effectiveness of reforms most pronounced in areas with pre-Napoléon institutional reforms (selection into treatment).
- IV strategy: supply of French troops depended on distance between Paris and occupied territory.

Main Results

Table 2. *French effect on literacy rates in 1861: OLS regressions*

	Literacy rate in 1861 (population age > 4)			
	(1)	(2)	(3)	(4)
French political control	0.090***	0.045***	0.052***	0.074***
	(0.027)	(0.014)	(0.012)	(0.015)
Density of Jesuit *collegia* before French	3.661***	3.693***	0.200	0.674
	(1.020)	(1.069)	(0.894)	(0.963)
Kingdom of Sardinia	11.926***	6.604**	8.153***	9.800***
	(4.058)	(2.652)	(1.807)	(2.161)
Lombardo Veneto	19.266***	15.340***	15.869***	14.256***
	(3.133)	(4.331)	(3.558)	(3.571)
Papal State	−7.699***	−6.671***	−3.144**	1.166
	(1.833)	(1.942)	(1.380)	(2.327)
Granduchy of Tuscany	4.673*	3.119	3.755*	4.935**
	(2.390)	(2.850)	(1.923)	(2.128)
Kingdom of Two Sicilies	−9.285***	−9.302***	−8.798***	−3.221
	(1.416)	(1.672)	(0.853)	(2.680)
Duchy of Parma and Piacenza	−6.867***	−8.594***	−7.527***	−7.089***
	(1.725)	(2.459)	(1.503)	(1.529)
Duchy of Modena and Reggio	−6.890**	−6.203	−1.976	−2.444
	(2.806)	(3.728)	(3.365)	(3.396)
Rainfalls		1.979**	3.264***	3.106***
		(0.855)	(0.647)	(0.588)
Landlocked		2.258	1.575	1.450
		(1.785)	(1.334)	(1.345)
Border		11.045***	12.292***	11.179***
		(3.639)	(3.155)	(3.346)
Urbanization rate 1800			0.236***	0.192***
			(0.056)	(0.063)
Export per capita				1.725**
				(0.767)
Constant	11.653***	0.472	−12.488**	−21.511***
	(3.224)	(6.965)	(4.952)	(5.879)
Observations	59	59	59	59
R-squared	0.834	0.894	0.934	0.937
Moran statistic	3.32	2.45	0.61	1.4
p-value	0.0686	0.1179	0.4366	0.2372

Robust standard errors in parentheses, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Dummy for the Duchy of Lucca has been dropped because of collinearity.

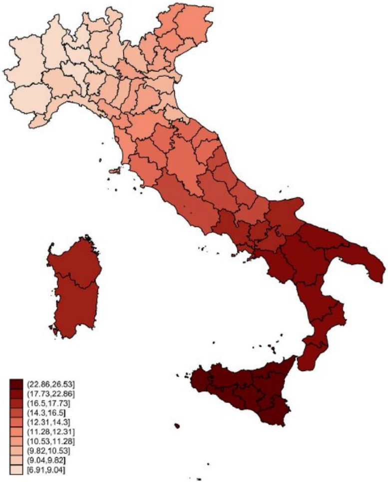
Main Results

Table 3. *French effect on male and female literacy rates in 1861: OLS regressions*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Male literacy rate in 1861 (population age > 4)				Female literacy rate in 1861 (population age > 4)			
French political control	0.105***	0.046***	0.053***	0.078***	0.075***	0.043***	0.050***	0.069***
	(0.031)	(0.015)	(0.014)	(0.019)	(0.023)	(0.014)	(0.012)	(0.014)
Density of Jesuit *collegia* before French	3.734***	3.732***	0.416	0.933	3.595***	3.654***	−0.024	0.369
	(1.233)	(1.275)	(1.027)	(1.102)	(0.899)	(0.952)	(0.874)	(0.944)
Rainfalls		2.829***	4.050***	3.877***		1.227	2.581***	2.450***
		(0.943)	(0.774)	(0.725)		(0.824)	(0.596)	(0.554)
Landlocked		2.088	1.439	1.302		2.390	1.671	1.567
		(1.984)	(1.614)	(1.632)		(1.751)	(1.268)	(1.281)
Border		13.390***	14.575***	13.358***		8.990**	10.304***	9.380***
		(3.694)	(3.485)	(3.669)		(3.956)	(3.250)	(3.456)
Urbanization rate 1800			0.225***	0.176**			0.249***	0.212***
			(0.064)	(0.076)			(0.050)	(0.057)
Export per capita				1.885*				1.432**
				(1.013)				(0.658)
Dummies pre-unitary kingdoms	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
Constant	19.847***	3.244	−9.062	−18.920**	4.147	−2.248	−15.897***	−23.386***
	(3.772)	(7.801)	(6.072)	(7.536)	(2.747)	(6.509)	(4.382)	(4.952)
Observations	59	59	59	59	59	59	59	59
R-squared	0.811	0.892	0.924	0.928	0.840	0.882	0.930	0.932
Moran statistic	3.23	1.53	0.62	1.03	1.96	1.51	1.28	1.43
p-value	0.0723	0.2166	0.4303	0.3113	0.1614	0.2195	0.2571	0.1189

Robust standard errors in parentheses, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Main Results



Source: Our computation on Ministero della Guerra (1808). See appendix A6

Figure 4. Provincial distance to Paris in hundreds of kilometres.

Main Results

Table 4. *Instrument relevance and validity*

	Panel A		Panel B	
Dependent variables	French political control		Density of Jesuit *collegia* before French	Urbanization rate before French
	(1)	(2)	(3)	(4)
Distance to Paris	−7.292***	−8.179***	0.007	0.702
	(0.755)	(2.449)	(0.039)	(1.176)
Density of Jesuit *collegia* before French		−7.263		
		(4.887)		
Rainfalls		9.643**	−0.008	−5.314
		(4.677)	(0.103)	(3.223)
Landlocked		−5.646	−0.353	−1.968
		(9.920)	(0.301)	(6.970)
Border		17.942**	0.178	−2.545
		(8.852)	(0.125)	(6.526)
Urbanization rate before French		0.449*		
		(0.248)		
Export per capita		−17.938***		
		(6.648)		
Dummies pre-unitary kingdoms	*N*	*Y*	*Y*	*Y*
Constant	209.415***	211.334***	−0.020	42.372
	(10.033)	(60.005)	(1.055)	(35.287)
Observations	59	59	59	59
R-squared	0.561	0.854	0.166	0.240

Robust standard errors in parentheses, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Main Results

Table 5. *French control and literacy rates of total population: 2SLS regressions*

	(1)	(2)	(3)	(4)
	Literacy rate in 1861 (population age > 4)			
French political control	0.104***	0.055**	0.067***	0.127***
	(0.030)	(0.021)	(0.020)	(0.038)
Density of Jesuit *collegia* before French	3.759***	3.732***	0.209	1.203
	(1.108)	(1.091)	(0.937)	(1.172)
Rainfalls		1.676*	2.815***	2.127**
		(0.990)	(0.777)	(0.911)
Landlocked		2.302	1.632	1.417
		(1.770)	(1.319)	(1.496)
Border		10.842***	11.996***	9.441***
		(3.579)	(3.084)	(3.275)
Urbanization rate 1800			0.240***	0.151**
			(0.055)	(0.073)
Export per capita				3.593**
				(1.353)
Dummies pre-unitary kingdoms	*Y*	*Y*	*Y*	*Y*
Constant	10.040***	1.820	−10.596**	−27.878***
	(3.669)	(7.262)	(5.161)	(6.685)
Observations	59	59	59	59
Distance to Paris	−13.260***	−11.659***	−11.661***	−8.179***
	(1.176)	(1.572)	(1.630)	(2.449)
F-test (1st stage)	127.13	55.04	51.17	11.15
Moran statistic	4.56	2.86	0.41	0.83
p-value	0.033	0.091	0.524	0.362

Robust standard errors in parentheses, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. A graphical representation of conditional correlations is shown in figure A1.

The Big Question

Long-term economic consequences of colonial institutions within Western Europe?

What Have We Learned?

- The AJR logic still holds, even in a Western context:
  - Inclusive colonial institutions rather beneficial for long-run growth and human capital accumulation (Germany, Italy).
  - Extractive colonial institutions rather detrimental for long-run growth and human capital accumulation (Spain).
- Timing is somewhat similar: the benefits generally occur upon industrialization.
- But unclear in German case, and no further analysis in Italian case.

Topic 3
State capacity, conflict, and development

The Big Question

What enables societies to adopt growth enhancing institutions?

Plan of Session

- State capacity: concepts.
- State capacity and economic performance.
- Warfare and state capacity.
- Warfare and the Malthusian circle.

Dincecco and Katz (2016) Dincecco (2017) Johnson and Koyama (2017) Dincecco and Wang (2018) Dincecco, Fenske, and Onorato (2019)

State Capacity: Concepts

- Ability of a state to accomplish its intended policy actions.

- Corresponds to infrastructural power of a state:

  "We might term this 'infrastructural power', the capacity of the state to penetrate civil society and to implement logistically political decisions throughout the realm." Mann (1986)

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  "We might term this 'infrastructural power', the capacity of the state to penetrate civil society and to implement logistically political decisions throughout the realm." Mann (1986)

- Ability of a state to collect taxes, enforce law and order, provide public goods.

State Capacity: Concepts

- Two main elements:
  - Legal capacity.

    $\Longrightarrow$ Ability to enforce rules across entire territory it claims to rule.

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  - Legal capacity.

    $\Longrightarrow$ Ability to enforce rules across entire territory it claims to rule.
  - Fiscal capacity.

    $\Longrightarrow$ Ability to garner enough tax revenues to implement its policies.
- State capacity requires degree of political and legal centralization.

State Capacity: Concepts

- Paradox of power:

  "In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and in the next place oblige it to control itself." Madison (1788)

State Capacity: Concepts

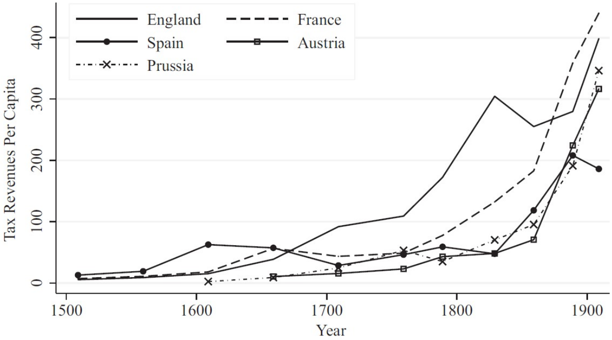
- Paradox of power:

  "In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and in the next place oblige it to control itself." Madison (1788)

- Effective statehood requires effective controls over the executive.

State Capacity in Europe

Log Tax Revenues per Capita



Source: Johnson and Koyama (2017)

- State capacity increased in Europe.
- But considerable institutional variation.

State Capacity in England

- High fiscal capacity, constraints on executive, rule of law.

State Capacity in England

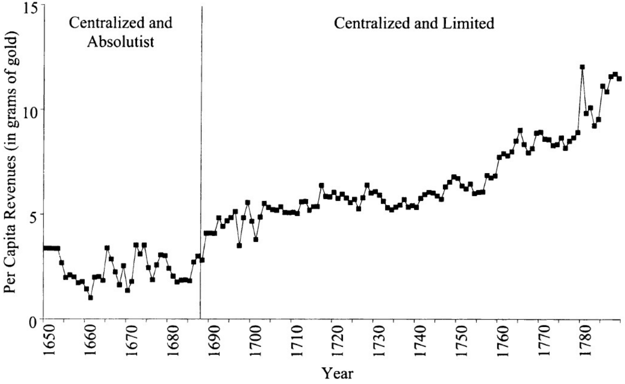
- High fiscal capacity, constraints on executive, rule of law.
  - Nationwide and representative Parliament.
  - Centralization of fiscal and legal institutions.

State Capacity in England

- High fiscal capacity, constraints on executive, rule of law.
  - Nationwide and representative Parliament.
  - Centralization of fiscal and legal institutions.
- One reason: history of homogeneous, coherent and centralized polity.

State Capacity in England

Per capita revenues, Britain



Source: Dincecco (2009)

State Capacity in France

- Kingdom constituted over time through warfare and marriages:
  - Dauphiné 1349, Burgundy 1477, Provence 1486, Brittany 1532 . . .
  - Collection of feudal appendages loosely held by loyalty to king.

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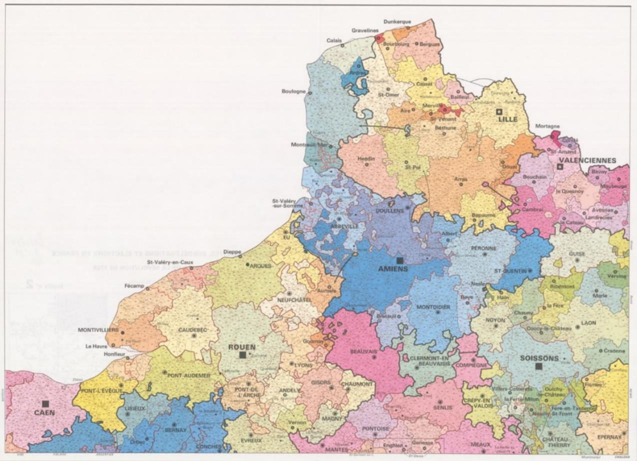
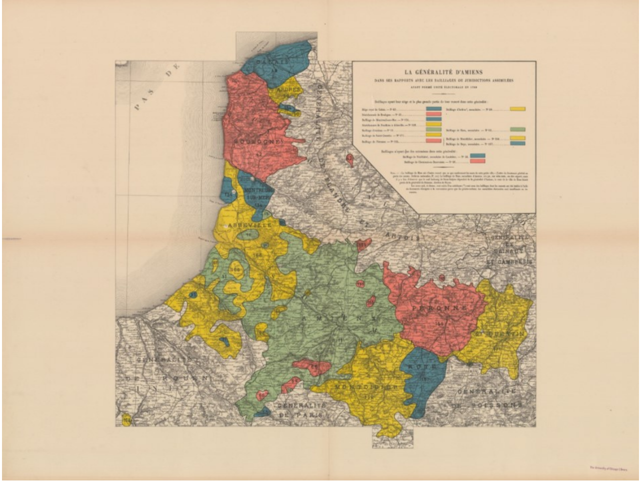
- Kingdom constituted over time through warfare and marriages:
  - Dauphiné 1349, Burgundy 1477, Provence 1486, Brittany 1532 . . .
  - Collection of feudal appendages loosely held by loyalty to king.
- France remained legally and fiscally fragmented until Revolution.
- Still, considerable improvements in state capacity 17th-18th centuries.

State Capacity in France

Administrative Institutions in France (Subdélégations)



Judicial Institutions in France (Bailliages)



State Capacity in France

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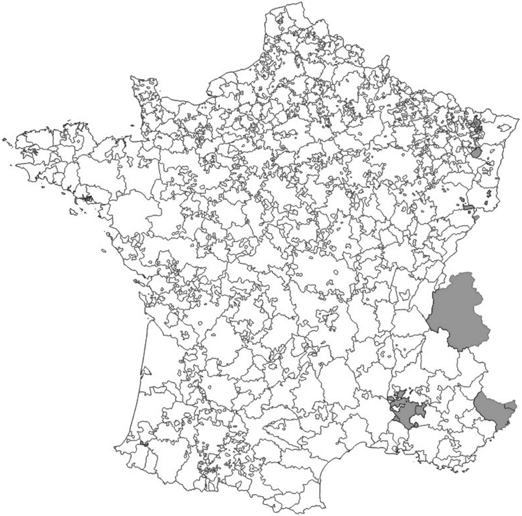
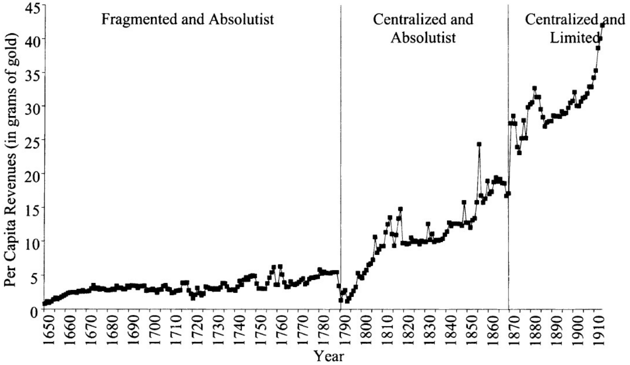


State Capacity in France

Per capita revenues, France



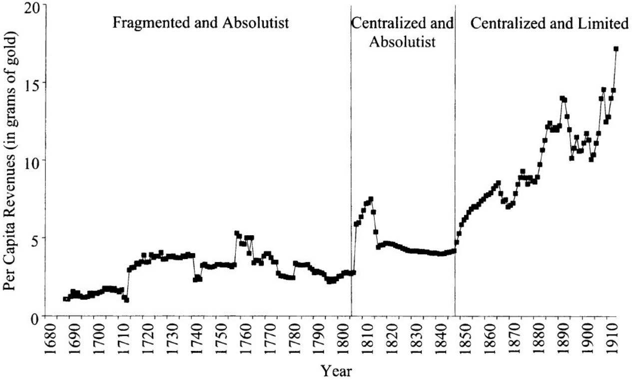
Source: Dincecco (2009)

State Capacity in Prussia, Russia, Habsburg

- Heterogeneous initial conditions: high ethnolinguistic diversity.
- State capacity took longer to build.
- Coercive path to modern statehood e.g. life-long conscription.

State Capacity in Prussia

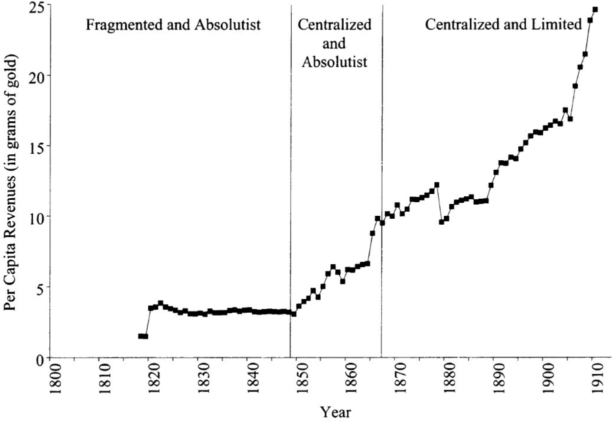
Per capita revenues, Prussia



Source: Dincecco (2009)

State Capacity in Austria-Hungary

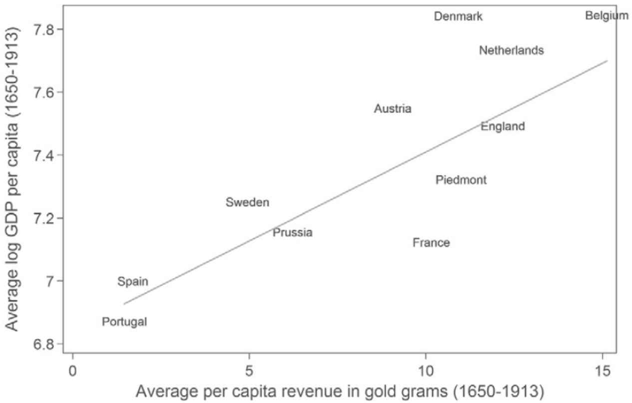
Per capita revenues, Austria-Hungary



Source: Dincecco (2009)

State Capacity and Economic Growth

State capacity and economic performance in European history



Source: Dincecco (2015)

State Capacity and Economic Growth

- Systematic empirical analysis. Dincecco and Katz (2016)
- Two elements of state capacity:
  - Fiscal centralization: year national government first secured revenues through uniform tax system.
  - Limited government: year parliament gained stable constitutional right to control national budget annually.

State Capacity and Economic Growth

Fiscal Centralization	Year	Limited Government	Year
England	1066	England	1688
France	1790	France	1870
Belgium	1795	Belgium	1831
Piedmont	1802	Piedmont	1848
Netherlands	1806	Netherlands	1848
Prussia	1806	Prussia	1848
Spain	1845	Spain	1876
Austria	1848	Austria	1867
Portugal	1859	Portugal	1851
Sweden	1861	Sweden	1866
Denmark	1903	Denmark	1848

State Capacity and Economic Growth

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- Measurement error: downward attenuation bias.

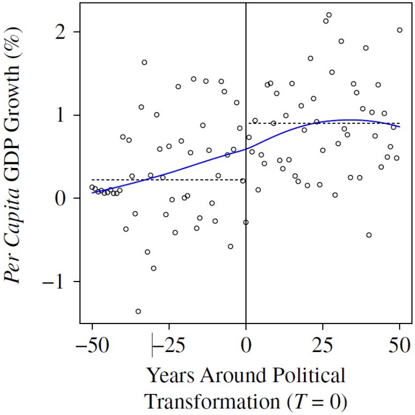
State Capacity and Economic Growth

- Economic performance:
    - Log annual growth rate of real GDP per capita, 1650–1913. Maddison
    - Missing values linearly interpolated, especially 1650–1820.

State Capacity and Economic Growth

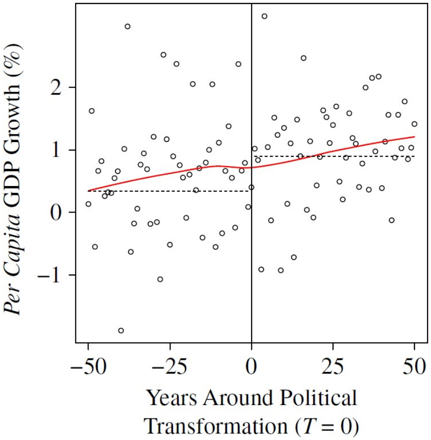
- Economic performance:
  - Log annual growth rate of real GDP per capita, 1650–1913. Maddison
  - Missing values linearly interpolated, especially 1650–1820.
- State capacity: Dincecco (2011)
  - Extractive capacity: government revenues per capita.
  - Productive capacity: non-military expenditures per capita.
  - Missing values linearly interpolated.

Time-demeaned per capita GDP growth rates and fiscal centralization



State Capacity and Economic Growth

Time-demeaned per capita GDP growth rates and limited government



State Capacity and Economic Growth

- Empirical strategy:

$$\Delta y_{i,t} = \alpha_0 + \alpha_1 C_{i,t} + \alpha_2 L_{i,t} + X'_{i,t-1}\alpha_3 + \mu_i + \lambda_t + \varepsilon_{i,t}$$

- $\Delta y_{i,t}$: Log annual GDP per capita growth rate.
- $C_{i,t}$: indicator for fiscal centralization.
- $L_{i,t}$: indicator for limited government.
- μ_i: country fixed effect.
- λ_t: year fixed effect.
- $X'_{i,t-1}$: conflict indicators, population growth, lagged y.

State Capacity and Economic Growth

- Source of identification and identifying assumption:

State Capacity and Economic Growth

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    - Relative changes in growth rate across countries.
    - Parallel counterfactual trends.

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  - Omitted variable bias: control for constant unobserved heterogeneity, but not time-varying.

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- Identification issues:
  - Reverse causality: economic growth might promote political reforms, political changes might take place in times of downturns or upswing.
  - Omitted variable bias: control for constant unobserved heterogeneity, but not time-varying.
- Not necessarily causal interpretation: document robust pattern.

State Capacity and Economic Growth

Dependent variable:	Real GDP per capita growth			
	(1)	(2)	(3)	(4)
Fiscal centralization	0.657***	0.222***	0.268***	0.344***
	[0.087]	[0.086]	[0.125]	[0.171]
Limited government	0.321***	0.053	-0.028	-0.080
	[0.109]	[0.165]	[0.146]	[0.205]
Country FE	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country time trends	No	No	Yes	Yes
Lags in y (2)	No	No	No	Yes
Observations	1,772	1,772	1,772	1,750
Countries	11	11	11	11

State Capacity and Economic Growth

- Robustness:
  - Include conflict and population growth controls.
  - Drop after 1845.
  - Averaged growth rates rather than annual.

State Capacity and Economic Growth

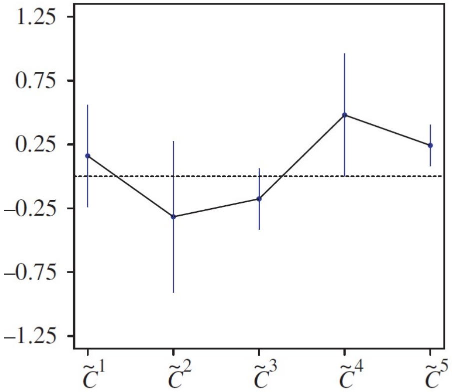
- Relax assumption of constant impact over time:

$$\Delta y_{i,t} = \alpha_0 + \sum_{j=1}^{5} \alpha_{1,j} \tilde{C}_{i,t}^{j} + \sum_{j=1}^{5} \alpha_{1,j} \tilde{L}_{i,t}^{j} + X'_{i,t-1}\alpha_3 + \mu_i + \lambda_t + \varepsilon_{i,t}$$

- $\tilde{C}_{i,t}^{1}$, $\tilde{L}_{i,t}^{1} = 1$ for years 6–10 before.
- $\tilde{C}_{i,t}^{2}$, $\tilde{L}_{i,t}^{2} = 1$ for years 1–5 before.
- $\tilde{C}_{i,t}^{3}$, $\tilde{L}_{i,t}^{3} = 1$ for years 0–4 after.
- $\tilde{C}_{i,t}^{4}$, $\tilde{L}_{i,t}^{4} = 1$ for years 5–10 after.
- $\tilde{C}_{i,t}^{5}$, $\tilde{L}_{i,t}^{5} = 1$ for more than 10 years after.

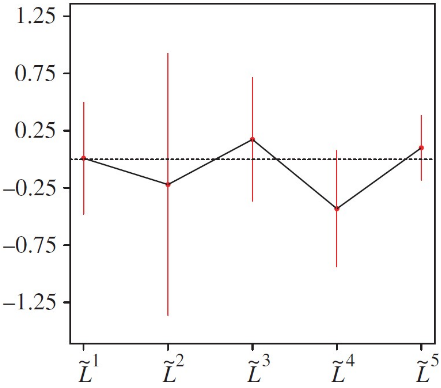
State Capacity and Economic Growth

Time-varying relationship between gdp per capita growth and fiscal centralization



State Capacity and Economic Growth

Time-varying relationship between gdp per capita growth and limited government



State Capacity and Economic Growth

- Important and direct role for fiscal centralization.
- Fiscally centralized regimes grew faster than fragmented:
  - On average by 0.2–0.4% higher per year.
  - Average 1650–1913: 0.6% $\Longrightarrow$ 1/4–2/3 of growth.

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  - Average 1650–1913: 0.6% $\Longrightarrow$ 1/4–2/3 of growth.
- Long-lasting economic improvements from fiscal centralization.

State Capacity and Economic Growth

- Test for relationship between political transformation and (extractive) state capacity:

$$\Delta E_{i,t} = \alpha_0 + \alpha_1 C_{i,t} + \alpha_2 L_{i,t} + X'_{i,t-1}\alpha_3 + \mu_i + \lambda_t + \varepsilon_{i,t}$$

- $\Delta E_{i,t}$: Log annual growth rate in per capita revenues.

State Capacity and Economic Growth

Dependent variable:	Revenues per capita growth			
	(1)	(2)	(3)	(4)
Fiscal centralization	1.405***	1.467***	2.929***	3.923***
	[0.497]	[0.531]	[0.926]	[0.907]
Limited government	0.438	0.047	0.717	1.601***
	[0.564]	[0.638]	[0.652]	[0.807]
Country, year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes
Country time trends	No	No	Yes	Yes
Lags in y (2)	No	No	No	Yes
Observations	1,760	1,748	1,748	1,734
Countries	11	11	11	11

State Capacity and Economic Growth

- Centralized regimes have 1.4–3.9% higher growth in extractive capacity.
- Some (less robust) evidence for correlation between limited government and productive capacity (non-military expenditure).

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- Additional evidence on extractive capacity and GDP growth.

Mechanisms

- Implement and enforce generalized institutions.

Mechanisms

- Public goods provision:
  - Defense (securing territorial borders).
  - Transportation infrastructures (competitive market integration, spread of innovation).
  - Mass education (investment in human capital).

Mechanisms

- States and markets as complements.
    - Competitive markets ensure allocative efficiency.
    - Need public-order property rights and contracting institutions.
    - Making fiscal revenues uniform and general increases market integration (no more internal tariffs).

Mechanisms

- Nation-building.
    - Early modern states were “stationary bandits”: taxes and war.
    - $\uparrow$ state capacity $\Longrightarrow \uparrow$ legitimacy.
    - Ideology (e.g. nationalism), conscription, school helped build common national identities.
    - Heterogeneity in preferences associated with less public goods, risk civil war, lower incomes.

Warfare and State Capacity

- Warfare was instrumental for building state capacity.

Warfare and State Capacity

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  - The rise of city-states in Western Europe.
  - The rise of nation-states in Western Europe.
  - The role of political geography: Europe, China, Africa.
  - Warfare and political development.

Rise of City-States in Western Europe

- Aftermath of fall of Carolingian Empire (800s).

  $\Longrightarrow$ High long-lasting political fragmentation.

- 500 small independent states in late medieval Europe. Tilly (1992)

Rise of City-States in Western Europe

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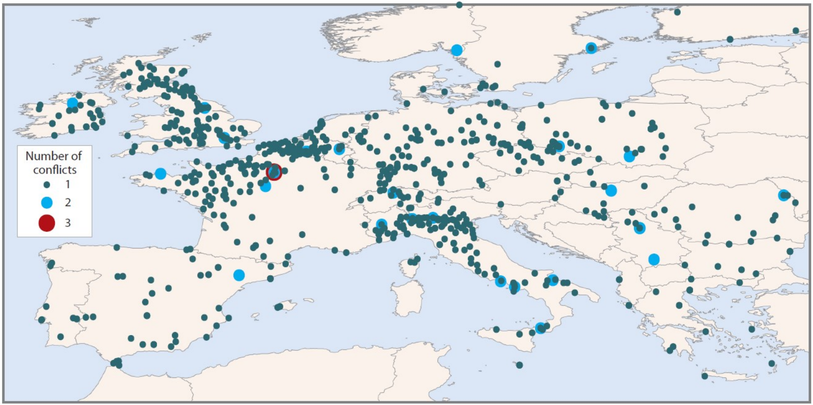
- 500 small independent states in late medieval Europe. Tilly (1992)

- High political fragmentation + scarce territory $\Longrightarrow$ endemic warfare.

- 100+ major military conflict per century (1000–1789).
  Dincecco and Onorato (2017)

Rise of City-States in Western Europe

Major military conflicts in Europe, 1000–1799



Source: Dincecco and Wang (2018) based on Dincecco and Onorato (2017)

Rise of City-States in Western Europe

- Endemic warfare $\Longrightarrow$ institutional change in Europe.

  "War made the state, and the state made war." Tilly (1975)

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- Historical warfare very expensive.

- Securing revenues $\Longrightarrow$ rulers grant local privileges, e.g. representative political institutions, property rights protections.

  $\Longrightarrow$ formal role in governance of elite taxpayers.

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- Strong empirical relationship between war frequency and parliamentary activity (1250–1800). Stasavage (2016)

Rise of City-States in Western Europe

- State capacity emerged earlier in city-states.
- Key issue: geographical scale for early nation-states:
  - High local institutional fragmentation within (more later).
  - Little control of executive: high monitoring costs. Stasavage (2011)

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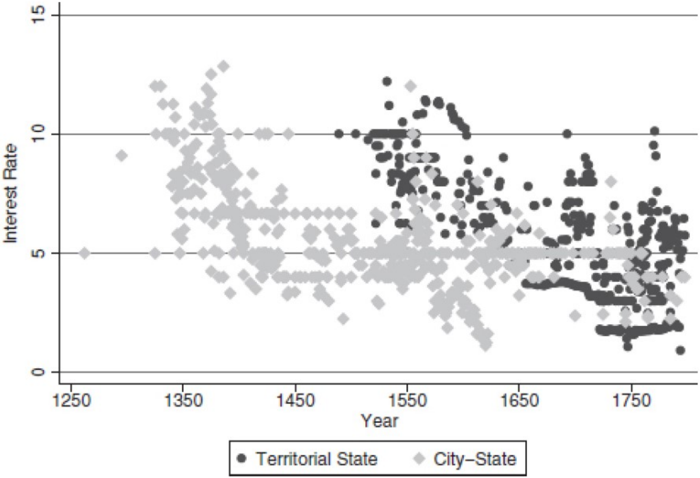
  - Little control of executive: high monitoring costs. Stasavage (2011)
- Visible in ability to borrow:
  - City-states established long-term public debt long before territorial states.
  - City-states borrow at lower cost than territorial states.

Rise of City-States in Western Europe

Interest rates on debts of city-states and territorial states



Source: Stasavage (2011)

Rise of City-States in Western Europe

City State	Year	Territorial State	Year
Arras	1241	Castile	1489
Venice	1262	Kingdom of Naples	1520
Siena	1290	France	1522
Bremen	1295	Holland	1522
Douai	1295	Papal States	1526
Hamburg	1308	Duchy of Milan	1543
Genoa	1340	Wurttemberg	1550
Florence	1347	Austria	1555
Barcelona	1360	Piedmont	1684
Cologne	1375	England	1693
Dortmund	1375	Tuscany	1700
Ghent	1375	Denmark	1725
Nuremberg	1381		
Basel	1383		
Zurich	1386		
Mainz	1415		
Bruges	1489		

Rise of Nation-States in Western Europe

- Emergence in the early 16th century.
- However, remained weak for a very long time.

  "The strength of a monarch's theoretical claims to absolutist rule was frequently inversely proportional to his de facto powers." Epstein (2000)

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- Endemic warfare $\Longrightarrow$ relinquish partial political control to local elites for funds $\Longrightarrow$ city-states obstructed centralization efforts at national level.
- Early modern nation-States were mosaics built upon medley of local institutional structures.

Warfare and Political Development

- Classical argument. Dincecco (2017) Dincecco and Wang (2018)
  - Low land-labor ratio $\Longrightarrow$ high marginal value of land $\Longrightarrow$ warfare.
  - Warfare is expensive (military revolution) $\Longrightarrow$ need to raise taxes.
  - Investment in fiscal capacity + political representation of local elites.

  $\Longrightarrow$ Political development $\Longrightarrow$ Economic development.

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- Is this logic universal?

Warfare in China

Major military conflicts in China, 1000–1799

Source: Dincecco and Wang (2018) based on Wang (2006)

Warfare in Europe and China

- Violent warfare was main feature of Europe and China.

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  - External (interstate) vs internal (intrastate) conflicts.
  - Multidirectional vs unidirectional foreign attack threats.

Warfare in Europe and China

- Violent warfare was main feature of Europe and China.
- But the nature of warfare differed greatly:
  - External (interstate) vs internal (intrastate) conflicts.
  - Multidirectional vs unidirectional foreign attack threats.
- China: 65% are rebellions and civil wars.
- China: 80% of external conflicts against Steppe nomads.

Political Geography

- Europe: political fragmentation.
  - Aftermath of fall of Carolingian Empire (800s)
  - 500 small independent states in late medieval Europe. Tilly (1992)
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Political Geography

- Europe: political fragmentation.
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- China: political centralization.
  - Qin (200 BCE): first unitary state in China.
  - Early uniform written language, currency, measure and weights.
  - 1.5 states on average 1000–1799.

The Role of Political Geography: Model

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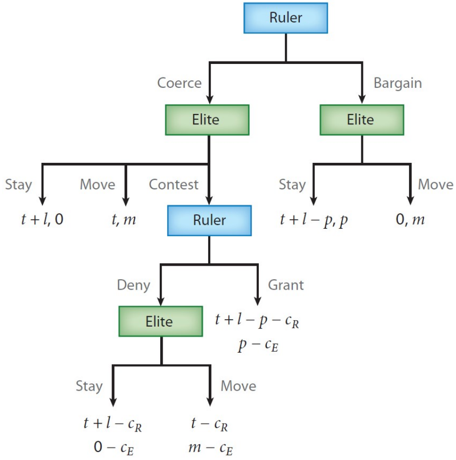
- Elites actions:
    - Move (exit): payoff $m \in \mathbb{R}$. Hirschman (1970) Clark et al. (2017)
    - Contest: cost $c_E > 0 \implies$ cost to rule $c_R > 0$.
    - Stay: ruler's payoff $l > 0$ for loyalty.
        - If rule grands demands: payoff p to elites, $-p$ to ruler.
        - If ruler denies demands: payoff 0 to elites.

The Role of Political Geography: Model

Model and payoffs



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- Subgame perfect equilibrium: (Bargain, Grant; Contest, Stay, Move).

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- Subgame perfect equilibrium: (Coerce, Deny; Stay, Stay, Stay).

The Role of Political Geography

Exit, voice, loyalty: Europe versus China

Attribute	Europe	China
Political geography	Fragmentation	Centralization
State size	Small	Large
Exit ability[a]	High	Low
Warfare	Common	Common
Conflict type	External	Internal
Threat direction[b]	Multidirectional	Unidirectional
Power balance	Favors elite	Favors ruler
Political representation	More likely	Less likely

Source: Dincecco and Wang (2018)

Extractive Capacity

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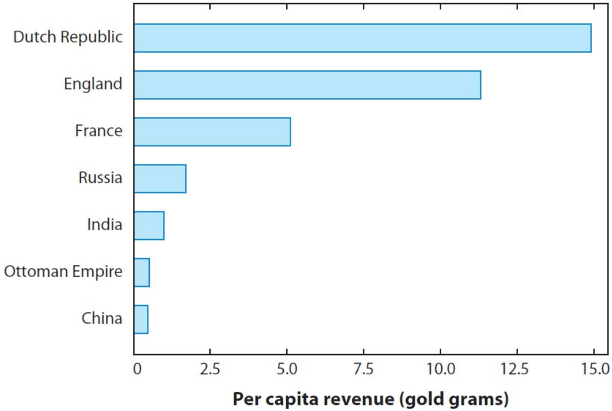
- In China:
  - No representation so little agreement on taxes.
  - Vast geography $\Longrightarrow$ communication costs and difficult monitoring.

Extractive Capacity

Per capita revenue across Eurasia in the 1780s



Warfare and Political Development in Africa

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Warfare and Political Development in Africa

- Does this logic apply in Sub-Saharan Africa?
- Three region-specific factors break the war-state logic.
    - Political geography.
    - Transatlantic slave trade.
    - European colonization.

Political geography in Sub-Saharan Africa

- High land-labor ratio $\Longrightarrow$ little incentives to control territory.
- Mostly raiding wars: much less expensive.
- Little incentives to extract revenues and build fiscal capacity.

Slave Trade and Colonization

- Transatlantic slave trade.
    - Generated outgrowth of pre-colonial conflicts over people.
    - Accentuated nature of intra-African wars.
    - Slaves more valuable than taxes $\implies \downarrow$ fiscal capacity.

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  - Arbitrary borders $\uparrow$ fractionalization $\Longrightarrow$ persistent civil conflicts.
- Civil conflicts $\Longrightarrow$ capture of state by specific groups
- Little incentives to invest in generalized particularized institutions.

Warfare and Political Development: Data

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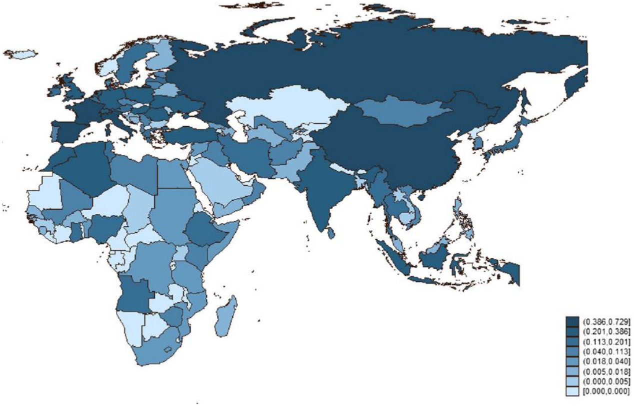
- Civil conflict: share of years in civil war 1950–2000. Besley and Persson (2011)
- Fiscal capacity (1990–2014).
  - Main variable: share of income taxes in total taxes. IMF
  - Income tax require large administrative capacity.
  - Also: share of direct taxes, income taxes to GDP, tax revenues to GDP.

Warfare and Political Development: Data

Historical conflict, 1400–1799



Warfare and Political Development: Strategy

$$y_i = \alpha + \beta\, \texttt{Conflict}_i + \delta\, \texttt{Conflict}_i \times \texttt{Africa} + x_i'\gamma + \mu_j + \varepsilon_i$$

- i indexes countries.
- y_i: measure of fiscal capacity today.
- $\texttt{Conflict}_i$: measure of historical conflict.
- x_i: vector of controls (population density in 1500, timing of Neolithic Revolution, land suitability for agriculture, log absolute latitude, total land area).
- μ_j: FE for Asia, Europe, North Africa, Sub-Saharan Africa.
- δ: measures how relationship for Africa differs from β.

Warfare and Political Development: Results

Dependent variable:	Income tax share	Direct tax share	Income tax to GDP	Total tax to GDP	Civil war share
	(1)	(2)	(3)	(4)	(5)
Conflict (1400–1799)	0.33***	0.60**	0.07*	0.05	0.02
	[0.11]	[0.28]	[0.03]	[0.05]	[0.183
Conflict × Africa	-0.06	1.32	0.12	0.27	2.75***
	[0.24]	[3.07]	[0.13]	[0.40]	[1.21]
Controls	Yes	Yes	Yes	Yes	Yes
Countries	110	37	110	118	116

- $\uparrow$ 1 s.d. conflict in Old World $\Longrightarrow \uparrow$ 0.4 s.d. income tax share.
- Fiscal strength rather than government size.
- Not in Africa + no "anti-persistence" of conflict.

Warfare and Political Development: Robustness

- Additional controls: colonizer, artificial borders, legal origin, state antiquity, geographical conditions.
- Test for OVB. Altonji et al. (2005)
- Alternative samples:
  - Drop 18th century wars, Russia, China.
  - Add New World.
- Intermediate outcomes:
  - Infrastructural power of state (railroads in 1910).
  - Share of years with conflict 1850–1899.

Alternative Explanation: Malthusian Circle

- Our hypothesis:
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- Alternative (demographic) hypothesis: Voigtlander and Voth (2013)
  - In a Malthusian world.
  - Wars $\Longrightarrow$ demography $\Longrightarrow$ economic development.

Europe's Early Rise to the Riches

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  - Feedback loop: $\uparrow$ income per capita $\Longrightarrow$ $\uparrow$ wars $\Longrightarrow$ $\uparrow$ death...

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- Industrial Revolution: escape Malthusian trap through fast technological change.

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- Incomes in pre-1800 Europe peaked after Black Death of 1350.
- In a Malthusian world, should have returned to pre-plague levels.
- Technology or institutions cannot win against population:
  - High rate of technological change pre-1800: 0.25–0.5 % annually.
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- But higher incomes were sustained. Why?

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- Religious wars in 16th-century France (36 years): 20%.
- Thirty Years' War in 17th-century Germany (30 years): 33%.
- Black Death in 14th-century Europe (4 years): 30–50%.

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  - Power of weaponry (soldiers).
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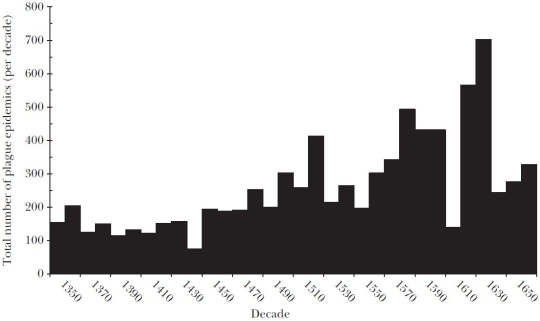
- Two determinants of deadliness of war:
  - Power of weaponry (soldiers).
  - Hunger and diseases (civilians).
- Diseases: main driver of death pre-1800.
- Main channel: contact with alien armies (and trade).
- Aggravated by geographical and political fragmentation.

The Effects of War

Plague Outbreaks in Europe, 1350–1650



Source: Biraben (1975).

Source: Voigtlander and Voth (2013)

The Effects of War

Frequency of War

Century	*Number of wars*	*Average duration (years)*	*Percentage of years under warfare*
16th	34	1.6	95%
17th	29	1.7	94%
18th	17	1.0	78%
19th	20	0.4	40%
20th	15	0.4	53%

Source: Tilly (1990).

Source: Voigtlander and Voth (2013)

The Effects of War

- Given wars and death, why higher income by 1700 than before and elsewhere?

The Effects of War

- Given wars and death, why higher income by 1700 than before and elsewhere?
- Because most death from diseases, not violence.

  $\Longrightarrow$ little destruction of infrastructures and capital stock.
- Land, houses, livestock rebuilt quickly.
- Pre-1800 wars $\Longrightarrow \uparrow\uparrow$ land+capital to labor ratio $\Longrightarrow \uparrow\uparrow$ income.

The Malthusian Circle

1. Black Death $\Longrightarrow \uparrow$ income $\Longrightarrow \uparrow$ government revenues.
2. $\uparrow$ government revenues $\Longrightarrow \uparrow$ wars $\Longrightarrow \uparrow$ death.

A Malthusian Circle: Incomes and Taxes

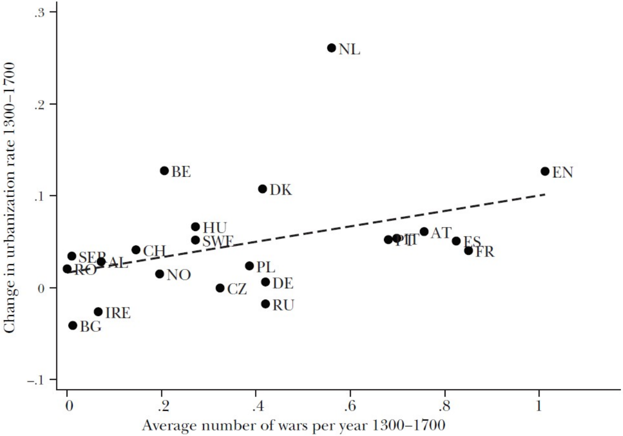
Tax Revenues in Europe

Year	*Total tax revenue (tons of silver)*	*Average tax per capita (daily urban wage equivalents)*
1509	214	3.7
1559	456	3.6
1609	1,116	4.9
1659	2,215	5.7
1709	2,667	8.1
1759	3,808	9.9
1789	6,846	12.2

- Driven by $\uparrow$ income (taxes $= 1/3$).
- 70–80% spent on wars.
- Military revolution: wars became very expensive.

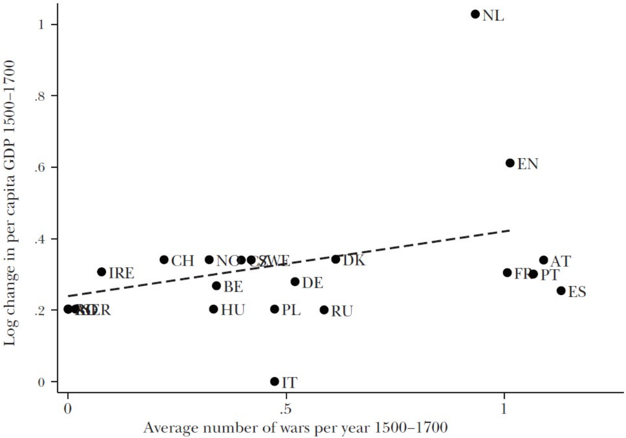
A Malthusian Circle: Wars and Rising Riches

Wars and Urbanization, 1300–1700



A Malthusian Circle: Wars and Rising Riches

Wars and per capita GDP, 1500–1700



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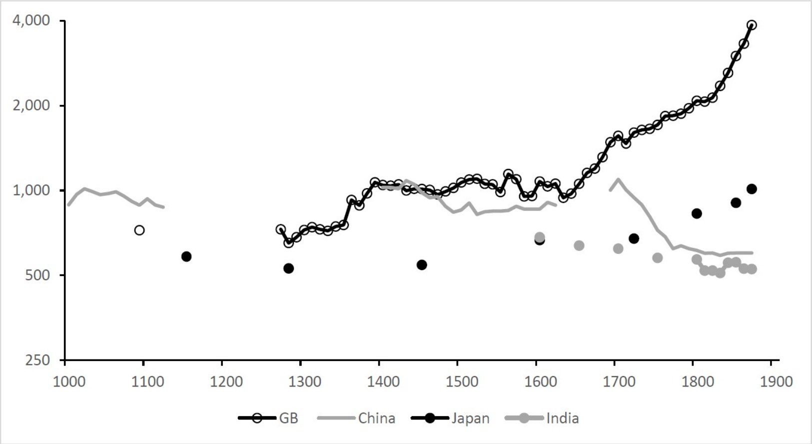
  - How to attain "$\uparrow$ income per capita $\implies \uparrow$ wars"?
  - Through $\uparrow$ fiscal capacity and political representation.
- Wars $\implies$ State capacity $\implies$ development at critical junctures.
- Malthusian circle: additional element for war-state link.

The Big Question

How path-dependent is the relationship between State capacity and long run development?

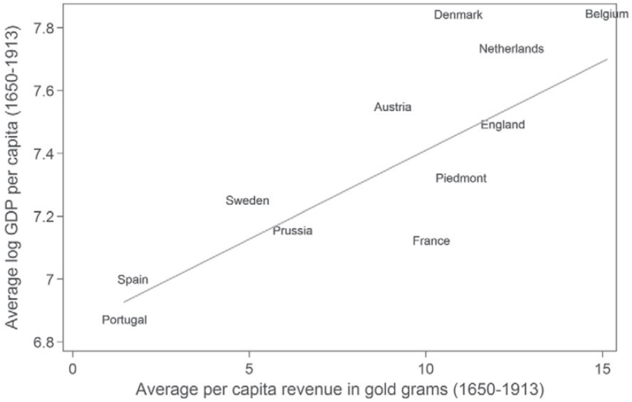
The Great Divergence

GDP per Capita in Asia, 1000–1870 (1990 GKI$, Log scale)



State Capacity and Economic Growth

State capacity and economic performance in European history



State Capacity and Economic Growth

- Our explanation: wars and state, conditioned on the nature of warfare and political geography.
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State Capacity and Economic Growth

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- How persistent is this relationship over time? Is it always linear?
- Explore non-linearities in relationship between state persistence and growth, with a focus on China.

Journal of Economic Growth, 7, 347–369, 2002

States and Markets: The Advantage of an Early Start*

VALERIE BOCKSTETTE

unaffiliated

AREENDAM CHANDA

Department of Economics, North Carolina State University, Raleigh, NC 27695

LOUIS PUTTERMAN

Department of Economics, Brown University, Providence, RI 02912

State Antiquity

- Bockstette, Chanda, and Putterman (2002)
- What gives rise to effective states?
- Does state antiquity predict state capacity?
- Do countries with longer state history perform better?

Antiquity of the State

- Periodization: 50-year intervals from 0 to 1950 (39 periods).
- Three components ($\times 50$):
  - Is there a government above the tribal level? $+1$
  - Is this government foreign (colonizer) or locally based? $+0.5$ / $+1$
  - How much of the territory was ruled by this government? $+1$ if $>$ 50%, $+0.75$ if $>$25%. . . .
- Compute for 119 countries.
- Combine with different discount rates. Baseline: $(1 + 0.05)^t$.
- Divide by the sample maximum (China) $\Rightarrow$ index between 0 and 1.

Antiquity of the State

Table 1. Regional averages of *statehist5* (weighted by 1960 population).

	Statehist5
Europe	0.79
Asia	0.79
Middle East & North Africa	0.64
Sub-Saharan Africa	0.32
Latin America/Caribbean	0.30
North America	0.20
Oceania	0.16
Total	0.41

Antiquity of the State

Table 2. Correlations with *statehist5*.

Political and Institutional Quality Indicators	Assassinations	Riots	Government Crises
Correlation	−0.1733‡	0.1869‡	0.2627*
Sample size	96	92	99
	Political stability	Lack of corruption	Lack of Government repudiation of contracts
Correlation	0.2437‡	0.3800*	0.5005*
Sample size	62	90	90
	Lack of expropriative risk	Rule of law	Bureaucratic quality
Correlation	0.4559*	0.3995*	0.3911*
Sample size	90	90	90
Social and Demographic Indicators	Ethno-linguistic fragmentation	Social development§	Population density 1960
Correlation	−0.2985*	0.4468*	0.1974*
Sample size	98	39	103
	Trust	Civic norms	
Correlation	0.1227	0.3077*	
Sample size	29	29	
GDP and Growth Indicators	GDP pc 1960	GDP pc 1970	GDP pc 1980
Correlation	0.2463†	0.3380*	0.3746*
Sample size	101	101	101
	GDP pc 1990	GDP pc 1995	GDP growth 1960–1995
Correlation	0.4589*	0.4747*	0.5317*
Sample size	101	101	94

Notes: *Statistically significant at the 0.01 level; †Statistically significant at the 0.05 level; ‡Statistically significant at the 0.10 level; §Excludes Latin America/Caribbean.

Antiquity of the State

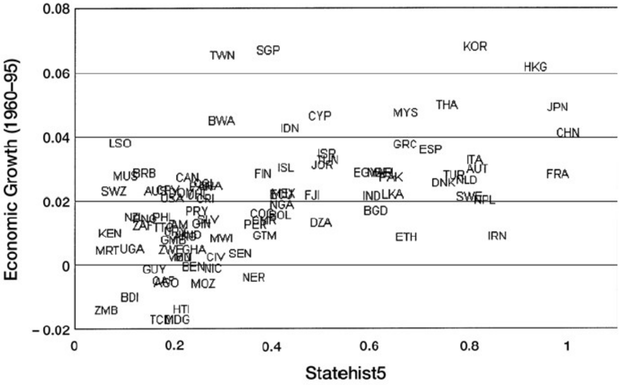


Figure 1. State history and economic growth.

Empirical Strategy

- Issue: OVB.
  - No reverse causality.
  - But state antiquity might proxy for more direct determinants (geographic region, population density, linguistic homogeneity...)
- Their solution: simple multivariate OLS.

Main Results

Table 3. Regressions with *statehist5* using growth (1960–1995) as the dependent variable.

	1	2	3†	4†	5†	6†	7†
Constant	0.049	0.029	0.036	0.021	0.029	0.035	0.029
	(2.692)*	(1.424)	(1.848)***	(1.06)	(1.51)	(1.6)	(1.04)
Log of GDP pc (1960)	−0.011	−0.009	−0.009	−0.009	−0.008	−0.009	−0.009
	(−4.237)*	(−3.119)*	(−3.515)*	(−3.01)*	(−3.21)*	(−3.21)*	(−2.62)**
Schooling	0.033	0.032	0.034	0.026	0.029	0.032	0.004
	(2.559)**	(2.654)*	(2.879)*	(2.33)**	(2.62)*	(2.71)*	(0.36)
Log of population growth (1960–1995)	−0.001	0.002	0.001	0.007	0.002	0.002	0.002
	(0.477)	(0.797)	(0.602)	(2.47)**	(0.86)	(0.85)	(0.72)
Log of investment rate (1960–1995)	0.017	0.014	0.014	0.012	0.013	0.014	0.009
	(5.854)*	(5.468)*	(5.396)*	(5.04)*	(5.51)*	(5.16)*	(2.64)*
Statehist5		0.025	0.021	0.029	0.021	0.025	0.028
		(3.586)*	(3.372)*	(4.45)*	(3.49)*	(3.63)*	(3.41)*
ICRG (Institutional Quality)				0.002			0.001
				(2.29)**			(1.39)
Population density (1960)					0.001		0.001
					(5.5)*		(6.01)*
ETHNIC						−0.004	−0.002
						(−0.84)	(−0.50)
East-Asia Pacific							0.014
							(2.82)*
Latin America							0.006
							(1.50)
Middle East and North Africa							0.01
							(2.72)*
North America							0.018
							(2.63)**
South Asia							0.0008
							(0.16)
Sub Saharan Africa							−0.0002
							(−0.03)
Western Europe							0.006
							(1.01)
Observations	88	88	87	77	86	82	73
R-square	0.47	0.58	0.58	0.65	0.65	0.6	0.77

Notes: †Hong Kong has been dropped from regressions (3)–(7). Numbers in parentheses are *t* statistics (calculated from heteroscedastic consistent standard errors). Schooling refers to secondary school enrollment ratio in 1960. Institutional quality is as measured by the ICRG index. ETHNIC is the variable used in Easterly and Levine (1997). * = significant at 0.01 level; ** = significant at 0.05 level; *** = significant at 0.10 level.

Main Results

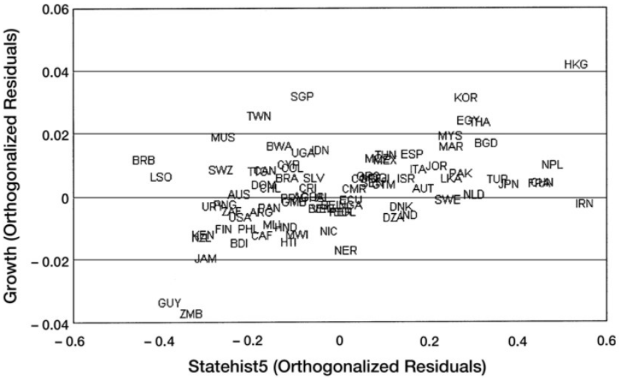


Figure 2. State history and economic growth.

Main Results

Table 4. Regressions with *statehist5* using growth (1960–1995) as the dependent variable (non OECD countries only).

	1	2	3†	4†	5†	6†	7†
Constant	0.043	0.025	0.032	0.0002	0.027	0.03	0.022
	(2.16)**	(1.05)	(1.46)	(0.01)	(1.23)	(1.18)	(0.91)
Log of GDP pc 1960	−0.01	−0.008	−0.009	−0.006	−0.008	−0.008	−0.007
	(−3.66)*	(−2.37)**	(−2.81)*	(−2.32)**	(−2.57)**	(−2.43)**	(−1.78)***
Schooling	0.066	0.052	0.056	0.045	0.044	0.049	0.021
	(3.14)*	(2.29)**	(2.52)**	(2.63)**	(2.00)**	(2.02)**	(1.11)
Log of population growth (1960–1995)	0.002	0.0002	0.0006	0.004	0.001	−0.0008	0.003
	(0.66)	(0.005)	(0.136)	(1.14)	(0.27)	(−0.18)	(0.67)
Log of investment rate (1960–1995)	0.013	0.012	0.012	0.008	0.012	0.012	0.007
	(4.48)*	(4.37)*	(4.34)*	(3.13)*	(4.37)*	(4.15)*	(1.83)***
Statehist5		0.03	0.025	0.037	0.024	0.035	0.048
		(3.29)*	(2.96)*	(4.42)*	(2.96)*	(3.72)*	(4.70)*
ICRG (Institutional quality)				0.004			0.003
				(3.71)*			(2.16)**
Population density (1960)					0.001		0.007
					(5.88)*		(4.20)*
ETHNIC						−0.003	−0.003
						(−0.68)	(−0.38)
East-Asia Pacific							−0.005
							(−0.73)
Latin America							−0.01
							(−1.42)
Middle East and North Africa							−0.012
							(−1.96)***
South Asia							−0.022
							(−3.36)*
Sub Saharan Africa							−0.014
							(−1.50)
Observations	70	70	69	59	68	64	55
R-square	0.46	0.59	0.57	0.72	0.63	0.60	0.80

Notes: †Hong Kong has been dropped from regressions (3)–(7). Numbers in parentheses are t statistics (calculated from heteroscedastic consistent standard errors). Schooling refers to secondary school enrollment ratio in 1960. Institutional quality is as measured by the ICRG index. ETHNIC is the variable used in Easterly and Levine (1997). Note that there are no West European countries that are not in the OECD and hence there is no dummy variable for this group. * = significant at 0.01 level; ** = significant at 0.05 level; *** = significant at 0.10 level.

Main Results

Table 5. Regressions with *statehist5* using log of output per worker (1988) as dependent variable.

	(1)	(2)
Constant	8.897	8.558
	(14.78)*	(15.53)*
Statehist5	0.742	0.194
	(1.85)***	(0.50)
ETHNIC	− 0.182	− 0.131
	(− 0.73)	(− 0.58)
Population Density (1960)	0.041	0.015
	(2.21)**	(0.84)
East-Asia Pacific	− 0.06	− 0.493
	(− 0.11)	(− 0.93)
Latin America	− 0.099	− 0.297
	(− 0.17)	(− 0.57)
Middle East & North Africa	0.473	0.192
	(0.86)	(0.38)
North America	1.957	0.646
	(2.87)*	(0.94)
South Asia	− 0.695	− 0.619
	(− 1.13)	(− 1.11)
Sub-Saharan Africa	− 1.387	− 1.453
	(− 2.38)**	(− 2.75)*
Latitude	− 0.011	− 0.008
	(− 3.02)*	(− 2.21)**
SI		1.642
		(4.31)*
Observations	93	93
R-squared	0.79	0.81

Notes: Data for log output per worker and latitude are from Hall and Jones (1999). Numbers in parentheses are *t* statistics. ETHNIC is the variable used in Easterly and Levine (1997). SI refers to ''social infrastructure'' in Hall and Jones (1999). * = significant at 0.01 level; ** = significant at 0.05 level; *** = significant at 0.10 level.

Social infrastructure: combines index of government antidiversion policies and openness to international trade.

Mechanisms

Table 6a. Hall-Jones social infrastructure equation with *statehist5* as an additional instrument.

Dependent variable: social infrastructure.

	(1) All Countries	(2) Non OECD Countries
Constant	0.04	−0.16
	(0.33)	(−1.4)
ENGFRAC	0.21	0.07
	(2.13)†	(0.58)
EURFRAC	0.14	0.11
	(3.29)*	(2.51)†
LOGFRANKROM	0.06	0.12
	(1.64)	(3.80)*
LATITUDE	0.001	−0.004
	(0.58)	(−3.04)*
Statehist5	0.49	0.59
	(3.39)*	(3.92)*
Observations	101	77
R-square	0.41	0.28

Notes: All data except *statehist5* come from Hall and Jones (1999). Both regressions exclude Hong Kong. * = significant at 0.01 level; † = significant at 0.05 level.

State History and Development

J Econ Growth (2018) 23:1–40
https://doi.org/10.1007/s10887-017-9152-0

CrossMark

State history and economic development: evidence from six millennia

Oana Borcan[1] · Ola Olsson[2] · Louis Putterman[3]

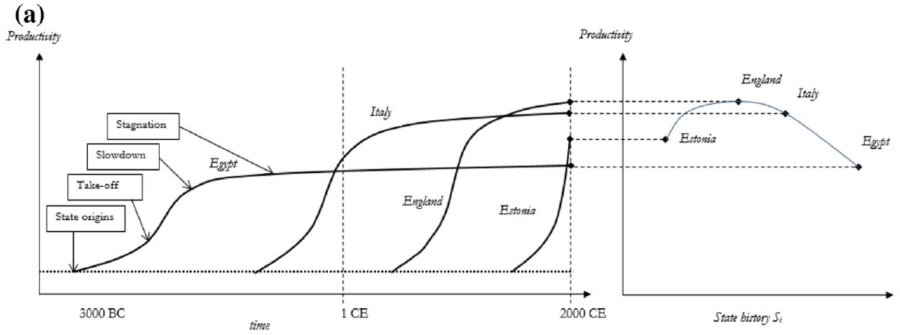
State History and Development

- Borcan, Olsson, and Putterman (2018)
- Same question as Bockstette et al (2002) but extend to 3500 BCE through 2000 CE.
- Key theoretical prediction: modern productivity and population density have non-linear relationship with state experience in pre-industrial era.

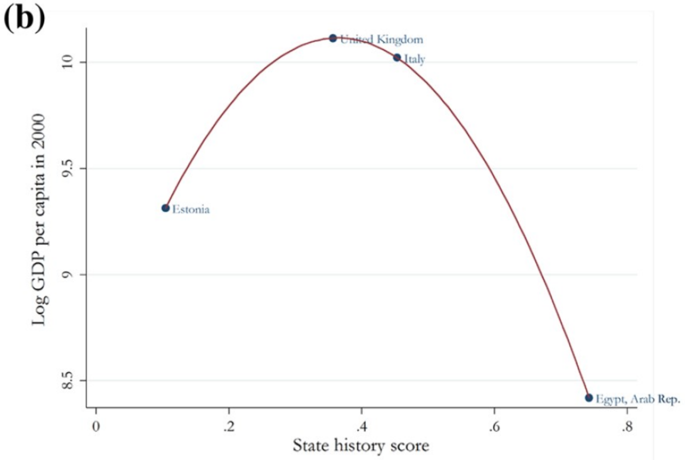
State History and Development

- Key assumption: accumulated history $\implies$ state capacity, taxation, public goods $\implies$ economic growth.
- But remember state capacity: without constraints, extractive institutions and appropriation by elites $\implies$ stagnation.
- Three predictions:
  - In newly established states, increased capacity increases growth.
  - In enduring states, increased capacity hurts growth.
  - Spill-overs in state experience from surrounding high state antiquity through learning.

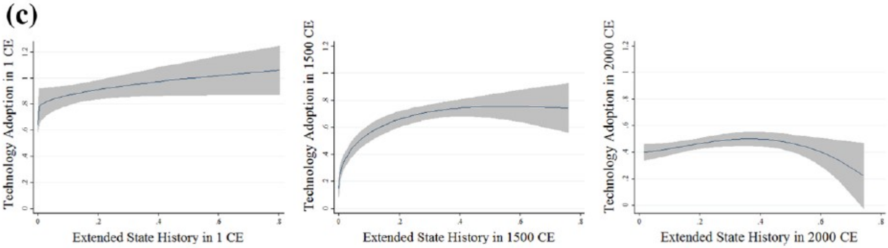
State History and Development



State History and Development



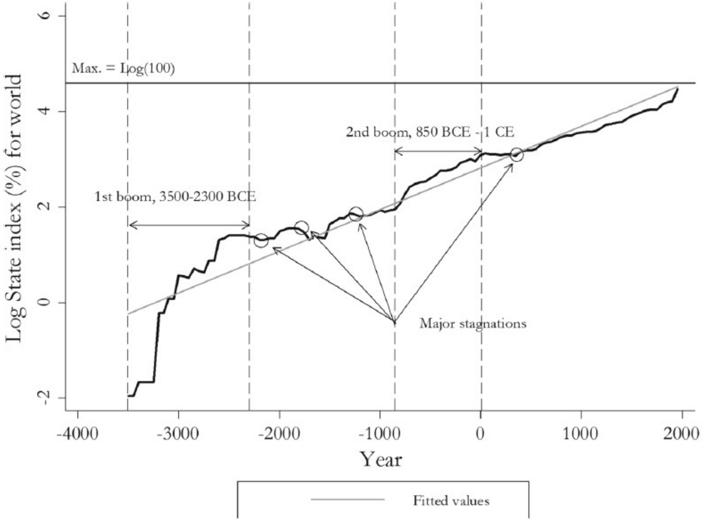
State History and Development



Data

- Index of state antiquity: extend Bockstette et al (2002) to 159 countries and 3500 BCE.
- Same method and periodization: 110 periods of 50 years.
  - Is there a government above the tribal level? $+1$
  - Is this government foreign (colonizer) or locally based? $+0.5$ / $+1$
  - How much of the territory was ruled by this government? $+1$ if $>$ 50%, $+0.75$ if $>$25%. . . .
- Multiply all three then by 50.
- Then discount and normalize so that between 0 and 1.

Data



Max. = Log(100)
2nd boom, 850 BCE - 1 CE
1st boom, 3500-2300 BCE
Major stagnations
Log State index (%) for world
-2
0
2
4
6
-4000
-3000
-2000
-1000
0
1000
2000
Year
Fitted values

Data

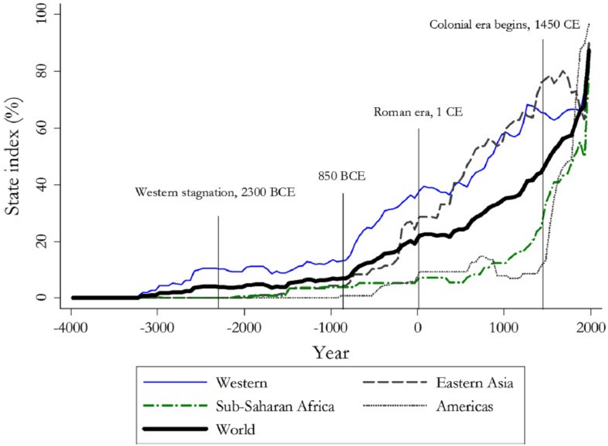


Fig. 3 Emergence of states in four agricultural core areas and in the world as a whole 3500 BCE–2000 CE. *Note*: The figure shows the development of the aggregated State index in the Western agricultural zone (including 62 current countries in Europe, North Africa, the Middle East, as well as Afghanistan, Armenia, Azerbaijan, Georgia, India, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan), Eastern Asia (20 countries), Americas (including 27 countries in North and South America and in the Caribbean), and Sub-Saharan Africa (47 countries). Oceania (only 3 countries in our sample) is omitted. It also shows the aggregate index for the 159 countries in the world as a whole (solid black line). On the horizontal axis, negative values imply years BCE whereas positive values show the CE period. Particular years with trend breaks are marked

Empirical Strategy

$$Technology1500_i = \beta_0 + \beta_1 \cdot Statehist1500_i + \beta_2 \cdot Statehist1500_i^2 + \beta_j' \cdot Z_i + \beta_k' \cdot X_i + \lambda_c + \epsilon_i \quad (5)$$

- First focus on relation in Malthusian era (1500).
- Simple cross-section OLS.
- Historical controls Z: time since transition to agriculture, first settlement of humans, state age in 1500.
- Geographic controls X: latitude, landlocked, distance to coast, elevation, land suitability for agriculture, temperature, rain.
- Continent fixed effects.
- When focusing on post-1500, use an ancestry-adjusted measure to account for population migrations.

Main Results

Table 2 State history and average technology adoption in 1500 CE

	Technology adoption in 1500 CE						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Statehist in 1500 CE	1.152***	2.643***		1.809***	1.535***	0.811***	1.168***
	(0.118)	(0.328)		(0.399)	(0.306)	(0.198)	(0.275)
Statehist in 1500 CE squared		−2.993***		−2.585***	−1.501***	−0.340	−0.226
		(0.645)		(0.744)	(0.543)	(0.330)	(0.306)
Agyears in 1500 CE			0.104***	0.068***	0.038***	0.005	0.013
			(0.008)	(0.014)	(0.012)	(0.010)	(0.011)
Origtime in 1500 CE					0.001	−0.001**	0.000
					(0.001)	(0.001)	(0.001)
Origtime in 1500 CE squared							−0.000
							(0.000)
State age in 1500 CE							−0.075*
							(0.043)
Observations	112	112	110	110	107	107	107
R-squared	0.446	0.558	0.532	0.641	0.818	0.904	0.912
Controls	No	No	No	No	Yes	Yes	Yes
Continent FE	No	No	No	No	No	Yes	Yes

The table displays OLS estimates from regressions of average technology adoption in 1500 CE on the *extended Statehist of 1500 CE, linear and squared*. The Average Technology Adoption index in 1500 CE is constructed by Comin et al. (2010). The list of controls includes: absolute latitude, an indicator of whether the present-day country is landlocked, distance to coast and rivers, mean elevation, land suitability, percentage arable land, temperature, precipitation, percentage population at risk of contracting malaria. Robust standard errors in parentheses

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Main Results

Table 3 State history, log population density and urbanization in 1500 CE

Panel A	Log population density in 1500 CE						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Statehist in 1500 CE	3.680***	8.730***		6.262***	6.496***	4.829***	7.689***
	(0.566)	(1.557)		(1.902)	(1.557)	(1.514)	(2.433)
Statehist in 1500 CE squared		−10.385***		−8.856***	−5.635**	−2.832	−3.447
		(2.663)		(2.855)	(2.702)	(2.139)	(2.131)
Agyears in 1500 CE			0.315***	0.186***	0.159***	0.139**	0.230***
			(0.042)	(0.065)	(0.060)	(0.065)	(0.068)
Origtime in 1500 CE					0.005**	−0.003	−0.021
					(0.003)	(0.004)	(0.014)
Origtime in 1500 CE squared							0.000
							(0.000)
State age in 1500 CE							−0.406**
							(0.188)
Observations	154	154	147	147	128	128	128
R-squared	0.214	0.269	0.269	0.321	0.716	0.770	0.787

Main Results

Table 3 continued

Panel B	Urbanization in 1500 CE						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Statehist in 1500 CE	15.392***	25.808***		30.826***	41.316***	35.336***	50.123***
	(2.183)	(7.147)		(8.168)	(10.318)	(10.870)	(16.171)
Statehist in 1500 CE squared		−20.101*		−23.144*	−32.852**	−25.467*	−28.826**
		(11.798)		(11.777)	(12.374)	(12.882)	(14.072)
Agyears in 1500 CE			0.761***	−0.391	−0.175	−0.245	0.245
			(0.177)	(0.248)	(0.307)	(0.406)	(0.483)
Origtime in 1500 CE					−0.081**	−0.084*	−0.213
					(0.037)	(0.042)	(0.145)
Origtime in 1500 CE squared							0.002
							(0.002)
State age in 1500 CE							−2.067
							(1.503)
Observations	83	83	83	83	76	76	76
R-squared	0.302	0.323	0.111	0.337	0.480	0.507	0.534
Controls	No	No	No	No	Yes	Yes	Yes
Continent FE	No	No	No	No	No	Yes	Yes

Main Results

Table 4 State history and average technology adoption 2000 CE

Panel A	Technology adoption in 2000 CE						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Statehist	0.086	0.842***		0.667**	0.303	0.461*	0.674**
	(0.095)	(0.318)		(0.331)	(0.239)	(0.243)	(0.282)
Statehist squared		−1.285***		−1.193**	−0.405	−0.553*	−0.574*
		(0.452)		(0.459)	(0.347)	(0.323)	(0.316)
Agyears			0.011	0.011	−0.007	−0.005	0.003
			(0.007)	(0.010)	(0.008)	(0.012)	(0.012)
Origtime					0.000	0.001**	0.001
					(0.000)	(0.001)	(0.002)
Origtime squared							0.000
							(0.000)
State age							−0.036*
							(0.021)
Observations	130	130	129	129	125	125	125
R-squared	0.006	0.044	0.016	0.050	0.643	0.683	0.690

Main Results

Table 4 continued

Panel B	Technology adoption in 2000 CE						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ancestry-Adjusted Statehist of 1500 CE	0.219**	1.285***		1.271***	0.785***	0.661***	0.791***
	(0.093)	(0.273)		(0.310)	(0.216)	(0.220)	(0.221)
Ancestry-Adjusted Statehist of 1500 CE squared		−2.024***		−2.021***	−1.120***	−0.930***	−0.892***
		(0.505)		(0.510)	(0.289)	(0.320)	(0.304)
Agyears			0.011	0.001	−0.010	−0.005	0.002
			(0.007)	(0.011)	(0.009)	(0.011)	(0.012)
Origtime					0.001*	0.001**	0.001
					(0.000)	(0.001)	(0.002)
Origtime squared							0.000
							(0.000)
State age							−0.030*
							(0.017)
Observations	130	130	129	129	125	125	125
R-squared	0.033	0.140	0.016	0.138	0.674	0.698	0.704
Controls	No	No	No	No	Yes	Yes	Yes
Continent FE	No	No	No	No	No	Yes	Yes

Main Results

Table 5 Statehist versus Statehist 1–1950 CE and Log GDP pc 2000. Nonlinear relationship

Panel A	Log GDP pc 2000						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Statehist	1.326*	7.010***		7.337***	3.869**	4.530**	6.790***
	(0.723)	(2.291)		(2.658)	(1.921)	(2.057)	(2.496)
Statehist squared		−9.842***		−9.832***	−4.718	−4.970*	−4.657*
		(3.529)		(3.549)	(2.854)	(2.793)	(2.776)
Agyears			0.105**	0.004	−0.071	−0.087	0.010
			(0.048)	(0.079)	(0.063)	(0.079)	(0.081)
Origtime					0.002	0.008**	0.010
					(0.003)	(0.004)	(0.013)
Origtime squared							−0.000
							(0.000)
State age							−0.460**
							(0.183)
Observations	154	154	147	147	125	125	125
R-squared	0.020	0.052	0.026	0.064	0.702	0.719	0.734

Main Results

Table 5 continued

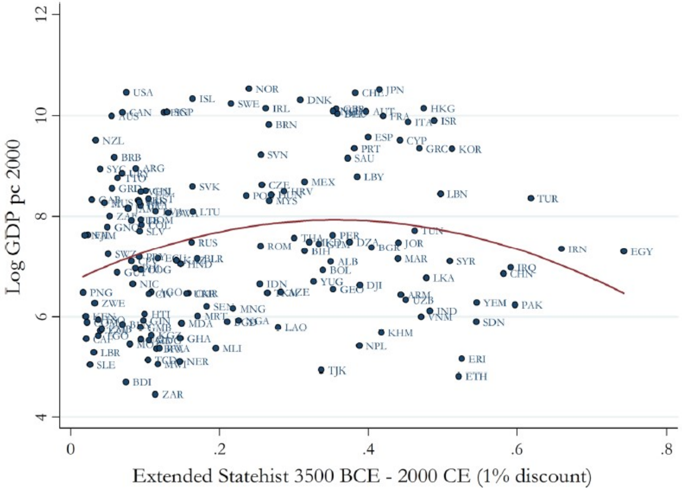
Panel B	Log GDP pc 2000						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Statehist 1–1950 CE	1.277**	1.940		2.200	0.066	0.251	1.267
	(0.531)	(2.049)		(2.278)	(1.441)	(1.597)	(1.667)
Statehist 1–1950 CE squared		−0.783		−0.748	0.942	0.962	0.453
		(2.518)		(2.625)	(1.608)	(1.811)	(1.776)
Agyears			0.105**	−0.011	−0.069	−0.080	0.012
			(0.048)	(0.068)	(0.055)	(0.072)	(0.081)
Origtime					0.001	0.007*	0.011
					(0.003)	(0.004)	(0.013)
Origtime squared							−0.000
							(0.000)
State age							−0.267**
							(0.127)
Observations	154	154	147	147	125	125	125
R-squared	0.043	0.044	0.026	0.058	0.704	0.722	0.730
Controls	No	No	No	No	Yes	Yes	Yes
Continent FE	No	No	No	No	No	Yes	Yes

Main Results

Table 6 Adjusted Statehist and Log GDP pc 2000. Nonlinear relationship

	Log GDP pc 2000						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ancestry-Adjusted Statehist of 1500 CE	2.934***	12.888***		12.991***	6.016***	5.292***	6.033***
	(0.784)	(2.183)		(2.092)	(1.572)	(1.644)	(1.774)
Ancestry-Adjusted Statehist of 1500 CE squared		−19.143***		−18.453***	−8.971***	−7.495***	−6.794***
		(4.322)		(4.029)	(2.201)	(2.349)	(2.332)
Agyears			0.105**	−0.026	−0.054	−0.073	−0.023
			(0.048)	(0.059)	(0.055)	(0.078)	(0.082)
Origtime					0.003	0.006*	0.007
					(0.003)	(0.004)	(0.013)
Origtime squared							−0.000
							(0.000)
State age							−0.239
							(0.147)
Observations	148	148	147	144	125	125	125
R-squared	0.093	0.234	0.026	0.238	0.722	0.727	0.732
Controls	No	No	No	No	Yes	Yes	Yes
Continent FE	No	No	No	No	No	Yes	Yes

Main Results



Main Results

- Interpretation:
  - Indonesia: 1350 years of state existence (score of 0.254).
  - Increasing the score by 0.1 (59% of 1 sd, reaching UK) $\Longrightarrow +20\%$ GDP per capita in 2000.
  - Inverse for China (score of 0.582): -44% GDP per capita in 2000.

State Capacity in China and Japan

J Econ Growth (2014) 19:439–470
DOI 10.1007/s10887-014-9108-6

Asia's little divergence: state capacity in China and Japan before 1850

Tuan-Hwee Sng · Chiaki Moriguchi

State Capacity in China and Japan

- Sng and Moriguchi (2014)
- Why was Japan the first non-Western country to industrialize?
- Why did China take longer to modernize?
- Explore the role of state capacity for development in China and Japan.

State Capacity in China and Japan

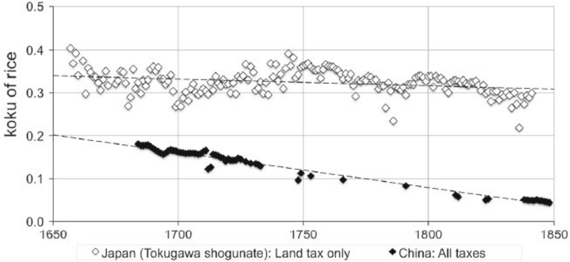


Fig. 1 Per Capita Tax Revenue in China and Japan. Sources: Shogunate's land tax from Ohno (1996); Japan's population estimates from Hayami and Miyamoto (1988); China's tax revenues from Sng (2014); China's population estimates from Perkins (1969)

Low state capacity in China: absence of warfare and political geography?
Why Japan so high?

Historical Background: Geography

Fig. 2 Early modern China and Japan. Source: CHGIS, Version 4, Cambridge: Harvard Yenching Institute, January 2007

Historical Background: Geography

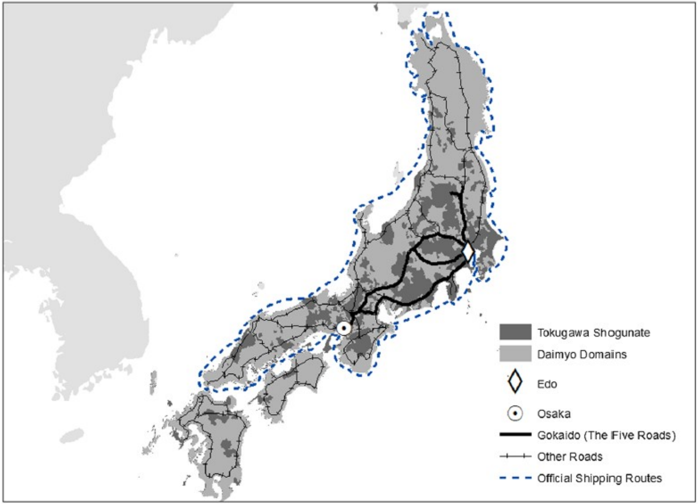


Fig. 3 Tokugawa Japan in 1664. Source: China Historical GIS Project, "Tokugawa Japan GIS, Demo Version." Feb 2004

Historical Background: Administrative Structures

- Stable dictatorships 1650–1850 in both countries.
- But one dictator in China (Qing dynasty) and multiple in Japan.
- Tokugawa Japan: 1 shogunate and league of dictatorships (each of 260 daimyo is a dictator).
- Shogunate: centralized bureaucracy with 2 layers: center, local. 40–50 jurisdictions.
- Qhing China: centralized bureaucracy with 4 layers: center, province, prefecture, local. 1,500 jurisdictions.

Historical Background: Monitoring System

- China: 90 times bigger than shogunate, so high monitoring costs.
- Similar monitoring systems:
  - Top-down monitoring: local officials supervised by higher-ranking officials within same bureaucratic hierarchy. Ineffective if bureaucratic patronage networks.
  - Bottom-up monitoring: petition systems. But extremely costly, especially in China.

Historical Background: Tax Collection

- Land taxation: most important source of revenue.
- Every land holding household pay land tax depending on size and quality of land.
- In Japan: fiscal base in rice (staple crop nationwide) collected on village as units.
- In China: base depends on region due to variety of crops and metals in China collected on households as units.
- Hence, more contacts between tax officials and individuals in China, increasing potential for tax officials to abuse power + monitoring delegated to village communities in Japan.

Model

- Model relation between geography and ruler's capacity to collect taxes and provide public goods.
- Prediction 1: lower legal tax rates and higher extralegal expropriation rates in China than Japan due to difficulties in monitoring tax agents in China.
- Prediction 2: when agency problems are more severe, rule has less incentives to invest in public goods in the region because returns to taxation are lower.
- Prediction 3: economic expansions are less beneficial to dictators in large dictatorships due to greater agency costs.
- Summary: lower corruption, higher tax rates, and higher production of public goods in Japan than China due to agency costs.

Data: Corruption

- Corruption: higher in China than Japan.
  - China: over-collection through manipulation of commutation rates above market rate (pay in copper instead of grain). Estimates of 20% of China's agricultural output in 1850 based on magistrates' incomes.
  - Japan: use prosecution cases for corruption, with estimates of bribes as share of output of maximum 13%.

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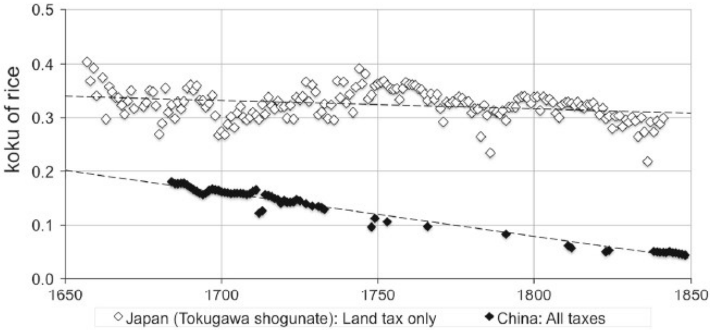
- Tax rate: higher in Japan than in China.
- Public goods: higher in Japan than China (coinage, roads, famine relief, forest protection).

Data: Tax Rates



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Data: Public Goods

Table 1 Public goods provision in Qing China and Tokugawa Japan

	China	Japan
(a) Coinage	Copper only	Gold, Silver, Copper
Annual output of copper coins, aggregate	3,639,800 k (1756–65)	1,096,000 k (1764–88)
Annual output of copper coins, per capita	15 (1756–1765)	35 (1764–1788)
(b) Length of trunk roads (km)	11,370 (imperial routes)	1,440 (Gokaido)
Length per '00 sq. km	0.26	0.51 or 3.37
(c) Urban population (urbanization rate)	20.5 m (5.8 %)	5.1 m (16.5 %)
(d) Forest cover (million ha)	18.5 (1700) → 9.6 (1850) (Lingnan region only)	27 (1600) → 25.5 (1850)
(e) Grain stockpile per capita (husked rice, koku)	0.065 (1751) → 0.030 (1843)	0.038 (1751) → 0.046 (1843)

Sources: (1) Lin (2006) and Tsuchiya and Yamaguchi (1972); (2) DQHD (Yongzheng edition) and Vaporis (1994); (3) Rozman (1973, Table 5); (4) Saito (2009); (5) Eto (1970); Yoshida (1991); Wang (1985[1890]); Will and Wong (1991); Li and Jiang (2008)

The Big Question

How path dependent is the relationship between State capacity and growth?

What Have We Learned?

- This course explores the interactions between institutions and alternative explanations (culture, geography).
- One additional explanation is path dependence.
- Here, non-linear relationship:
  - Statehood persists over time.
  - But non-linear effects on growth due to unlimited constraints to state power and elite capture.
  - Might help explain the Little Divergence and the downfall of China.

Topic 4
Geography, institutions, and development

The Big Question

Can geography alone explain differences in long-run economic development?

Plan of Session

- Long-term effects of geography
- The legacy of the Neolithic transition
- Reversal of fortune
- The disease environment
- The fractured land hypothesis

Long-term effects of geography

Spolaore and Wacziarg (2013)

- Long-standing geography hypothesis (starting with Montesquieu):
  - Climate, temperature, ruggedness.
  - Disease environment.
  - Natural resources.

$\Longrightarrow$ Direct effects on productivity and development?

Mediating historical channels

- Prehistoric and biological conditions $\Longrightarrow$ spread of agriculture and domestication. Diamond (1997) Olsson and Hibbs (2005)
- Initial advantages of Eurasia:
  - Initial biological conditions (diversity of animals and plants).
  - East-West orientation facilitating spread of agricultural innovation.

  $\Longrightarrow$ Population growth and early Neolithic transition.
- Lead from transition enabled Europeans to dominate other regions.
- Empirical evidence for correlation between biogeographic endowments and long-run development.

Long-term effects of geography

Geography and Contemporary Development
(Dependent variable: log per capita income, 2005; estimator: OLS)

Sample:	Whole World	Olsson–Hibbs sample[a]	Olsson–Hibbs sample[a]	Olsson–Hibbs sample[a]	Olsson–Hibbs sample[a]	Old World only
	(1)	(2)	(3)	(4)	(5)	(6)
Absolute latitude	0.044	0.052				
	(6.645)***	(7.524)***				
Percent land area in the tropics	–0.049	0.209	–0.410	–0.650	–0.421	–0.448
	(0.154)	(0.660)	(1.595)	(2.252)**	(1.641)	(1.646)
Landlocked dummy	–0.742	–0.518	–0.499	–0.572	–0.505	–0.226
	(4.375)***	(2.687)***	(2.487)**	(2.622)**	(2.523)**	(1.160)
Island dummy	0.643	0.306	0.920	0.560	0.952	1.306
	(2.496)**	(1.033)	(3.479)***	(1.996)**	(3.425)***	(4.504)***
Geographic conditions (Olsson–Hibbs)[b]			0.706		0.768	0.780
			(6.931)***		(4.739)***	(5.167)***
Biological conditions (Olsson–Hibbs)[c]				0.585	–0.074	0.086
				(4.759)***	(0.483)	(0.581)
Constant	7.703	7.354	8.745	8.958	8.741	8.438
	(25.377)***	(25.360)***	(61.561)***	(58.200)***	(61.352)***	(60.049)***
Observations	155	102	102	102	102	83
Adjusted R^2	0.440	0.546	0.521	0.449	0.516	0.641

Notes:
[a]The Olsson and Hibbs sample excludes the neo-European countries (Australia, Canada, New Zealand, and the United States) and countries whose current income is based primarily on extractive wealth (Olsson and Hibbs 2005).
[b]First principal component of number of annual or perennial wild grasses and number of domesticable big mammals (all variables from Olsson and Hibbs 2005)
[c]First principal component of absolute latitude; climate suitability to agriculture; rate of East–West orientation; size of landmass in millions of sq km (all variables from Olsson and Hibbs 2005).

The legacy of the Neolithic transition

- Geographic factors influenced timing of adoption of agriculture Ashraf and Galor (2011)
- Quantify impact of Neolithic transition for development in 1500.
    - First stage: geography $\Longrightarrow$ timing of transition.
    - Reduced form: geography $\Longrightarrow$ population density 1500.
    - Second stage: timing of transition (IV: geography) $\Longrightarrow$ population density 1500 ($\widehat{\beta}_0 = 0.88$).
    - Exclusion restriction: geography only affects population density through Neolithic transition.
- Biogeographic factors matter through early exposure to agriculture.

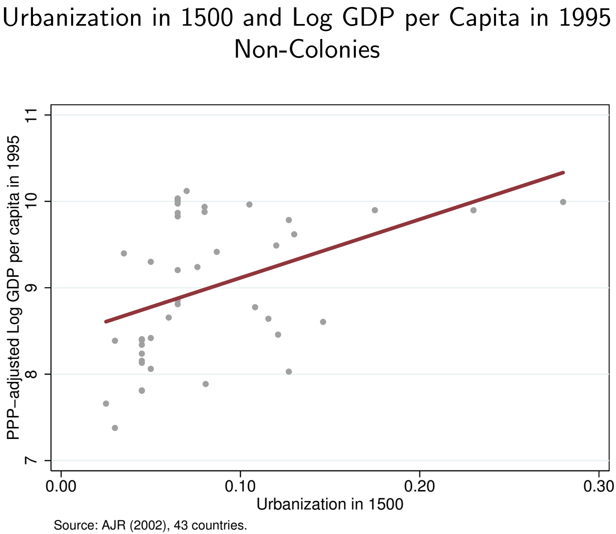
GEOGRAPHY AND DEVELOPMENT IN 1500 AD

Dependent Variable:	Years since agricultural transition	Population density in 1500	Population density in 1500	Population density in 1500
Estimator:	OLS	OLS	OLS	IV
	(1)	(2)	(3)	(4)
Absolute latitude	–0.074 (3.637)***	–0.022 (1.411)	0.027 (2.373)**	0.020 (1.872)*
Percent land area in the tropics	–1.052 (2.356)**	0.997 (2.291)**	1.464 (3.312)***	1.636 (3.789)***
Landlocked dummy	–0.585 (2.306)**	0.384 (1.332)	0.532 (1.616)	0.702 (2.158)**
Island dummy	–1.085 (3.699)***	0.072 (0.188)	0.391 (0.993)	0.508 (1.254)
Number of annual or perennial wild grasses	0.017 (0.642)	0.030 (1.105)		
Number of domesticable big mammals	0.554 (8.349)***	0.258 (3.129)***		
Years since agricultural transition			0.426 (6.694)***	0.584 (6.887)***
Constant	4.657 (9.069)***	–0.164 (0.379)	–2.159 (4.421)***	–2.814 (5.463)***
Observations	100	100	98	98
Adjusted R^2	0.707	0.439	0.393	—

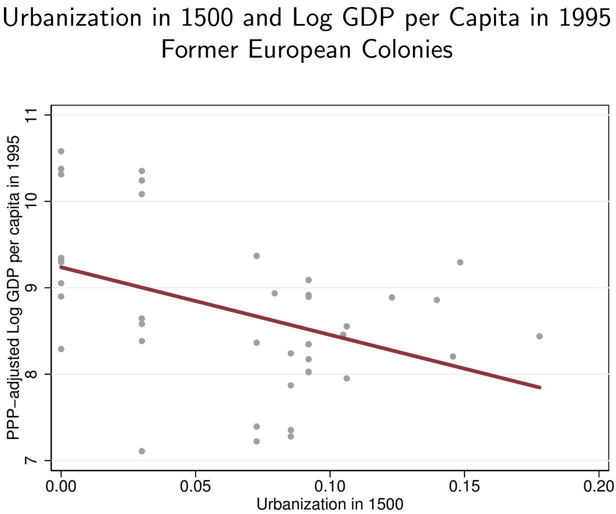
Reversal of fortune

- Geography might matter through institutions.
  - Terrain ruggedness protected from slave trade in Africa. Nunn and Puga (2007)
  - Reversal of fortune inconsistent with fixed geographic features having direct effects. AJR (2002)
  - Geography matters through disease environment and early settlers mortality, which determined historical institutions. AJR (2001)
  - Fractured land affected state formation $\Longrightarrow$ development. Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Reversal of fortune

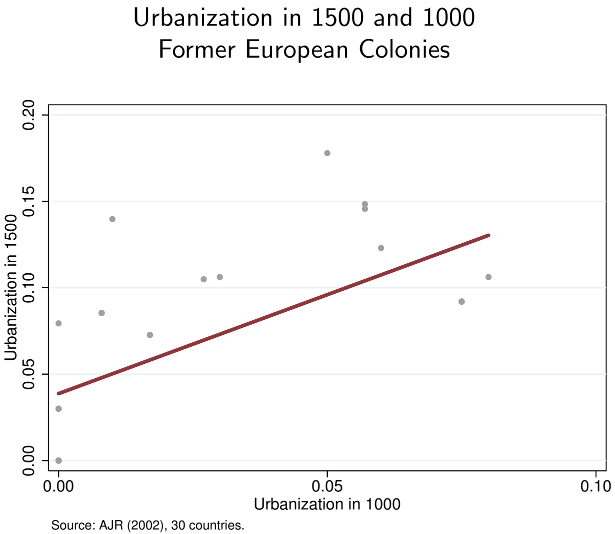


Reversal of fortune



Source: Penn World Table 9, CEPII GeoDist, AJR (2002), 40 countries.

Reversal of fortune



The disease environment

- AJR (2001) Colonial origins: settler mortality as IV.

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  - But disease environment affecting settlers persists, affecting income today.

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    $\Longrightarrow$ Exclusion restriction invalid?
  - AJR (2001) Malaria and yellow fever affected settlers, natives immune.

Life Expectancy and Economic Growth

- Geography $\implies$ disease environment $\implies$ health $\implies$ economic development?

- Improving health (e.g. malaria) should have great economic returns.

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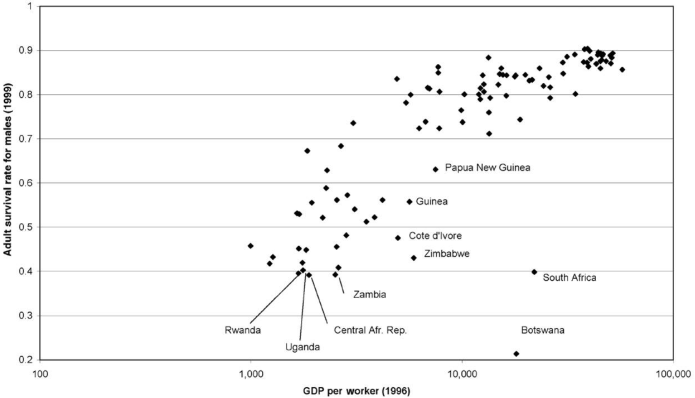
- Weil (2007) Health capital.

$$F(K, H, Q, A)$$

  - K: physical capital.
  - A: technology.
  - H: human capital.
  - Q: health capital.

Life Expectancy and Economic Growth

GDP per Worker and Adult Survival Rate



Source: Weil (2007)

Life Expectancy and Economic Growth

- Effect of life expectancy on economic growth. AJ (2007)

Life Expectancy and Economic Growth

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$$y_{it} = \pi x_{it} + \zeta_i + \mu_t + Z_{it}'\beta + \varepsilon_{it}$$

  - y: log income per capita.
  - x: log life expectancy at birth.
  - ζ: country FE.
  - μ_t: year FE.

Life Expectancy and Economic Growth

- But yearly changes in life expectancy have full effects in long run.
- Estimate long differences: panel including two dates.

$$\Delta y_i = \pi \Delta x_i + \Delta \mu + \Delta Z_i' \beta + \Delta \varepsilon_i$$

- $t_0 = 1940$ or $t_0 = 1960$ and $t_1 = 1980$ or $t_1 = 2000$.

Life Expectancy and Economic Growth

- Data:
  - Life expectancy, demographic data. UN
  - GDP per capita. Maddison

Life Expectancy and Economic Growth

- Data:
  - Life expectancy, demographic data. UN
  - GDP per capita. Maddison
- Samples:
  - Whole world: 120 countries.
  - Base sample: 47–59 countries (reliable data).

Life Expectancy and Economic Growth

Dependent variable:	Log Population		
	(1)	(2)	(3)
Log life expectancy	1.60***	1.75***	2.01***
	$[0.30]$	$[0.40]$	$[0.22]$
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Years	1960–2000	1960–2000	1940–2000
Sample	World	Base	Base
Countries	120	59	47

Life Expectancy and Economic Growth

- $\uparrow$ 1% in life expectancy $\Longrightarrow \uparrow$ 1.6–1.7% in population.
- Not driven by sample selection.

Life Expectancy and Economic Growth

- $\uparrow$ 1% in life expectancy $\Longrightarrow$ $\uparrow$ 1.6–1.7% in population.
- Not driven by sample selection.
- $\uparrow$ 1% in life expectancy $\Longrightarrow$ $\uparrow$ 2–3% in total births.
- Also increases ratio of population under age of 20.

Life Expectancy and Economic Growth

Dependent variable:	Log GDP		
	(1)	(2)	(3)
Log life expectancy	1.17***	1.55***	0.85***
	[0.56]	[0.35]	[0.28]
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Years	1960–2000	1960–2000	1940–2000
Sample	World	Base	Base
Countries	120	59	47

Life Expectancy and Economic Growth

Dependent variable:	Log GDP per Capita		
	(1)	(2)	(3)
Log life expectancy	-0.42	-0.19	-1.14***
	[0.58]	[0.54]	[0.27]
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Years	1960–2000	1960–2000	1940–2000
Sample	World	Base	Base
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Life Expectancy and Economic Growth

- $\uparrow$ 1% in life expectancy $\implies \uparrow$ 1.5% in GDP 1960–2000.
- $\uparrow$ 1% in life expectancy $\implies \uparrow$ 0.8% in GDP 1940–1980.
- Not driven by sample selection.

Life Expectancy and Economic Growth

- $\uparrow$ 1% in life expectancy $\Longrightarrow$ $\uparrow$ 1.5% in GDP 1960–2000.
- $\uparrow$ 1% in life expectancy $\Longrightarrow$ $\uparrow$ 0.8% in GDP 1940–1980.
- Not driven by sample selection.
- Seems insufficient to compensate for increased population.

Life Expectancy and Economic Growth

- Strong correlation between health and development.
- Causal relationship? OVB and reverse causality

Life Expectancy and Economic Growth

- Strong correlation between health and development.
- Causal relationship? OVB and reverse causality
  - $\uparrow$ growth rates $+ \uparrow$ investment in health.
  - Better at solving health problems.

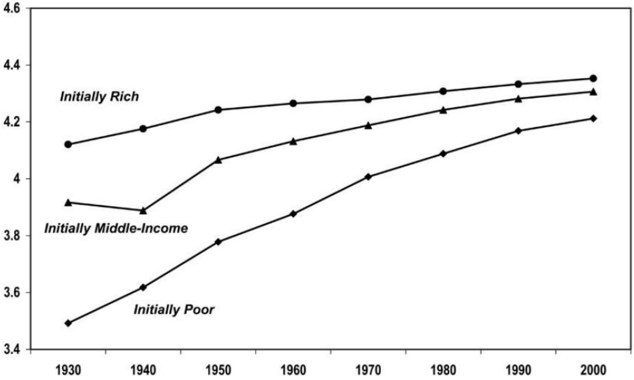
Life Expectancy and Economic Growth

- Exploit the "international epidemiological transition" in 1940s–1950s.
  - Wave of drug and chemical innovations $\Longrightarrow$ cures for malaria, yellow fever, cholera, smallpox…
  - Establishment of World Health Organization $\Longrightarrow$ spread of technology to poorer countries.

$\Longrightarrow$ Dramatic improvement of life expectancy across world.

Life Expectancy and Economic Growth

Log life expectancy at birth



Source: Acemoglu and Johnson (2007)

Life Expectancy and Economic Growth

- Build instrument for changes in life expectancy:
  - Predicted mortality of 15 diseases before intervention.
  - Interaction with global intervention dates for each disease.

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$$M_{it}^{I} = \sum_{d \in \mathcal{D}} \left[(1 - I_{dt}) \, M_{di40} + I_{dt} M_{dFt} \right]$$

  - M_{dit}: mortality in country i from disease d at t.
  - I_{dt}: indicator for intervention on disease d at t (1 hereafter).
  - $\mathcal{D}$: set of 15 diseases.

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  - $\mathcal{D}$: set of 15 diseases.
  - M_{di40}: preintervention mortality.
  - M_{dFt}: mortality from disease d at health frontier at t.

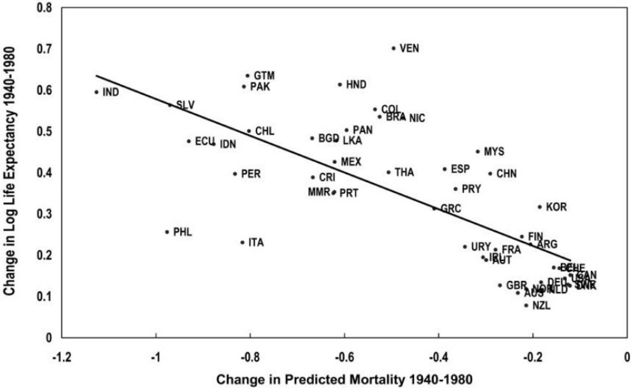
$\Longrightarrow M_{it}^{I}$ is an instrument for life expectancy

Life Expectancy and Economic Growth

- Predicted mortality M_{it}^{I} is an instrument for life expectancy
  - Effect of global interventions on life expectancy depends on baseline distribution of diseases.
  - Only source of variation: interaction baseline distribution with timing of global intervention.
  - $I_d t$ turns on for all countries at same time.
  - No reason for correlation with economic or population changes in given country.
- Threat:
  - Baseline mortality rates $M'_{d40}s$ predict future changes in population or income.
  - Include differential trends to control for this.

Life Expectancy and Economic Growth

First Stage



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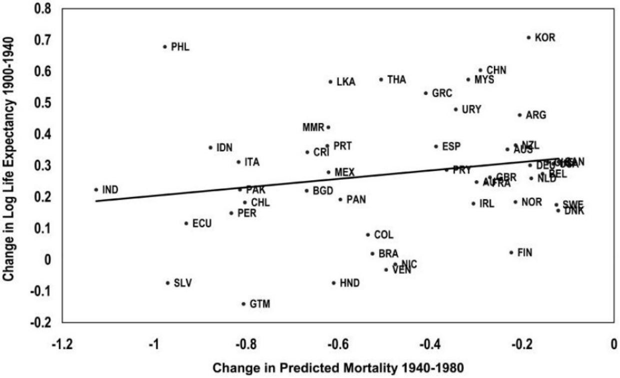
First Stage: No Pre-Trends



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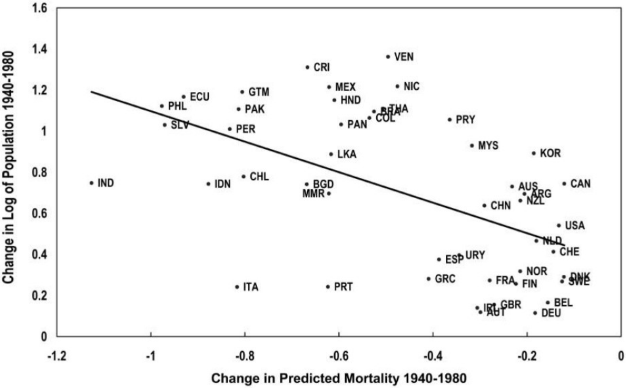
Life Expectancy and Economic Growth

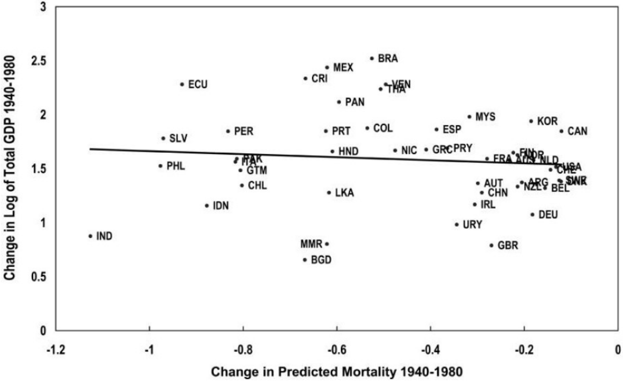
Reduced Form: Log Population



Source: Acemoglu and Johnson (2007)

Life Expectancy and Economic Growth

Reduced Form: Log Total GDP



Source: Acemoglu and Johnson (2007)

Life Expectancy and Economic Growth

Dependent variable:	Log GDP		Log GDP per C	
	(1)	(2)	(3)	(4)
Log life expectancy	0.85***	0.42	-1.14***	-1.51***
	[0.28]	[0.52]	[0.27]	[0.57]
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Estimate	OLS	IV	OLS	IV
Years	1940–2000	1940–2000	1940–2000	1940–2000
Countries	47	47	47	47

Life Expectancy and Economic Growth

- Increases in life expectancy increased population and births.
- Source of variation: exogenous differential changes in mortality due to international epidemiological transition.
- Increased population somewhat increased GDP.
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  $\Longrightarrow$ Little direct effect of geography through disease burden.
- Generated heated debates. Blum et al. (2014) AJ (2014)
- Indirect effect of disease burden through institutions? Alsan (2015)

Life Expectancy and Economic Growth

- Critique of Bloom et al. (2014)
  - Healthier countries in 1940 experienced faster subsequent growth and slower health gains.

    $\Longrightarrow$ Initial life expectancy in 1940 affects subsequent growth.
  - The instrument essentially measures national health in 1940.
  - Including initial life expectancy is important since strong dependency over time.

    $\Longrightarrow$ FS vanishes once initial life expectancy vanishes.

Life Expectancy and Economic Growth

Log life expectancy in 1914 and predicted mortality

Source: Bloom et al. (2014)

Life Expectancy and Economic Growth

Dependent variable:	Log GDP per Capita			
	(1)	(2)	(3)	(4)
Log life expectancy (Δ)	-1.14***	-1.51***	3.68***	-21.56
	[0.27]	[0.57]	[1.30]	[81.29]
Log life expectancy (1940)			3.77***	-15.23
			[0.94]	[61.37]
Country & year FE	Yes	Yes	Yes	Yes
Estimate	OLS	IV	OLS	IV
Years	1940–2000	1940–2000	1940–2000	1940–2000
Countries	47	47	47	47
F-statistic		60.84		0.14

Life Expectancy and Economic Growth

- Response of Acemoglu and Johnson (2014)
  - Changes in predicted mortality is uncorrelated with past changes in outcomes.
  - Cannot distinguish impact of life expectancy in 1940 and subsequent 1940–2000 change using only variation in predicted mortality (mechanical correlation)
  - Use 1900 life expectancy, interacted with decade effects: allows initial life expectancy to flexibly affect future growth.

Life Expectancy and Economic Growth

Dependent variable:	Log GDP per Capita			
	(1)	(2)	(3)	(4)
Log life expectancy (Δ)	-1.14*** $[0.27]$	-1.39*** $[0.36]$	-0.93* $[0.49]$	-1.32*** $[0.63]$
Log LE (1900) $\times$ decade	No	No	Yes	Yes
Log LE (1940) $\times$ decade	No	No	No	Yes
Country & year FE	Yes	Yes	Yes	Yes
Estimate	OLS	IV	IV	IV
Years	1940–2000	1940–2000	1940–2000	1940–2000
Countries	47	47	47	47

The fractured land hypothesis

Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

- Great Divergence $\Longleftarrow$ Inclusive institutions $\Longleftarrow$ Early state formation $\Longleftarrow$ Inter-state competition $\Longleftarrow$ Political fragmentation in Europe
- Source of political fragmentation: fractured land? Diamond (1997)
  - Fractured = mountains, forests, ruggedness.
  - Impedes development of large empires in Europe vs China.
  - But China more mountainous than Europe. Hoffman (2015)
  - Too deterministic explanation?

$\Longrightarrow$ Empirical examination

Fractured land?

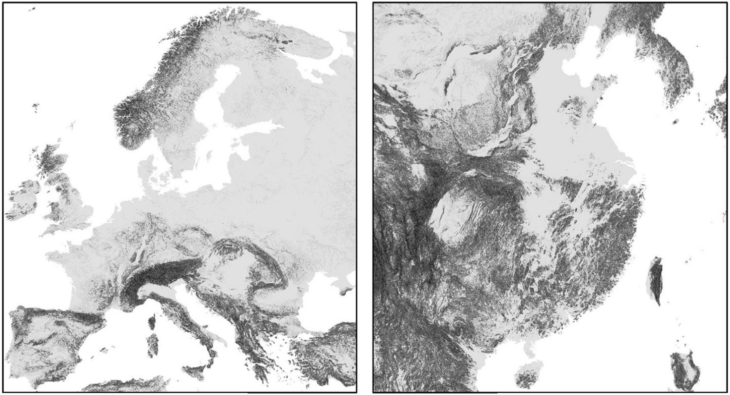
- Long-standing argument:
  - States need large area of productive land for rents.
  - Agricultural output needs easy appropriation.
  - Easiness of appropriation depends on geography.

Fractured land?

- Long-standing argument:
  - States need large area of productive land for rents.
  - Agricultural output needs easy appropriation.
  - Easiness of appropriation depends on geography.
- Concept of geographical core:
  - Successful states: core based on self-contained geographical region with fertile land, good transport connections, defensible to invasions.
  - Europe did not possess such a core (fractured land).
  - China possessed such a core (unified land–though more montaneous).

Fractured land?

Ruggedness in Europe and China proper



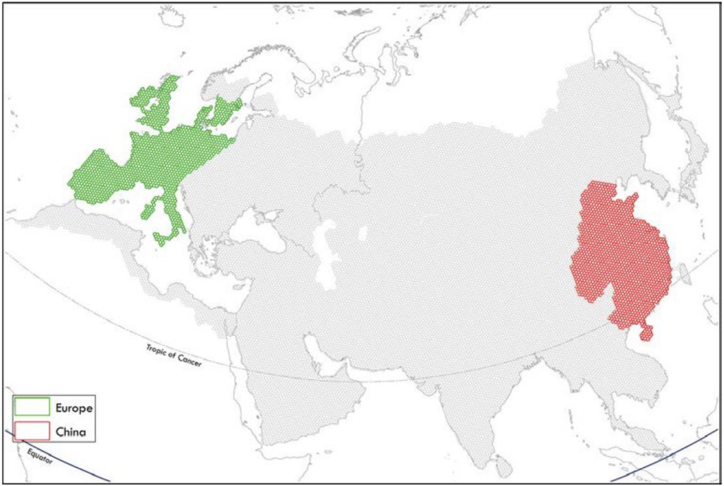
Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Fractured land?

- Europe's cores:
  - British Isles
  - Scandinavia
  - Iberian peninsula
  - Italian peninsula
  - Northern European plain (Poland, Germany, France)
- China's cores:
  - Central-North plain
  - Yunnan-Guizhou Plateau in South
  - Easy connections with river system

Geographical space

Study area



Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Geographical space

- Divide space of study:
  - 20,637 hexagonal cells of 28km radius.
  - Each cell can sustain a polity.
  - Distance by foot in one day: base polity can monitor.
- Area of study:
  - "China" 1,434 cells.
  - (Western) "Europe" 1,307

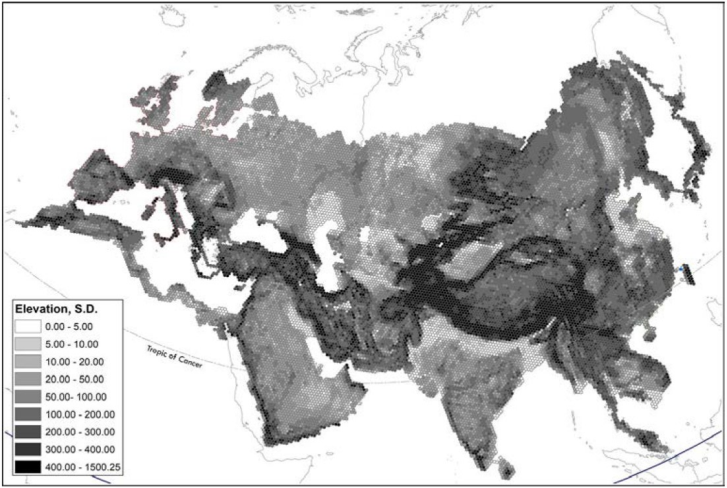
Geographical characteristics

- Geographical features affecting likelihood of regional clustering of cells into empires:
  - x_{rugged}: ruggedness (average s.d. of elevation)
  - x_{sea}: indicator for water as barrier.
  - x_{frigid}: indicator for temperature < 0 for > 6 months / year.
  - x_{torrid}: indicator for tropical or torrid zone.
  - x_{forest}: indicator for ancient forest in 0 CE.

  $\implies \mathbf{x} = \{x_{\text{rugged}}, x_{\text{sea}}, x_{\text{frigid}}, x_{\text{torrid}}, x_{\text{forest}}\}$
- Resource availability: population density in 0 CE (Malthusian logic).

Geographical characteristics

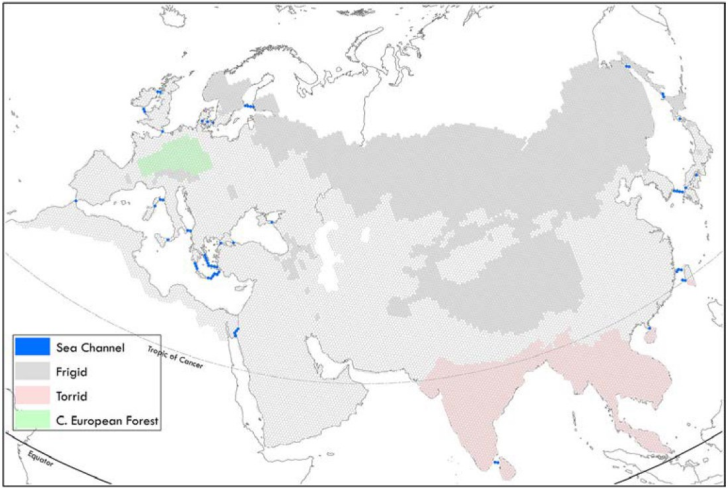
Ruggedness (standard deviation of elevation)



Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Geographical characteristics

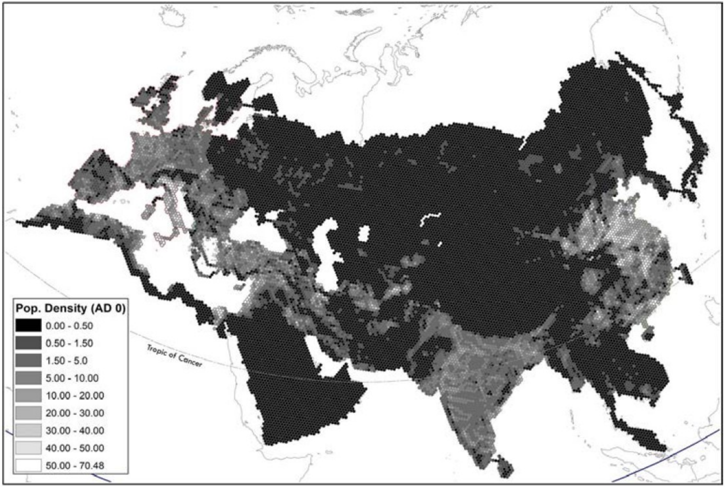
Auxiliary barriers to conquest



Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Geographical characteristics

Population density (0 CE)



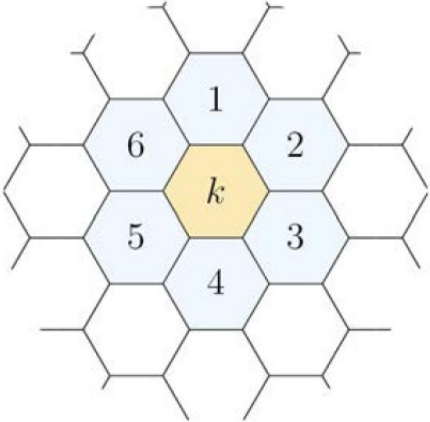
Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Evolution of polities

- Time:
  - Discrete time $t = 0, 1, 2, \ldots$
  - At $t = 0$, each cell is independent polity.
  - Over time, polities expand over cells or lose control of cells.

Evolution of polities

Cell k and adjacent cells



Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Evolution of polities

- Conquest:
  - In each period, k is in conflict with border cell with probability $\alpha \cdot y_k$, where y_k is productivity (population density) of cell k.
  - Victory in war depends on aggregate productivity and geographical characteristics:
    - More productive win more often.
    - Geography makes it harder or easier.
    - Resources allocated improve win probability (potentially multiple conflicts).
  - Winner absorbs loosing polities (single or block).
- Border cells might secede with positive probability.

$\Longrightarrow$ Simulate evolution of polities from Iron to Exploration Age

Evolution of polities

Period 50 (1100 BCE –850 BCE)

Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

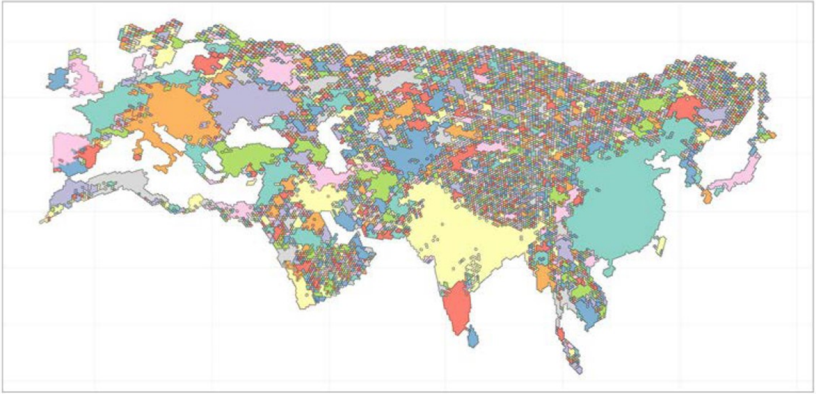
Evolution of polities

Period 300 (1100 BCE –400 CE)

Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Evolution of polities

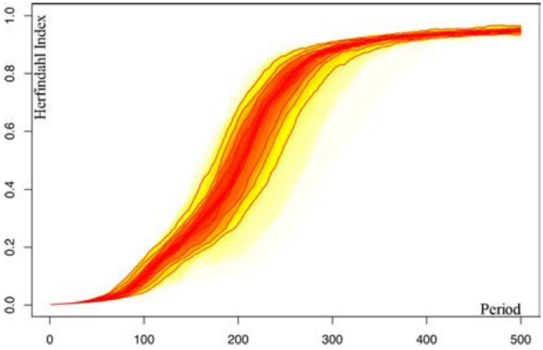
Period 500 (1100 BCE –1400 CE)



Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Evolution of polities

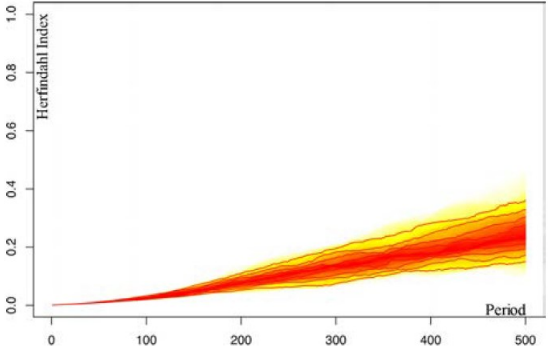
Herfindahl indices of political unity: China



Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Evolution of polities

Herfindahl indices of political unity: Europe



Source: Fernandez-Villaverde, Koyama, Lin, and Sng (2020)

Historical perspective: China

- Despite ruggedness, salient role of North China in fostering unification.
- Flatness of North plain facilitates military conquest.
- Geographical characteristics enable a single powerful state to overcome rivals and build a centralized state.

Historical perspective: Europe

- Rome dominated early.
- Dense European forest impeded consolidation.
- Mountain barriers raised cost of military intervention in Western Europe.
- Central Habsburg hegemony due to marriages strategy rather than geography.

Discussion

- Model does not include strategic interactions e.g. investment in military capacity, alliances, etc.
- But would strengthen results through balance of power in Europe.

Discussion

- Model does not include strategic interactions e.g. investment in military capacity, alliances, etc.
- But would strengthen results through balance of power in Europe.
- Abstract from feedback from economic growth.

$\Longrightarrow$ Fractured land generates unification in China and persistent fragmentation in Europe.

Topic 5
Culture, institutions, and development

The Big Questions

Can culture affect economic development directly?

How to separate the effects of culture and institutions?

How do culture and institutions interact?

Plan of Session

- Measuring culture.
- Empirical methodology to separate culture from institutions.
- Applications.

Measuring culture

Definition of Culture

Culture is the integrated pattern of human knowledge, belief, and behavior that depends upon the capacity for learning and transmitting knowledge to succeeding generations, and the customary beliefs, social forms, and material traits of a racial, religious group, or social group; and the set of shared attitudes, values, goals, and practices that characterizes an institution or organization.

(Webster Dictionary)

- Broadly, culture is a body of shared knowledge and practices.

Definition of Culture

- Need practical definition for empirical analysis.
- Identification: more useful to think about *differences in culture*.
- Differences in culture are:
  - Systematic variations in preferences and beliefs.
  - Across time, space, and/or social groups.
- Most common criteria: space. But not always most relevant.
- No attempt to differentiate preferences, expectations, beliefs. Bicchieri (2006, 2016)

Definition of Culture

Alternative approach:

- Culture as a focal factor. Myerson (2009)
- Social structures characterized as a game with multiple equilibria.
- Culture is a mechanism of equilibrium selection and coordination.
- No need for differences in preferences.

Definition of Culture

Alternative approach:

- Culture as a focal factor. Myerson (2009)
- Social structures characterized as a game with multiple equilibria.
- Culture is a mechanism of equilibrium selection and coordination.
- No need for differences in preferences.
- Related to the emergence of culture?
- Challenging to provide empirical evidence (analytical narratives).

Cross-Cultural Surveys: Datasets

- World-wide:
  - World Values Survey: 6 waves, 1981–2014, up to 60 countries.
  - International Social Survey: 4 waves, 1985–2016, up to 43 countries.
  - Global Preferences Survey: 76 countries (2012). Falk et al. (2018)
- Regional:
  - European Values Study: 4 waves, 1981–2009, up to 47 countries.
  - Demographic and Health Surveys: 1985–2017, 90 countries.
  - Afro Barometer (1999–2019), Latino Barometer (1995–2017), Asian Barometer (2001–2016).
- Country:
  - United States: General Social Survey (1976–2017).
  - France: DREES, ECAM, CREDOC...

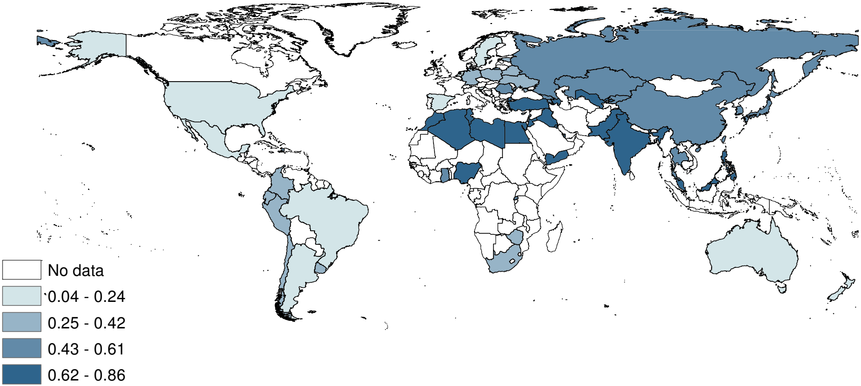
Cross-Cultural Surveys: Cultural Traits

- Trust.
- Gender roles.
- Time preference.
- Individualism vs collectivism.
- Family ties.
- Morality.
- Work and Poverty.

Measurement Challenges: Data Availability

- Across countries.
  - WVS: 60 countries in wave 6 (2010–2014).
  - GPS: 76 countries, 90% of world population.
  - Cultures as units matter.
- Across time.
  - WVS: wave 1 (1981–1984), 10 countries.
  - GSS: since 1976, but only for the U.S.
  - Culture is a long-run process, changes over multiple generations.
- Within countries.
  - WVS: wave 6 (2010–2014), average 13 regions per country.
  - GPS: state/province of residence.
  - Usually: no precise residence location, no birth location.

Data Availability across Countries



- Share approves of "When jobs are scarce, men should have more right to a job than women" across 58 countries WVS, Wave 6, 2010–2014

Measurement Challenges: Aggregation Issues

- Question level:
  - "When jobs are scarce, men should have more right to a job than women"
    - Agree: 1$\rightarrow$1.
    - Neither: 2$\rightarrow$0.5.
    - Disagree: 3$\rightarrow$0.
  - "Being a housewife is just as fulfilling as working for pay"
    - Strongly agree: 1$\rightarrow$1.
    - Agree: 2$\rightarrow$0.66.
    - Disagree: 3$\rightarrow$0.33.
    - Strongly disagree: 4$\rightarrow$0.
  - Several issues with Likert scales.
- Index level: linear, PCA, ...?
- Country level: flat or sample weights?

Measurement Challenges: Fundamental Issues

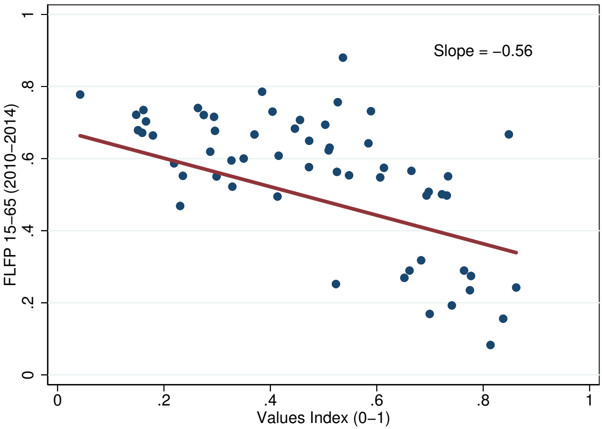
- What is measured?
  - Expectations, beliefs (1st, 2nd order), preferences, attitudes?
  - GPS: cross-validated with experiments (but rare).
- Comparing cultures
  - Do universal categories of culture exist?
  - Cultural biases (ethnocentrism).

Potential Solutions

- Past behavior e.g. past FLFP
  - Captures culture + economic and institutional conditions.
  - Data comparability and coverage.
- (Deep) historical measures
  - E.g. Pre-modern division of labor, language structures.
  - Fixed over time.
  - Measurement issues.
  - Little within-country variation.
  - Assumptions on historical processes (persistence, transmission).

Empirical methodology to separate culture from institutions

Correlation between Attitudes and FLFP



- Values: share approves of "When jobs are scarce, men should have more right to a job than women." WVS, Wave 6, 2010–2014

Cross-Country Approach

- Outcome: FLFP 15–65 (2010–2014). ILO
- Cultural variable: approves of "When jobs are scarce, men should have more right to a job than women" WVS
- (Very rough) controls (more later): area, GDP, schooling, fertility, migration, population.

Dependent variable:	FLFP 15–65	
	(1)	(2)
WVS question (0–1)	-0.61***	-0.82***
	[0.08]	[0.16]
Controls	No	Yes
Continent FE	No	Yes
Countries	51	51
Adj. R2	0.477	0.502

Cross-Country Approach

Results lack credibility:

- Reverse causality.
- Endogeneity with economic incentives and institutional structures.
- Few countries available in surveys.
- No data for past attitudes.

The Epidemiological Approach

- Identify culture by fixing economic and institutional factors.
  Fernández (2011)

The Epidemiological Approach

- Identify culture by fixing economic and institutional factors. Fernández (2011)
- Compare individuals
  - Within same institutional and economic environment.
  - Whose preferences and beliefs might differ systematically.

The Epidemiological Approach

- Identify culture by fixing economic and institutional factors.
  Fernández (2011)
- Compare individuals
  - Within same institutional and economic environment.
  - Whose preferences and beliefs might differ systematically.
- Compare movers (1st, 2nd, higher order generations).
- (Testable) assumptions:
  - Cultural beliefs persist across generations.
  - Cultural beliefs vary systematically across groups (spatially defined?).
  - Individuals in the same area face identical institutional environment.

The Epidemiological Approach: Main Issues

- Origin culture might attenuates over time.
- Institutional environment might vary within host environment.
- Movers are a selected sample.

The Epidemiological Approach: A Simple Model

- Gender roles and married women LFP.
- Married women i from country k maximizes:

$$U(c, v_i) = u(c) - \mathbb{1} v_i$$

  - $u(\cdot)$: strictly increasing concave utility function.
  - $\mathbb{1}$: indicator for working.
  - c: household consumption.
  - v_i: disutility from working.

$$c = w_{hk} + \mathbb{1} w_{fk}$$

  - w_f: wife labor income if works.
  - w_h: husband's income (always works).

The Epidemiological Approach: A Simple Model

Sources of heterogeneity:

- Wages:
  - Identical and exogenous within countries.
  - (Potentially) hetegoreneous across countries and sex.
- Disutility of work:
  - Drawn from country-specific distribution $G_k(m_k, \sigma)$.
  - Varies across women within a country.
  - Varies across countries.
- Differences in culture: differences in mean m_k.
- Approximation: country $\simeq$ culture.

The Epidemiological Approach: A Simple Model

- L_k: FLFP in country k is given by

$$L_k = \Pr\left(v_k \leq v_k*\right) = G_k\left(v_k^*\right)$$

$$\text{with} \;\; v_k^* = v^*\left(w_{hk}, w_{fk}\right) = u\left(w_{hk} + w_{fk}\right) - u\left(w_{hk}\right)$$

- Suppose $G \sim \mathcal{N}\left(m_k, \sigma^2\right)$. Then:

$$L_k = G_k\left(v_k^*\right) = \Phi\left(\frac{v_k^* - m_k}{\sigma}\right)$$

The Epidemiological Approach: A Simple Model

- Culture matters through m_k: $\uparrow m_k \Longrightarrow \downarrow L_k$.

$$\frac{\partial L_k}{\partial m_k} = -\frac{1}{\sigma}\phi\left(\frac{v_k^* - m_k}{\sigma}\right) < 0$$

- Institutional framework matters through wages and thus v_k^*.

$$\frac{\partial L_k}{\partial w_{fk}} = \frac{1}{\sigma}\phi\left(\frac{v_k^* - m_k}{\sigma}\right) u'\left(w_{hk} + w_{fk}\right) > 0$$

$$\frac{\partial L_k}{\partial w_{hk}} = \frac{1}{\sigma}\phi\left(\frac{v_k^* - m_k}{\sigma}\right) \left[u'\left(w_{hk} + w_{fk}\right) - u'\left(w_{hk}\right)\right] < 0$$

The Epidemiological Approach: A Simple Model

- Women from different countries in same environment and same husbands:
  - Same w_{hi} and same w_{fi}.
  - Same threshold v^*.
- But draw from different distributions G_k.
- (Assumption: culture persists for higher order generations of movers.)
- Proportion of women from (ancestry) k who work in country j is:

$$L_{kj} = \Phi\left(\frac{v_j^* - m_k}{\sigma}\right)$$

- Structural estimation approach left aside
  Fernández (2013)   Fogli and Veldkamp (2011)

A Proxy for Culture

Cultural differences m_k not observable, so need a proxy.

- Measure of attitudes: measurement issues.
- Economic behaviors directly.
  - Reference group behavior e.g ancestry FLFP.
  - Captures culture + economic and institutional conditions.
  - Leverage economic and institutional conditions are fixed (same v^*).
  - Left with cultural component.
  - (Relatively) easy to implement.
- (Deep) historical measures:
  - Measurement challenges.
  - Potentially (much more) meaningful for identification.

A Proxy for Culture

Further issues common to all measures of culture:

- Other (endogenous) sources of heterogeneity beyond culture.
- Proxy might capture inherited social capital.
- Which dimension of culture is captured?

Application: Gender Roles and FLFP

- Case: FLFP of Immigrants to the United States.
- Fernández and Fogli (2009) Blau (2015)
- Data: ACS 2005–2017 IPUMS
- Sample selection:
  - Born outside the U.S. from non US parents.
  - Age: 30–49.
  - Regular household, no farms, married spouse present.
  - Born in single identified country. BPL

$\Longrightarrow$ 268k women from 109 countries.

Application: Gender Roles and FLFP

- Proxy for country of birth culture: ratio FLFP to MLFP age 15–65.
- Data: ILO Estimates
- Assignment: year of migration.
- Time coverage for migration year: 1990–2017.

Application: Gender Roles and FLFP

- Controls to build comparison groups.

Application: Gender Roles and FLFP

- Controls to build comparison groups.
- Survey year: 13 categories.
- Individual characteristics:
  - Cohort: 32 categories (1956–1987).
  - Education: 4 categories (below HS, HS, College, College+). `EDUC`
  - English: 3 categories (No English, some, English+). `SPEAKENG`
  - Ethnicity: 4 categories (White, Black, Asian, Other). `RACE`
  - Year immigration: 28 categories (1990–2017).
  - Number of children (in household): 0–9.
  - State of residence: 50 categories.

Application: Gender Roles and FLFP

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  - Year immigration: 28 categories (1990–2017).
  - Number of children (in household): 0–9.
  - State of residence: 50 categories.
- Spouse characteristics:
  - Same as above.
  - Employment status (indicator).
  - Citizenship status (indicator).
  - Total income in 1999 US$.

Application: Gender Roles and FLFP

- COB geography:
  - Area, distance, continent, landlocked. CEPII
- COB history:
  - Identity of colonizer: 14 categories. CEPII
  - Genetic distance to US. Spolaore and Wacziarg (2018)
- COB economy:
  - Real GDP PPP 2011 US$. PWT
  - Population. PWT
  - Female years of schooling and female/male ratio. Barro and Lee (2013)
  - Total fertility rate. UN DESA
  - Net migration rate. UN DESA

Application: Gender Roles and FLFP

Dependent variable:	Active			
	(1)	(2)	(3)	(4)
COB M/F LFP 15–65	0.31***	0.24***	0.33***	0.33***
	[0.05]	[0.05]	[0.09]	[0.06]
Controls				
State and year FE	Yes	Yes	Yes	Yes
Individual and Spouse	No	Yes	No	Yes
COB	No	No	Yes	Yes
COB	109	109	109	109
Observations	268,452	268,452	268,452	268,452
Adj. R2	0.024	0.093	0.049	0.106

Outcome: mean = 0.57, s.d. = 0.13
COB proxy: mean = 0.69, s.d. = 0.21

Application: Gender Roles and FLFP

- $\uparrow$ 1pp COB FLFP associated with $\uparrow$ 0.3pp Active.
- $\uparrow$ 10pp COB FLFP associated with $\uparrow$ 6% of mean in Active
- $\uparrow$ 1 s.d. COB FLFP associated with $\uparrow$ 0.5 s.d. in Active.

Application: Gender Roles and FLFP

- $\uparrow$ 1pp COB FLFP associated with $\uparrow$ 0.3pp Active.
- $\uparrow$ 10pp COB FLFP associated with $\uparrow$ 6% of mean in Active
- $\uparrow$ 1 s.d. COB FLFP associated with $\uparrow$ 0.5 s.d. in Active.
- Spirit of this method used to identify cultural effects.

Applications

General Applications

Similar strategy to assess role of culture for economic outcomes (1/2).

- Divorce rates Furtado, Marcén, and Sevilla (2013)
- Self-employment Marcén (2014)
- Living arrangements Giuliano (2007) Marcén and Morales (2018)
- Fertility Bellido et. al (2016) Stichnoth and Yeter (2016) Marcén et. al (2018) Salari (2018)
- Son preference Almond, Edlund, and Milligan (2013)
- Savings rates Costa-Font et al. (2018)

General Applications

Similar strategy to assess role of culture for economic outcomes (2/2).

- Mortgage finance Rodríguez-Planas (2018)
- Home-ownership Marcén and Morales (2019)
- Unemployment rates Brugger et al. (2009)
- Division of labor within family Frank and Hou (2015)
- Science education Nollenberger et al. (2016) Rodríguez-Planas and Nollenberger (2018)
- Human capital accumulation Hoorn (2019)
- Health behavior Rodríguez-Planas and Sanz-de-Galdeano (2019)
- Preference for redistribution Luttmer and Singhal (2011)

Applications in Long-Run Perspective

- Most useful to study bigger questions with historical perspective:
  - How can we explain observed differences in culture?
  - Mechanisms through which culture affects behavior?
  - How does culture transmit across generations?
  - When does culture persist over time? When doesn't it?
  - What are the mechanisms of cultural change?
  - How does culture emerge?

Applications in Long-Run Perspective

- Explain contemporaneous distribution of norms about gender roles: pre-industrial division of labor. Alesina, Giuliano, and Nunn (2013)
- Explain contemporaneous distribution of trust in Africa: the slave trade. Nunn and Wantchekon (2011)
- Explain contemporaneous distribution of economic status in Africa: ancestral lifeways. Michalopoulos, Putterman and Weil (2019)
- Mechanisms of persistence of historical shocks: contemporaneous gender norms in Africa and the slave trade. Teso (2019)

Alesina, Giuliano, and Nunn (2013)

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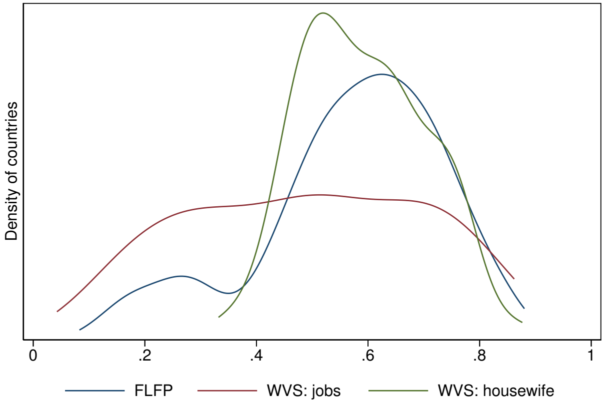
ON THE ORIGINS OF GENDER ROLES: WOMEN AND THE PLOUGH*

ALBERTO ALESINA
PAOLA GIULIANO
NATHAN NUNN

Alesina, Giuliano, and Nunn (2013)



Source: WVS, ILO.

Alesina, Giuliano, and Nunn (2013)

- How can we explain current dispersion in norms about gender roles?

Alesina, Giuliano, and Nunn (2013)

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- Hypothesis of Boserup (1970):
  - Form of traditional agriculture in pre-industrial societies.
  - Shifting versus plough.
  - Plough: capital intensive, requiring more strength to control animal.
  - Men have comparative advantage in farming.

  $\Longrightarrow$ Specialization along gender lines $\Longrightarrow$ gender norms.

Alesina, Giuliano, and Nunn (2013)

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  $\Longrightarrow$ Specialization along gender lines $\Longrightarrow$ gender norms.
- Generated norms about gender roles that persisted:
  - Underlying trait reinforced by institutions.
  - Complementarities between cultural beliefs and industrial structure.
  - Cultural beliefs are inherently sticky.

Alesina, Giuliano, and Nunn (2013)

Does traditional plough use have a causal impact on subsequent cultural norms?

Historical data

- Murdock's *Ethnographic Atlas*.
- Information for 1,265 ethnic groups (before European contact).
- Widely used but source criticism needed.
  Giuliano and Nunn (2018) Giuliano and Matranga (2020)
- Historical plough use:
  1. Absent (`plough` = 0)
  2. Existed but not aboriginal (`plough` = 1)
  3. Aboriginal (`plough` = 1)

Historical data

- Traditional female participation in agriculture:
  1. Males only (`Female specialization` = 1)
  2. Males appreciably more (`Female specialization` = 2)
  3. Equal participation (`Female specialization` = 3)
  4. Females appreciably more (`Female specialization` = 4)
  5. Females only (`Female specialization` = 5)
- Presence of domesticated animals.
- Density of ethnic groups' settlements.
- Political complexity.

Geographic data

- Geographic coordinates of centroid of historical group.
- Land suitability for cultivation of crops (FAO).
- Tropical or subtropical characteristics.

Historical Impact of Traditional Plough Agriculture

Traditional plough use and female participation in pre-industrial agriculture

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: Traditional participation of females relative to males in the following tasks:						
	Overall agriculture		Land clearance	Soil preparation	Planting	Crop tending	Harvesting
Mean of dep. var.	3.04	2.83	1.45	2.15	2.86	3.16	3.23
Traditional plough agriculture	−0.883***	−1.136***	−0.434**	−1.182***	−1.290***	−1.188***	−0.954***
	(0.225)	(0.240)	(0.197)	(0.320)	(0.306)	(0.351)	(0.271)
Ethnographic controls	yes	yes	yes	yes	yes	yes	yes
Observations	660	124	129	124	131	122	131
Adjusted R-squared	0.13	0.19	0.14	0.10	0.09	0.13	0.16
R-squared	0.14	0.23	0.18	0.14	0.13	0.18	0.20

s.d. outcome in (1) is 1.0

Historical Impact of Traditional Plough Agriculture

Traditional plough use and female participation outside agriculture

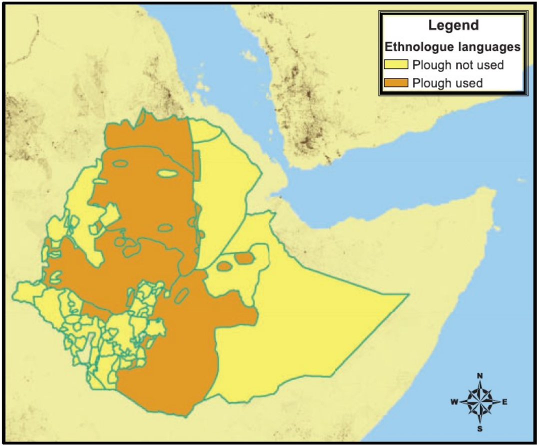
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable: Traditional participation of females relative to males in the following tasks:								
	Caring for small animals	Caring for large animals	Milking	Cooking	Fuel gathering	Water fetching	Burden carrying	Handicrafts	Trading
Mean of dep. var.	3.53	1.73	3.25	4.65	3.90	4.64	3.47	2.78	2.47
Traditional plough use	0.14	0.064	0.63	−0.019	−0.638	−0.052	−0.962**	−0.157	−0.155
	(0.517)	(0.254)	(0.697)	(0.108)	(0.403)	(0.205)	(0.378)	(0.274)	(0.542)
Ethnographic controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	88	95	48	173	159	154	135	74	59
Adjusted R-squared	−0.02	−0.02	0.03	0.01	−0.001	0.01	0.12	0.07	−0.01
R-squared	0.05	0.04	0.14	0.04	0.04	0.04	0.16	0.15	0.10

Long-Term Impact Traditional Plough

- Data:
  - Use *Ethnologue* for location of language groups.
  - Use *Landscan 2000* for world's population by 1 km^2 grid cell.
  - Combine for distribution of language groups today.
  - Match with *Ethnographic Atlas* plough data by grid cell.
  - Aggregate at country or district level.
- Main variable: fraction of location with ancestors traditionally using plough.

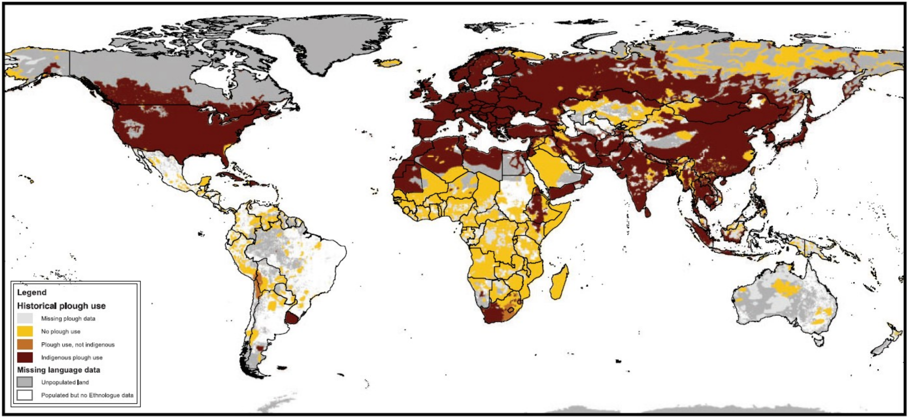
Long-Term Impact Traditional Plough

Language groups and historical plough use in Ethiopia



Long-Term Impact Traditional Plough

Traditional plough use among ethnic groups



Country-Level Estimates

- Contemporaneous outcomes:
    - FLFP in 2000 (World Bank).
    - Proportion of firms owned by women (World Bank).
    - Share women in Parliament (UN).

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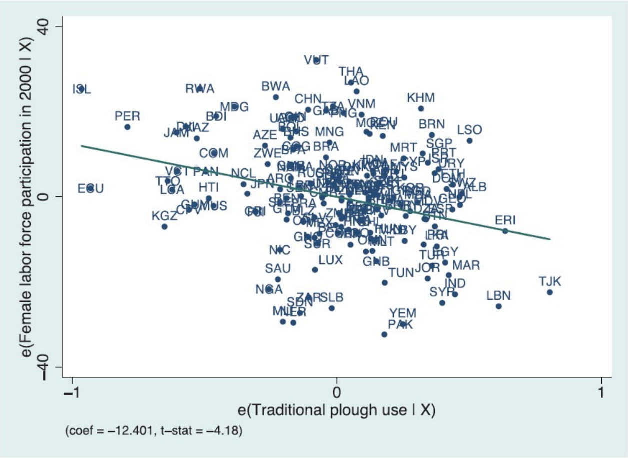
$$y_c = \alpha + \beta \mathrm{Plough}_c + \mathbf{X_c^H}\mathbf{\Gamma} + \mathbf{X_c^C}\mathbf{\Pi} + \varepsilon_c$$

  - $\mathbf{X_c^H}$: historical ethnographic controls (domesticated animals, density of settlements, tropical climate,...).
  - $\mathbf{X_c^C}$: contemporaneous controls (GDP per capita , flexible).

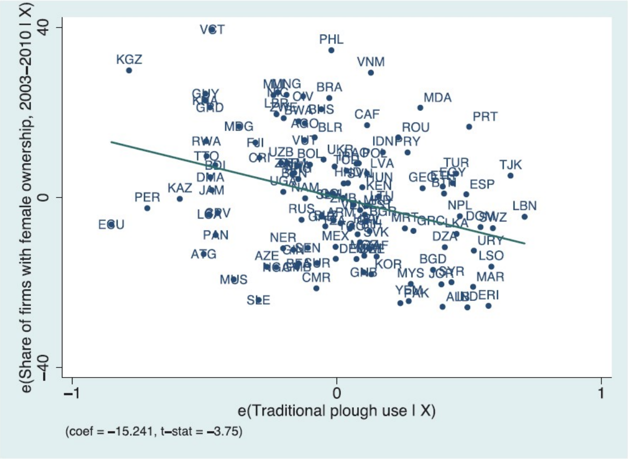
Country-Level Estimates

Partial Correlation: Plough and FLFP



Country-Level Estimates

Partial Correlation: Plough and Ownership



Country-Level Estimates

Partial Correlation: Plough and Politics

Country-Level Estimates: Magnitudes

- Summary statistics: mean (s.d.)
  - Plough: 0.53 (0.47).
  - FLFP: 51.3 (15.6).
  - Ownership: 35.2 (15.0).
  - Politics: 11.8 (8.9).

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- Interpretation in means:
  - $\uparrow$ 1 s.d. plough associated with $\downarrow$ 11% FLFP mean.
  - $\uparrow$ 1 s.d. plough associated with $\downarrow$ 20% ownership mean.
  - $\uparrow$ 1 s.d. plough associated with $\downarrow$ 19% politics mean.

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  - $\uparrow$ 1 s.d. plough associated with $\downarrow$ 0.38 FLFP s.d.
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- Based on R2, explains 6% of FLFP, 11% of ownership, 3% of politics.

Subnational Estimates 1

- Individual-level outcomes from WVS:
  - Indicator for participation in labor force.
  - Attitudes toward work ("When jobs scarce, men have priority").
  - Attitudes toward politics ("Men better politicians").

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$$y_{i,d,c} = \alpha_c + \beta \mathrm{Plough}_d + \mathbf{X_d^H \Pi} + \mathbf{X_i \Phi} + \varepsilon_{i,d,c}$$

  - α_c: country FE.
  - $\mathbf{X_d^H}$: historical ethnographic controls in district d, country c.
  - $\mathbf{X_i}$: individual controls (age, marital status, gender, education).

Subnational Estimates 1

Individual-level OLS estimates using WVS data

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable:					
	Female labor force participation, 1995–2007		When jobs are scarce, 1995–2007		Men better political leaders, 1995–2007	
Mean of dep. var.	0.55	0.55	0.46	0.47	2.62	2.64
Traditional plough use	−0.177***	−0.002	0.193***	0.100*	0.224***	0.304***
	(0.035)	(0.031)	(0.033)	(0.059)	(0.069)	(0.117)
Individual & district controls	yes	yes	yes	yes	yes	yes
Contemporary country controls	yes	n/a	yes	n/a	yes	n/a
Fixed effects	continent	country	continent	country	continent	country
Number of countries	73	78	74	79	50	55
Number of districts	672	698	674	700	453	479
Observations	43,801	47,587	80,303	87,528	64,215	72,152
Adjusted R-squared	0.17	0.27	0.21	0.28	0.19	0.26
R-squared	0.17	0.27	0.21	0.28	0.19	0.26

Subnational Estimates 2

- Individual-level outcomes from IPUMS-I:
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- Individual-level outcomes from IPUMS-I:
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$$y_{i,d,e} = \alpha_d + \beta \mathrm{Plough}_e + \mathbf{X_e^H \Pi} + \mathbf{X_i \Phi} + \varepsilon_{i,d,e}$$

  - α_d: district FE.
  - $\mathbf{X_e^H}$: historical ethnographic controls in district d, ethnicity e.
  - $\mathbf{X_i}$: individual controls (age, marital status, gender, education).

Subnational Estimates 2

Individual-level OLS estimates using IPUMS-I data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable: Female labor force participation indicator								
	Bolivia 2001	Chile, 2002	Cambodia, 2008	Malaysia, 70, 80, 91, 00	Mongolia, 1989, 2000	Nepal, 2001	Philippines, 1990	Uganda, 1991, 2002	All countries
Mean of dep. var.	0.44	0.40	0.78	0.40	0.38	0.54	0.39	0.56	0.49
Traditional plough use	−0.035***	−0.073***	−0.064**	−0.080***	−0.006	−0.100**	0.035	−0.079***	−0.040**
	(0.002)	(0.003)	(0.027)	(0.016)	(0.013)	(0.043)	(0.023)	(0.020)	(0.019)
Individual & ethnicity controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
District fixed effects	9	26	24	15	23	14	77	4	192
Ethnic groups	6	5	11	21	10	16	21	60	150
Observations	173,804	505,114	432,481	319,580	125,349	710,662	1,266,363	1,003,321	4,536,674
Adjusted R-squared	0.07	0.17	0.19	0.10	0.50	0.19	0.13	0.09	0.15
R-squared	0.07	0.17	0.19	0.10	0.50	0.19	0.13	0.09	0.15

Country-Level Estimates: 2SLS

Countr-level 2SLS estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A. First stage 2SLS estimates. Dependent variable: Traditional plough use							
Mean of dep. var.	0.53		0.44		0.54		0.51	
Plough-positive environment	0.744***	0.629***	0.861***	0.673***	0.820***	0.685***	0.874***	0.717***
	(0.084)	(0.089)	(0.078)	(0.103)	(0.082)	(0.104)	(0.089)	(0.118)
Plough-negative environment	0.119	0.185	0.100	0.115	0.132	0.187	0.129	0.142
	(0.122)	(0.133)	(0.166)	(0.171)	(0.130)	(0.141)	(0.181)	(0.188)
Equality of coefficients (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F-stat (plough variables)	40.21	25.06	66.80	21.88	51.96	21.88	49.54	18.52

Country-Level Estimates: 2SLS

Country-level 2SLS estimates

	Dependent variable (panels B & C):							
	Female labor force participation in 2000		Share of firms with female ownership, 2005–2011		Share of political positions held by women in 2000		Average effect size (AES)	
Plough-negative environment	18.928***	19.571***	6.072	9.134	−2.975	−2.868	0.607	0.653*
	(6.506)	(6.329)	(9.926)	(10.401)	(6.093)	(6.258)	(0.391)	(0.393)
Equality of coefficients (p-value)	0.00	0.00	0.02	0.02	0.56	0.47	0.00	0.00
F-stat (plough variables)	14.87	12.49	5.41	4.46	3.44	3.40	9.19	7.11
	Panel C. Second-stage 2SLS estimates							
Traditional plough use	−21.630***	−25.013***	−17.486***	−22.689***	−6.460***	−9.726***	−0.918***	−1.313***
	(5.252)	(7.513)	(5.533)	(7.620)	(2.334)	(3.750)	(0.225)	(0.388)
Hausman test (p-value)	0.02	0.04	0.56	0.40	0.22	0.10	0.33	0.16
Hansen J	0.00	0.00	0.41	0.31	0.72	0.86	0.05	0.06
Historical & contemporary controls	yes	yes	yes	yes	yes	yes	yes	yes
Continent FEs	no	yes	no	yes	no	yes	no	yes
Observations	160	160	122	122	140	140	104	104

Cultural Transmission

- Separate cultural transmission from correlated effects from institutions.

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- OLS regression on daughters of immigrants, aged 15–64:

$$y_{i,s,c} = \alpha_s + \beta \mathrm{Plough}_c + \mathbf{X_c^C \Gamma} + \mathbf{X_d^H \Pi} + \mathbf{X_i \Phi} + \varepsilon_{i,s,c}$$

  - α_s: state FE.
  - $\mathbf{X_c^H}$: historical ethnographic controls (domesticated animals, density of settlements, tropical climate,...).
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Cultural Transmission

Determinants of FLFP for US children of immigrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable: Labor force participation indicator, 1994–2011								
	All women			Married women					
	Woman's ancestry			Woman's ancestry			Husband's ancestry		
	Father's country	Mother's country	Parents same country	Father's country	Mother's country	Parents same country	Father's country	Mother's country	Parents same country
Mean of dep. var.	0.63	0.63	0.60	0.68	0.69	0.69	0.70	0.71	0.70
Traditional plough use	−0.044***	−0.043**	−0.062***	−0.094**	−0.118***	−0.136**	−0.065***	−0.045**	−0.058**
	(0.015)	(0.018)	(0.020)	(0.046)	(0.043)	(0.054)	(0.024)	(0.022)	(0.024)
Observations	57,138	55,341	32,776	10,206	9,508	6,835	35,393	35,158	23,124
Adjusted R-squared	0.23	0.23	0.25	0.10	0.10	0.11	0.08	0.08	0.08
R-squared	0.23	0.23	0.26	0.11	0.11	0.12	0.09	0.08	0.09

- Cultural transmission accounts for 35–50% of total effect.

Cultural Transmission

Determinants of gender attitudes of European children of immigrants

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variables: "When jobs are scarce..." survey response, 2004–2011					
	Father's country		Mother's country		Same country	
	1–5 scale	Indicator	1–5 scale	Indicator	1–5 scale	Indicator
Mean of dep. var.	2.54	0.32	2.53	0.32	2.62	0.35
Traditional plough use	0.219**	0.073**	0.214**	0.070**	0.298***	0.094**
	(0.091)	(0.034)	(0.086)	(0.033)	(0.096)	(0.038)
Observations	15,545	13,024	15,260	12,788	10,535	8,780
Adjusted R-squared	0.18	0.16	0.17	0.16	0.17	0.16
R-squared	0.18	0.17	0.17	0.16	0.17	0.17

- Cultural transmission accounts for 36–49% of total effect.

Nunn and Wantchekon (2011)

American Economic Review 101 (December 2011): 3221–3252
http://www.aeaweb.org/articles.php?doi=10.1257/aer.101.7.3221

The Slave Trade and the Origins of Mistrust in Africa[†]

By Nathan Nunn and Leonard Wantchekon[*]

Nunn and Wantchekon (2011)

- How can we explain current dispersion of trust in Africa?

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- How can we explain current dispersion of trust in Africa?
- Why did Africa's slave trade have detrimental effects on economic development? Nunn (2008)
- Hypothesis:
    - Slave trade = environment of ubiquitous insecurity.
    - Individuals turned on others to sell each other into slavery (including friends and family) through kidnapping or trickery.
    - A culture of mistrust might have developed because higher returns (Boyd and Richerson, 1985).
    - This cultural trait then persisted (stickiness, complementarities with institutions, self-reinforcement).

Data

- Contemporaneous data on trust:
  - Individual-level data Afrobarometer 2005 across 17 sub-Saharan countries.
  - 21,000 individuals with identified ethnicity.
  - Questions about trust in relatives, neighbors, local government, own and other ethic groups.

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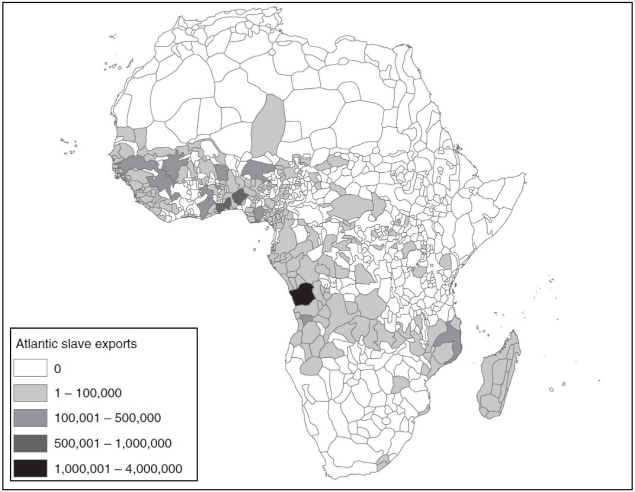
  - Questions about trust in relatives, neighbors, local government, own and other ethic groups.
- Historical data on slave exports:
  - Number of slaves taken from each ethnic group and country from Nunn (2008).
  - Four slave trades 1400–1900.
  - Matching slave ethnicities to Afrobarometer ethnies through Murdock Atlas.

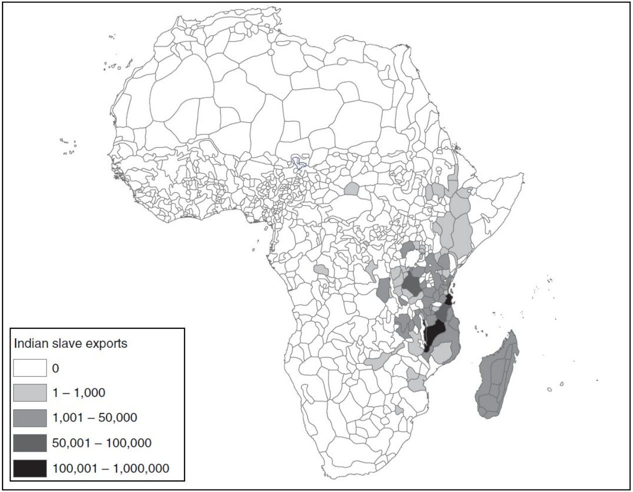
Data

Transatlantic slave trade



Data

Indian Ocean slave trade



Slave Trade and Contemporaneous Trust

$$\text{trust}_{i,e,d,c} = \alpha_c + \beta \text{slave exports}_e + \mathbf{X}'_{\mathbf{i,e,d,c}}\mathbf{\Gamma} + \mathbf{X}'_{\mathbf{d,c}}\mathbf{\Omega} + \varepsilon_{i,e,d,c}$$

- $\text{trust}_{i,e,d,c}$: trust of individual i, ethnic group e, district d, country c.
- slave exports_e: number of slaves taken from ethnic group e (log normalized by land area).
- α_c: country fixed effects.
- $\mathbf{X}'_{\mathbf{i,e,d,c}}$: individual controls (age, gender, urban, living conditions, education, religion, occupation).
- $\mathbf{X}'_{\mathbf{d,c}}$: ethnic controls for district (fractionalization, share same ethnicity).
- Two-way clustering on ethnic group and district.

Slave Trade and Contemporaneous Trust

OLS estimates of the determinants of the trust of others

	Trust of relatives (1)	Trust of neighbors (2)	Trust of local council (3)	Intra-group trust (4)	Inter-group trust (5)
ln (1 + exports/area)	−0.133***	−0.159***	−0.111***	−0.144***	−0.097***
	(0.037)	(0.034)	(0.021)	(0.032)	(0.028)
Individual controls	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	20,062	20,027	19,733	19,952	19,765
Number of ethnicity clusters	185	185	185	185	185
Number of district clusters	1,257	1,257	1,283	1,257	1,255
R^2	0.13	0.16	0.20	0.14	0.11

Magnitudes

- S.d. of trust and slave measure close to 1.

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- Alternative: compare explanatory power with other variables.
  - Standard variance decomposition.
  - Slave exports and other covariates explain 5.4% of outcome.
  - Slave exports explain 16–27% of this variation.

Causality

- Control for observables.
  - Ethnicity-level determinants of colonial rule: disease environment and precolonial prosperity.
  - Ethnicity-level characteristics of colonial rule: railway lines in 1911, European missionary contact.
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- IV using historical distance from the coast with falsification tests.

Slave Trade and Contemporaneous Trust

OLS estimates of the determinants of the trust of others

	Trust of relatives (1)	Trust of neighbors (2)	Trust of local council (3)	Intragroup trust (4)	Intergroup trust (5)
ln (1 + exports/area)	−0.178***	−0.202***	−0.129***	−0.188***	−0.115***
	(0.032)	(0.031)	(0.022)	(0.033)	(0.030)
Colonial population density	Yes	Yes	Yes	Yes	Yes
Ethnicity-level colonial controls	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	16,709	16,679	15,905	16,636	16,473
Number of ethnicity clusters	147	147	146	147	147
Number of district clusters	1,187	1,187	1,194	1,186	1,184
R^2	0.13	0.16	0.21	0.16	0.12

Slave Trade and Contemporaneous Trust

IV estimates of the effect of the slave trade on trust

	Trust of relatives (1)	Trust of neighbors (2)	Trust of local council (3)	Intragroup trust (4)	Intergroup trust (5)
Second stage: Dependent variable is an individual's trust					
ln (1 + exports/area)	−0.190***	−0.245***	−0.221***	−0.251***	−0.174**
	(0.067)	(0.070)	(0.060)	(0.088)	(0.080)
Hausman test (*p*-value)	0.88	0.53	0.09	0.44	0.41
R^2	0.13	0.16	0.20	0.15	0.12
First stage: Dependent variable is ln (1 + exports/area)					
Historical distance of ethnic group from coast	−0.0014***	−0.0014***	−0.0014***	−0.0014***	−0.0014***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Colonial population density	Yes	Yes	Yes	Yes	Yes
Ethnicity-level colonial controls	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	16,709	16,679	15,905	16,636	16,473
Number of clusters	147 / 1,187	147 / 1,187	146 / 1,194	147 / 1,186	147 / 1,184
F-stat of excl. instrument	26.9	26.8	27.4	27.1	27.0
R^2	0.81	0.81	0.81	0.81	0.81

Falsification test: reduced form in Africa and Asia

	Trust of local government council			
	Afrobarometer sample		Asiabarometer sample	
	(1)	(2)	(3)	(4)
Distance from the coast	0.00039***	0.00031***	−0.00001	0.00001
	(0.00009)	(0.00008)	(0.00010)	(0.00009)
Country fixed effects	Yes	Yes	Yes	Yes
Individual controls	No	Yes	No	Yes
Number of observations	19,913	19,913	5,409	5,409
Number of clusters	185	185	62	62
R^2	0.16	0.18	0.19	0.22

Mechanisms: External vs Internal Factors

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Mechanisms: External vs Internal Factors

- Slave trade might have weakened institutions, generating mistrust.
- Measure of this: mistrust in local government.
  - Control for trust in local government.
  - Use various measures through fixed effects.
  - Half of the overall effect can be explained by effect through quality of local institutions.

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- Measure of this: mistrust in local government.
  - Control for trust in local government.
  - Use various measures through fixed effects.
  - Half of the overall effect can be explained by effect through quality of local institutions.
- Effects through untrustworthiness of others.
  - Measure of intergroup trust in local area: weighted average slave export intensity of other ethnic groups in same area.
  - No effect from deteriorated intergroup trust.

Mechanisms: External vs Internal Factors

Identifying channels of causality

	Trust of local council (1)	Trust of local council (2)	Intergroup trust: Within town (3)	Intergroup trust: Within district (4)	Intergroup trust: Within province (5)
Ethnicity-based slave export measure (baseline measure)	−0.072*** (0.019)	−0.070*** (0.019)	−0.102*** (0.028)	−0.120*** (0.027)	−0.098*** (0.029)
Average slave export measure among other ethnicities in the same location			−0.037 (0.029)	−0.063** (0.030)	−0.091*** (0.035)
Council trustworthiness fixed effects	Yes	Yes	No	No	No
Five public goods fixed effects	No	Yes	No	No	No
Colonial population density	Yes	Yes	Yes	Yes	Yes
Ethnicity-level colonial controls	Yes	Yes	Yes	Yes	Yes
Baseline controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	12,827	12,203	9,673	12,513	15,999
Number of clusters	146/1,172	145/1,130	147/725	147/737	147/1,127
R^2	0.37	0.37	0.12	0.12	0.12

Mechanisms: External vs Internal Factors

- Effect of slave trade through external environment (institutions, trustworthiness of others) versus individuals' internal norms.

Mechanisms: External vs Internal Factors

- Effect of slave trade through external environment (institutions, trustworthiness of others) versus individuals' internal norms.
- Location-based measure slave intensity: slaves taken from area of residence.
- When both variables included, identification from movers (45% of sample).

Mechanisms: External vs Internal Factors

- Effect of slave trade through external environment (institutions, trustworthiness of others) versus individuals' internal norms.
- Location-based measure slave intensity: slaves taken from area of residence.
- When both variables included, identification from movers (45% of sample).
- Ethnicity-based measures decrease by 10–15%, so explains 85–90% of the overall effect.
- It is always twice as large in magnitude than location-based effects.

Mechanisms: External vs Internal Factors

Identifying channels of causality

	Trust of relatives (1)	Trust of neighbors (2)	Trust of local council (3)	Intragroup trust (4)	Intergroup trust (5)
Ethnicity-based slave export measure (baseline measure)	−0.155*** (0.029)	−0.182*** (0.029)	−0.100*** (0.023)	−0.169*** (0.033)	−0.090*** (0.030)
Location-based slave export measure	−0.045*** (0.014)	−0.045*** (0.016)	−0.045** (0.018)	−0.043** (0.018)	−0.047** (0.020)
Colonial population density	Yes	Yes	Yes	Yes	Yes
Ethnicity-level colonial controls	Yes	Yes	Yes	Yes	Yes
Baseline controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	15,999	15,972	15,221	15,931	15,773
Number of clusters	146/269	146/269	145/272	146/269	146/269
R^2	0.13	0.16	0.20	0.16	0.12

Michalopoulos, Putterman and Weil (2019)

THE INFLUENCE OF ANCESTRAL LIFEWAYS ON INDIVIDUAL ECONOMIC OUTCOMES IN SUB-SAHARAN AFRICA

Stelios Michalopoulos
Brown University

Louis Putterman
Brown University

David N. Weil
Brown University

Two Approaches to History

- Place-based approach:
  - Focuses on institutions and geography (Neolithic transition).
  - More developed: easy to map space across time.
- Individual-based approach:
  - Focuses on lineage, cultural transmission, intergenerational mobility.
  - Less developed: little data on lineage.

Michalopoulos, Putterman and Weil (2019)

- Does lineage to preindustrial subsistence matter for economic outcomes today in sub-Saharan Africa?
- Compare pastoralist vs agriculture ancestral subsistence lifeways.
- Focus on Africa because easy to match individuals to ethnic groups and ancestral lifeways.
- Distinguish between institution and cultural channels through within location variation.

Michalopoulos, Putterman and Weil (2019)

The introduction of location fixed effects is crucial, since it allows us to absorb characteristics related to the geographic, ecological, and institutional environment of a given region that recent studies have highlighted as important determinants of regional African development. Moreover, it allows us to uncover the importance of portable ethnic-specific traits whose influence is not limited to the ancestral homeland of a given group. This methodology is similar to Nunn and Wantchekon (2011), who investigate the impact of slavery on individual trust among respondents residing outside their ethnic enclaves.

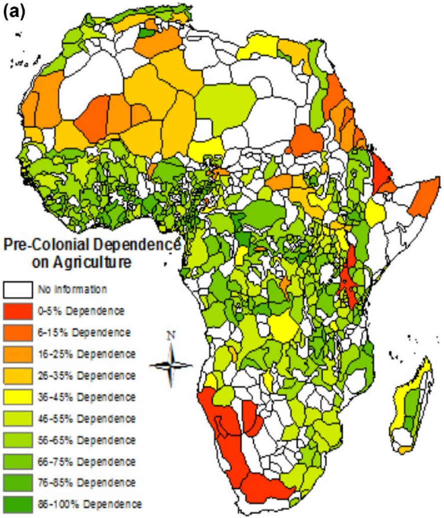
Data

- Ethnicity data:
  - DHS surveys.
  - Information for both ethnicity and enumeration area coordinates.
  - 337k respondents across 21 countries, 492 ethnicity-country groups.
- Matching modern ethnicities to ancestral groups:
  - Murdock's Ethnographic Atlas.
  - Match DHS ethnicities to those in atlas.
  - Average distance moved: residence vs nearest border of ancestral homeland (51% movers).

Data

- Modern outcomes (DHS):
  - Education: categories and years completed.
  - Wealth: quintiles.
- Historical mode of subsistence:
  - Activities in Ethnographic Atlas: gathering, hunting, fishing, animal husbandry, agriculture.
  - Shares of subsistence in 9 bands.
  - In regressions: pastoralism (husbandry) is default activity, focal independent variable on degree of reliance on agriculture (the rest are controls).

Data


(a)
Pre-Colonial Dependence on Agriculture
No Information
0-5% Dependence
6-15% Dependence
16-25% Dependence
26-35% Dependence
36-45% Dependence
46-55% Dependence
56-65% Dependence
66-75% Dependence
76-85% Dependence
86-100% Dependence
N

Predictive Power of Ethnicity

R^2 from FE regressions	All education	All wealth	Movers education	Movers wealth
Country FE	0.159	0.013	0.147	0.038
Homeland FE	0.291	0.231	0.290	0.295
Ethnicity FE	0.265	0.138	0.257	0.182
Country-ethnicity FE	0.281	0.159	0.282	0.209
Country-homeland FE	0.301	0.248	0.304	0.319
Country-homeland FE and country-ethnicity FE	0.325	0.283	0.337	0.362
Observations	285,255	285,263	154,744	154,747

The Influence of Ancestral Characteristics

$$y_{i,e,h,c,v} = \beta \text{Agriculture}_e + \delta \mathbf{X}_{i,e,h,c,v} + \alpha_c \cdot \alpha_{h,c} \cdot \alpha_v + \varepsilon_{i,e,h,c,v}$$

- $y_{i,e,h,c,v}$: outcome for individual i of ethnicity e residing in homeland h in country c and enumeration area v.
- Agriculture_e: subsistence share of agriculture of ancestral group e.
- $\mathbf{X}_{i,e,h,c,v}$: controls (age, female, mover status).
- α_c: country FE.
- $\alpha_{h,c}$: country-homeland FE.
- α_v: enumeration area FE.
- Clustering: ethnicity level.

The Influence of Ancestral Characteristics

Benchmark: DHS regressions within ethnic homelands

Variables	(1) Education	(2) Education	(3) Education	(4) Education	(5) Wealth	(6) Wealth	(7) Wealth	(8) Wealth
Agriculture	0.2337***	0.1498***	0.1034***	0.1011***	0.2233***	0.1797***	0.0970***	0.0972***
	(0.0432)	(0.0259)	(0.0212)	(0.0191)	(0.044)	(0.0324)	(0.0221)	(0.0219)
Gather/hunt/fish	0.2095***	0.1026***	0.0918***	0.0911***	0.1574***	0.0681***	0.0488***	0.0524***
	(0.0547)	(0.0214)	(0.0200)	(0.0185)	(0.0457)	(0.0249)	(0.0152)	(0.0146)
Urban			0.9199***	0.7079***			1.6401***	1.4330***
			(0.0357)	(0.0292)			(0.0460)	(0.0468)
Simple controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	No	No	No	Yes	No	No	No
Country-ethnic homeland FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Occupation FE	No	No	No	Yes	No	No	No	Yes
Observations	285,192	285,192	285,192	285,192	285,200	285,200	285,200	285,200
R^2	0.239	0.350	0.418	0.493	0.052	0.266	0.491	0.518

- Country characteristics only explain 1/3.
- Part explained by migration to urban locations.
- Differences in ancestral lifeways explain 1/3 of individual variation in outcomes due to ethnic identity.

The Influence of Ancestral Characteristics

Benchmark: DHS regressions within villages

Variables	(1) Education	(2) Education	(3) Education	(4) Wealth	(5) Wealth	(6) Wealth
Agriculture	0.1034***	0.0731***	0.0694***	0.0970***	0.0389***	0.0379***
	(0.0212)	(0.0147)	(0.0128)	(0.0221)	(0.0070)	(0.0068)
Gather/hunt/fish	0.0918***	0.0708***	0.0681***	0.0488***	0.0176**	0.0190***
	(0.0200)	(0.0155)	(0.0140)	(0.0152)	(0.0068)	(0.0065)
Urban	0.9199***			1.6401***		
	(0.0357)			(0.0460)		
Simple controls	Yes	Yes	Yes	Yes	Yes	Yes
Country-ethnic Homeland FE	Yes	No	No	Yes	No	No
Coordinates FE	No	Yes	Yes	No	Yes	Yes
Occupation FE	No	No	Yes	No	No	Yes
Observations	285,192	285,192	285,192	285,200	285,200	285,200
R^2	0.418	0.506	0.559	0.491	0.677	0.682

- Shifting from pastoralism to agriculture raises education by 0.28 points, or 0.8 years of education.
- Shifting from pastoralism to agriculture raises wealth by 20% within

Selection into Migration

- Identification based on movers (54% of sample).
- Differential selection into migration across liefeway groups?
- Assess if ancestral lifeway predicts migration.
- Explicitly assess selective migration.

Selection into Migration

Determinants of migration

Variables	(1) Mover	(2) Mover	(3) Moved in life	(4) Moved in life
Agriculture	–0.0465**	–0.0464**	0.0052	0.0048
	(0.0212)	(0.0211)	(0.0052)	(0.0050)
Gather/hunt/fish	–0.1179***	–0.1177***	–0.0062	–0.0061
	(0.0254)	(0.0253)	(0.0053)	(0.0051)
Simple controls	Yes	Yes	Yes	Yes
Coordinates FE	Yes	Yes	Yes	Yes
Occupation FE	No	Yes	No	Yes
Observations	285,200	285,200	188,304	188,304
R^2	0.768	0.768	0.206	0.210

Selection into Migration

Determinants of migration

Variables	(1) Education	(2) Education	(3) Wealth	(4) Wealth
Agriculture	0.2808***	0.2710***	0.2431***	0.2368***
	(0.0607)	(0.0543)	(0.0559)	(0.0483)
Gather/hunt/fish	0.2816***	0.2747***	0.1826***	0.1879***
	(0.0683)	(0.0638)	(0.0594)	(0.0499)
Mover	0.7459**	0.7805**	0.5330	0.5994*
	(0.3505)	(0.3280)	(0.3417)	(0.3029)
Mover × agriculture	−0.0570	−0.0731	−0.0251	−0.0462
	(0.0515)	(0.0482)	(0.0441)	(0.0393)
Mover × gather/hunt/fish	−0.1085**	−0.1155***	−0.0372	−0.0529
	(0.0482)	(0.0441)	(0.0562)	(0.0472)
Simple controls	Yes	Yes	Yes	Yes
Occupation FE	No	Yes	No	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	285,192	285,192	285,200	285,200
R^2	0.241	0.38	0.053	0.222

Teso (2019)

THE LONG-TERM EFFECT OF DEMOGRAPHIC SHOCKS ON THE EVOLUTION OF GENDER ROLES: EVIDENCE FROM THE TRANSATLANTIC SLAVE TRADE

Edoardo Teso
Harvard University and IQSS

Teso (2019)

- What are the mechanisms of persistence of historical shocks?
- The case of gender norms in Africa and the slave trade.

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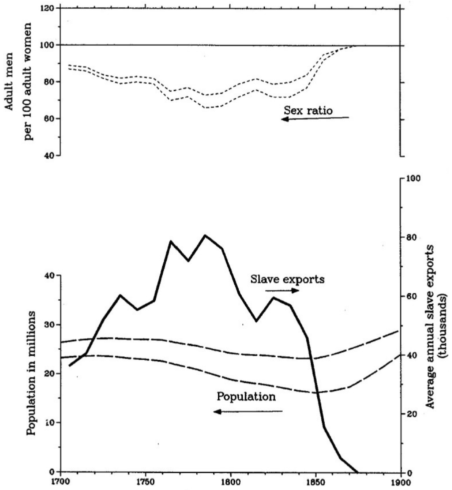
- Alternative framing: explain current distribution in FLFP in Africa.

Teso (2019)

- What are the mechanisms of persistence of historical shocks?
- The case of gender norms in Africa and the slave trade.
- Alternative framing: explain current distribution in FLFP in Africa.
- Hypothesis:
    - Male slaves outnumbered female slaves.
    - This generated historically skewed sex ratios in Africa.
    - Women had to substitute for men in previously male-dominated activities.
    - This changed attitudes and beliefs in the long run, affecting FLFP.
    - Multiple equilibria, intergenerational learning, institutional change.

Historical Experiment

Demographic impact of the transatlantic slave trade



Data

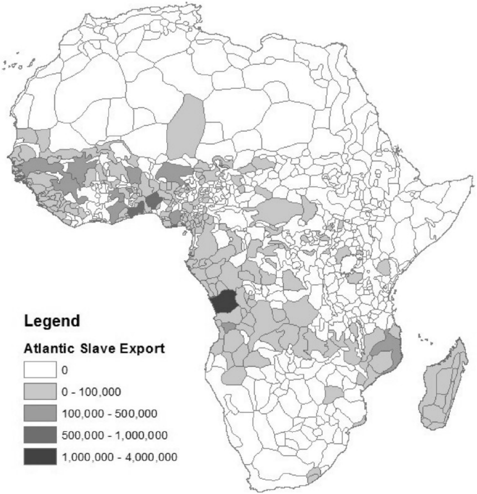
- Contemporaneous data.
  - FLFP data from DHS (61 surveys, 21 countries, 1992–2014).
  - Sample of 662k women aged 15–49.
  - Also information on occupation, fertility, age at first birth, attitudes, household tasks.

Data

- Contemporaneous data.
    - FLFP data from DHS (61 surveys, 21 countries, 1992–2014).
    - Sample of 662k women aged 15–49.
    - Also information on occupation, fertility, age at first birth, attitudes, household tasks.
- Historical data.
    - Slaves taken from Nunn and Wantchekon (2011).
    - Ethnicity data from Murdock's Atlas (1959).
    - Matched with DHS: 583k women and 223k men.

Data

Ethnic group-level exposure to transatlantic slave trade



Specification

$$y_{i,e,c} = \alpha_c + \beta \text{Trades}_e + X'_{i,e,c}\Delta + Z'_e\Omega + \varepsilon_{i,e,c}$$

- $y_{i,e,c}$: outcome of woman i, in country c, ethnic group e.
- Trades_e: slaves taken in transatlantic or indian ocean slave trades, normalized by historical area.
- $X'_{i,e,c}$: individual controls (age, marital status, urban, religion).
- Z'_e: ethnicity controls (disease environment, precolonial urbanization, jurisdictional hierarchies, population density, colonial railroads, missions, agricultural practices, historical warfare).
- Clustering: ethnic group level.

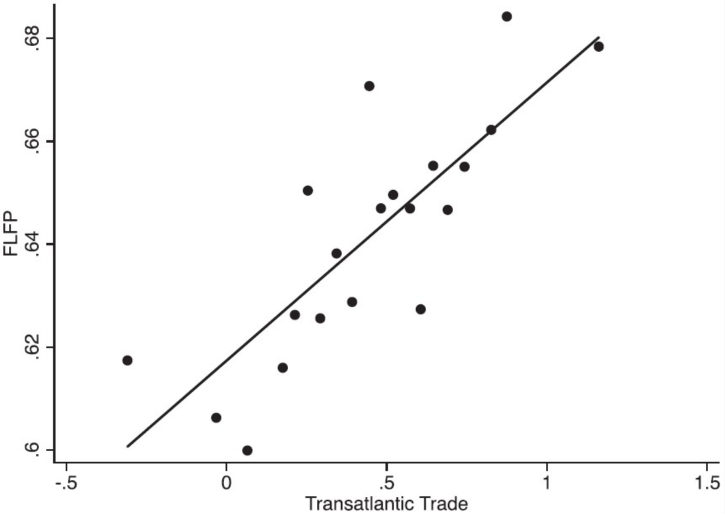
Long-Run Impact of Slave Trade on FLFP

OLS estimates, the effect of the slave trade on FLFP

	FLFP (1)	FLFP (2)	FLFP (3)	FLFP (4)	FLFP (5)	FLFP (6)
Transatlantic Trade	0.048***	0.054***	0.059***	0.056***	0.073***	0.072***
	(0.013)	(0.011)	(0.013)	(0.011)	(0.012)	(0.012)
Indian Ocean Trade	−0.059	−0.120	−0.061	−0.111	−0.146	−0.133
	(0.140)	(0.158)	(0.175)	(0.174)	(0.205)	(0.196)
Observations	583,562	563,379	470,183	563,054	386,503	386,317
R-squared	0.16	0.17	0.18	0.18	0.14	0.14
Ethnic Groups	261	243	170	243	241	241
Country-survey FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Historical Controls	No	Yes	Yes	Yes	Yes	Yes
Hist. Part. Agriculture	No	No	Yes	No	No	No
Education	No	No	No	Yes	Yes	Yes
Polygyny	No	No	No	No	Yes	Yes
Transatlantic std. dev.	0.564	0.564	0.570	0.564	0.564	0.564
Indian Ocean std. dev.	0.033	0.031	0.034	0.031	0.031	0.031
Dep. var. mean unaffected	0.588	0.586	0.589	0.586	0.635	0.635

Long-Run Impact of Slave Trade on FLFP

Residuals plot (Column 2)



Magnitudes (Column 2)

- $\uparrow$ 1 s.d. ancestor exposure to slave trade $\Longrightarrow \uparrow$ 3pp FLFP.
- $\uparrow$ 1 s.d. ancestor exposure to slave trade $\Longrightarrow \uparrow$ 5% FLFP mean.
- $\uparrow$ 1 s.d. ancestor exposure to slave trade $\Longrightarrow \uparrow$ 0.06 FLFP s.d.

Long-Run Impact of Slave Trade on FLFP

OLS estimates, the effect of the slave trade on occupational choices

	Agriculture (1)	Clerical (2)	Manual (3)	Domestic (4)	High Ranking (5)
Transatlantic Trade	0.018	−0.000	−0.010	−0.004**	0.048***
	(0.016)	(0.001)	(0.008)	(0.002)	(0.011)
Observations	549,009	549,009	549,009	549,009	549,009
R-squared	0.23	0.02	0.05	0.07	0.14
Ethnic Groups	243	243	243	243	243
Country-survey FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes
Historical Controls	Yes	Yes	Yes	Yes	Yes
Transatlantic std. dev.	0.564	0.564	0.564	0.564	0.564
Dep. var. mean unaffected	0.276	0.011	0.061	0.026	0.224

Magnitudes

- High ranking.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 3pp high ranking.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 12% high ranking mean.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 0.06 high ranking s.d.

Magnitudes

- High ranking.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 3pp high ranking.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 12% high ranking mean.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 0.06 high ranking s.d.
- Domestic.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \downarrow$ 0.2pp domestic.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \downarrow$ 9% domestic mean.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \downarrow$ 0.19 domestic s.d.
- But think of base rates.

Male Falsification Test

OLS estimates, women's versus men's employment

Sample	Men (1)	Women (2)	Men (3)	Women (4)	Men (5)	Women (6)
Transatlantic Trade	−0.010**	0.050***	−0.012**	0.054***	−0.008	0.056***
	(0.005)	(0.013)	(0.006)	(0.010)	(0.005)	(0.010)
Observations	222,970	548,178	216,419	528,006	216,125	527,687
R-squared	0.31	0.16	0.31	0.17	0.32	0.18
Ethnic Groups	235	261	219	243	219	243
Country-survey FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Historical Controls	No	No	Yes	Yes	Yes	Yes
Education	No	No	No	No	Yes	Yes
Transatlantic std. dev.	0.564	0.567	0.563	0.567	0.563	0.567
Dep. var. mean unaffected	0.831	0.593	0.831	0.591	0.831	0.591

Magnitudes (Columms 3 and 4)

- Women.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 3pp FLFP.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 5% FLFP mean.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 0.06 FLFP s.d.

Magnitudes (Columms 3 and 4)

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  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 3pp FLFP.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 5% FLFP mean.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \uparrow$ 0.06 FLFP s.d.
- Men.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \downarrow$ 0.7pp MLFP.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \downarrow$ 0.8% MLFP mean.
  - $\uparrow$ 1 s.d. ancestor exposure $\Longrightarrow \downarrow$ 0.02 MLFP s.d.

The Marriage Market Channel

- Hypothesis from Fernandez et al (2004):
  - Working mothers transmit positive views about female labor to their sons.
  - Women whose husbands' ancestors were more exposed to slave trade are more likely to have working mother, and thus working wife.

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The Marriage Market Channel

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  - Working mothers transmit positive views about female labor to their sons.
  - Women whose husbands' ancestors were more exposed to slave trade are more likely to have working mother, and thus working wife.
- Use women's ancestry FE to isolate role of husband's origins.
- To assess relative magnitude, use husband ancestry FE.
- Cannot have causal interpretation:
  - Husbands have an impact, holding beliefs constant.
  - Selection into marriage with different types of men.

The Marriage Market Channel

OLS estimates, the marriage market channel

	FLFP (1)	FLFP (2)	FLFP (3)
Transatlantic Trade	0.071***		0.045***
	(0.015)		(0.009)
Transatlantic Trade Husband		0.021**	
		(0.009)	
Observations	109,310	109,294	109,293
R-squared	0.14	0.18	0.17
Ethnic Groups	232	228	232
Country-survey FE	Yes	No	No
Country-survey-woman's ethnicity FE	No	Yes	No
Country-survey-husband's ethnicity FE	No	No	Yes
Individual Controls	Yes	Yes	Yes
Historical Controls	Yes	Yes	No
Transatlantic std. dev.	0.558	0.559	0.558
Dep. var. mean unaffected	0.652	0.657	0.652

Cultural Transmission

- Separate culture and institutions effects.
- Epidemiological approach using enumeration area FE.
- Find that half is due to cultural transmission.
- Not affected by heterogeneous response of movers relative to non-movers.

Cultural Transmission

OLS estimates, the cultural transmission channel

	FLFP (1)	FLFP (2)	FLFP (3)	FLFP (4)	FLFP (5)
Transatlantic Trade	0.027***	0.029***	0.029***	0.036***	0.035***
	(0.007)	(0.005)	(0.005)	(0.006)	(0.006)
Observations	583,377	563,092	562,766	386,121	385,935
R-squared	0.32	0.32	0.32	0.33	0.33
Ethnic Groups	261	243	243	241	241
EA-survey FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes
Historical Controls	No	Yes	Yes	Yes	Yes
Education	No	No	Yes	No	Yes
Polygyny	No	No	No	Yes	Yes
Transatlantic std. dev.	0.564	0.564	0.564	0.564	0.564
Dep. var. mean unaffected	0.588	0.586	0.586	0.635	0.635

Attitudes

OLS estimates, women's empowerment

	Share HH Decisions (1)	Share Violence (2)	Share Violence (3)	Rights Politics (4)	Rights Politics (5)	Rights General (6)	Rights General (7)
Transatlantic Trade	0.048***	−0.008	−0.005	0.018	−0.057*	0.098***	−0.019
	(0.013)	(0.011)	(0.009)	(0.031)	(0.031)	(0.037)	(0.057)
Observations	337,994	426,485	163,173	40,394	40,536	24,215	24,389
R-squared	0.26	0.22	0.11	0.07	0.07	0.10	0.09
Ethnic Groups	223	225	189	275	275	261	262
Sample	DHS	DHS	DHS	Afrob.	Afrob.	Afrob.	Afrob.
Gender	Female	Female	Male	Female	Male	Female	Male
Transatlantic std. dev.	0.567	0.570	0.564	0.536	0.536	0.540	0.538
Dep. var. mean unaffected	0.451	0.336	0.198	4.031	3.578	4.081	3.712

Topic 6
Political regimes, corruption, and development

The Big Questions

Does good governance cause growth?

Plan of Session

- Causal impact of democracy on growth.
  Acemoglu et al. (2019) Colagrossi et al. (2020)

- Causal impact of corruption on growth. Ugur (2014)

Democracy and Economic Growth

- Recall Dincecco and Katz (2016)
- Two elements of state capacity:
  - Fiscal centralization: year national government first secured revenues through uniform tax system.
  - Limited government: year parliament gained stable constitutional right to control national budget annually.

Democracy and Economic Growth

- Economic performance:
  - Log annual growth rate of real GDP per capita, 1650–1913. Maddison
  - Missing values linearly interpolated, especially 1650–1820.

Democracy and Economic Growth

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  - Missing values linearly interpolated, especially 1650–1820.
- State capacity: Dincecco (2011)
  - Extractive capacity: government revenues per capita.
  - Productive capacity: non-military expenditures per capita.
  - Missing values linearly interpolated.

Democracy and Economic Growth

- Empirical strategy:

$$\Delta y_{i,t} = \alpha_0 + \alpha_1 C_{i,t} + \alpha_2 L_{i,t} + X'_{i,t-1}\alpha_3 + \mu_i + \lambda_t + \varepsilon_{i,t}$$

- $\Delta y_{i,t}$: Log annual GDP per capita growth rate.
- $C_{i,t}$: indicator for fiscal centralization.
- $L_{i,t}$: indicator for limited government.
- μ_i: country fixed effect.
- λ_t: year fixed effect.
- $X'_{i,t-1}$: conflict indicators, population growth, lagged y.

State Capacity and Economic Growth

- Source of identification and identifying assumption:

State Capacity and Economic Growth

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- Not necessarily causal interpretation: document robust pattern.

Democracy and Economic Growth

Dependent variable:	Real GDP per capita growth			
	(1)	(2)	(3)	(4)
Fiscal centralization	0.657***	0.222***	0.268***	0.344***
	[0.087]	[0.086]	[0.125]	[0.171]
Limited government	0.321***	0.053	-0.028	-0.080
	[0.109]	[0.165]	[0.146]	[0.205]
Country FE	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Country time trends	No	No	Yes	Yes
Lags in y (2)	No	No	No	Yes
Observations	1,772	1,772	1,772	1,750
Countries	11	11	11	11

Democracy and Economic Growth

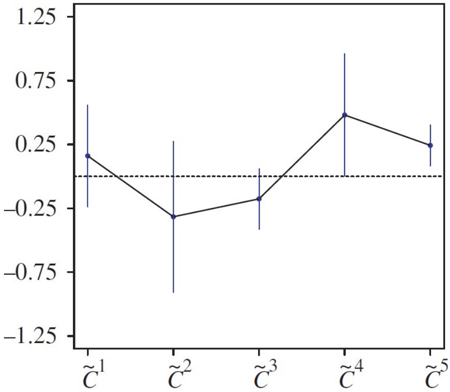
- Relax assumption of constant impact over time:

$$\Delta y_{i,t} = \alpha_0 + \sum_{j=1}^{5} \alpha_{1,j} \tilde{C}^{j}_{i,t} + \sum_{j=1}^{5} \alpha_{1,j} \tilde{L}^{j}_{i,t} + X'_{i,t-1}\alpha_3 + \mu_i + \lambda_t + \varepsilon_{i,t}$$

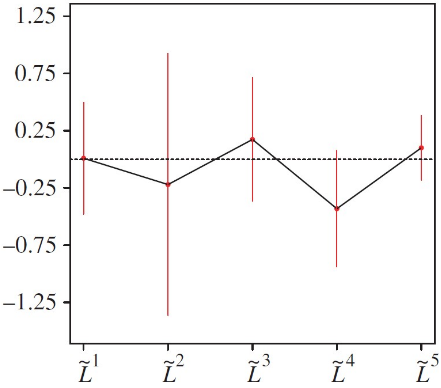
- $\tilde{C}^1_{i,t}$, $\tilde{L}^1_{i,t} = 1$ for years 6–10 before.
- $\tilde{C}^2_{i,t}$, $\tilde{L}^2_{i,t} = 1$ for years 1–5 before.
- $\tilde{C}^3_{i,t}$, $\tilde{L}^3_{i,t} = 1$ for years 0–4 after.
- $\tilde{C}^4_{i,t}$, $\tilde{L}^4_{i,t} = 1$ for years 5–10 after.
- $\tilde{C}^5_{i,t}$, $\tilde{L}^5_{i,t} = 1$ for more than 10 years after.

Democracy and Economic Growth

Time-varying relationship between gdp per capita growth and fiscal centralization



Time-varying relationship between gdp per capita growth and limited government



Democracy and Economic Growth

- Important and direct role for fiscal centralization.
- Fiscally centralized regimes grew faster than fragmented:
  - On average by 0.2–0.4% higher per year.
  - Average 1650–1913: 0.6% $\Longrightarrow$ 1/4–2/3 of growth.

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- Long-lasting economic improvements from fiscal centralization.

Democracy and Economic Growth

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    - "The net effect of democracy on growth performance cross-nationally over the last five decades is negative or null." Gerring et al. (2005)

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- Acemoglu et al (2019) Explore causal relationship 1960–2010.

$\Longrightarrow$ Transitioning to democracy $\uparrow$ 20% GDP per capita in 25 years.

Challenges for Causal Identification

- Measurement error in democratic transition.

Challenges for Causal Identification

- Measurement error in democratic transition.
- OVB: democracy is correlated with unobserved characteristics that affect growth.

  $\Longrightarrow$ use DiD (country FE)
- Democratizations are preceded by temporary dip in GDP.

  $\Longrightarrow$ Parallel-trends assumption is not valid.
- Time-varying unobservables related to future economic conditions

Measuring Democracy

- Freedom House.
- Polity.
- Cheibub et al. (2010).
- Boix et al. (2012).

Freedom House

- 151 countries and 45 territories.
- Scores 0–4 for on 25 indicators.
- 10 political rights indicators.
    - Electoral process (3).
    - Political pluralism and participation (4).
    - Functioning of government (3).
- 15 civil liberty indicators.
    - Freedom of expression and belief (4).
    - Associational and organizational rights (3)
    - Rule of law (4).
    - Personal autonomy and individual rights (4).
- 125 analysts and 40 advisers, yearly updates since 1972.

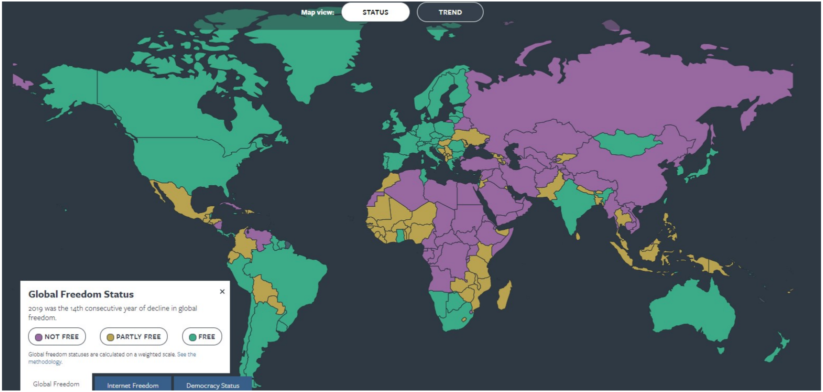
Freedom House

Global freedom status: 3 categories

Status		Political Rights score						
		0-5*	6-11	12-17	18-23	24-29	30-35	36-40
Civil Liberties score	53-60	PF	PF	PF	F	F	F	F
	44-52	PF	PF	PF	PF	F	F	F
	35-43	PF	PF	PF	PF	PF	F	F
	26-34	NF	PF	PF	PF	PF	PF	F
	17-25	NF	NF	PF	PF	PF	PF	PF
	8-16	NF	NF	NF	PF	PF	PF	PF
	0-7	NF	NF	NF	NF	PF	PF	PF

Freedom House

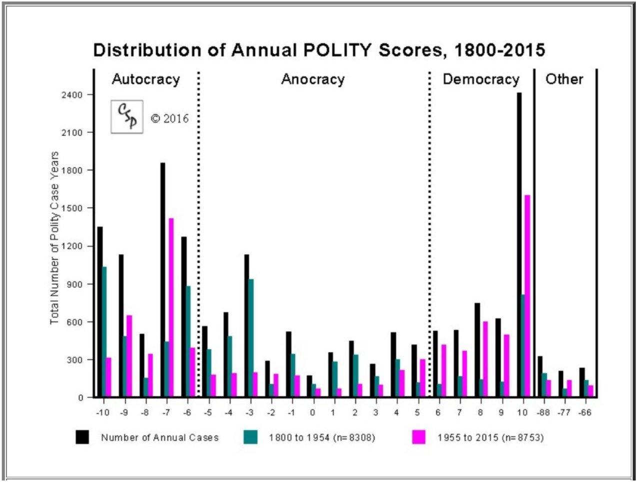
Global freedom status: 3 categories



Polity

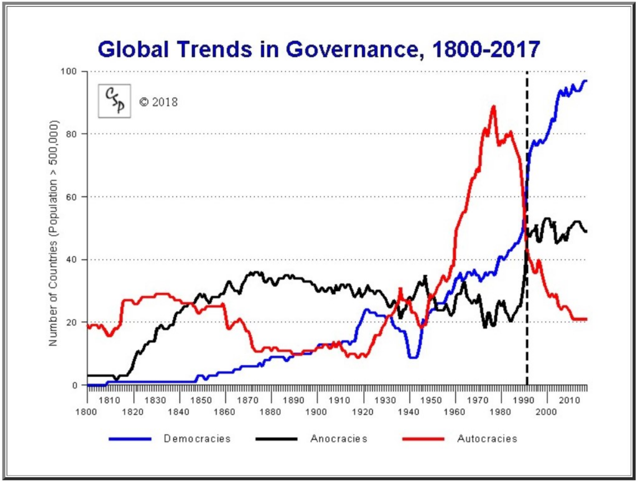
- 167 countries 1800–2018
- 21-point scale from -10 to +10.
- POLITY = DEMOC - AUTOC.
- DEMOC: institutionalized democracy index (0–10).
  - Competitiveness of executive recruitment (0–2)
  - Openness of executive recruitment (0–1)
  - Constraint on chief executive (0–4)
  - Competitiveness of political participation (0–3)
- AUTOC: Authoritarian regime index (0–10). Same categories as above, different schemes.
- Coding by country experts, yearly updates since 1974.

Polity



Distribution of Annual POLITY Scores, 1800-2015
Autocracy
Anocracy
Democracy
Other
© 2016
Total Number of Polity Case Years
2400
2100
1800
1500
1200
900
600
300
0
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 -88 -77 -66
Number of Annual Cases
1800 to 1954 (n=8308)
1955 to 2015 (n=8753)

Polity



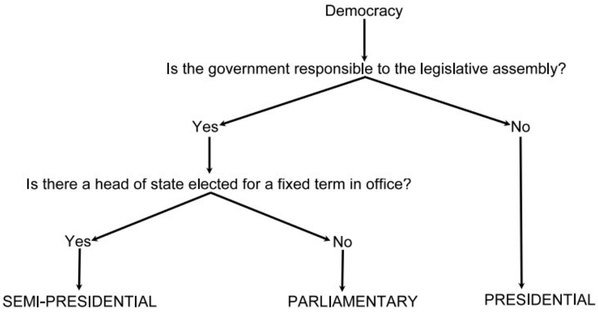
Global Trends in Governance, 1800-2017
© 2018
Number of Countries (Population > 500,000)
100
80
60
40
20
0
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Democracies
Anocracies
Autocracies

Cheibub et al. (2010)

- Democracy-Dictatorship (DD): dichotomous measure of political regime.
- Based on 6-fold regime classification:
  - Monarchy.
  - Military dictatorship.
  - Civilian dictatorship.
  - Presidential democracy.
  - Parliamentary democracy.
  - Semi-presidential democracy.
- Relies on events rather than assessment (holding elections, existence than more than one party, changes in leadership of government).
- Criticizes false sense of continuous variation of Polity and FH.
- 199 countries since 1946.

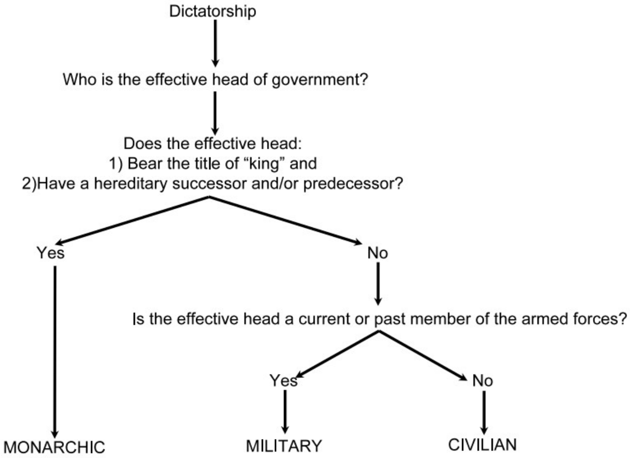
Cheibub et al. (2010)

Classifying forms of democratic government



Cheibub et al. (2010)

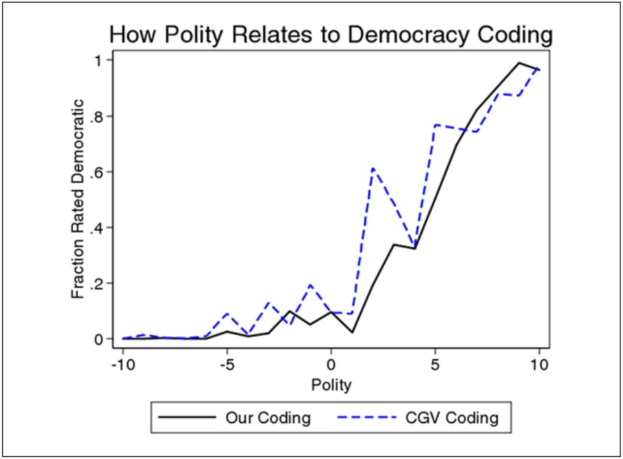
Classifying forms of dictatorial government



Boix et al. (2012)

- Democracy-Dictatorship: dichotomous measure of political regime.
- Democracy if meets following conditions:
  - Contestation: executive directly or indirectly elected in popular elections; the legislature is chosen in free and fair elections.
  - Participation: majority of adult men has right to vote.
- Relies on events rather than assessment (holding elections, existence than more than one party, changes in leadership of government).
- Extends Cheibub over time.
- 219 countries 1800–2007.

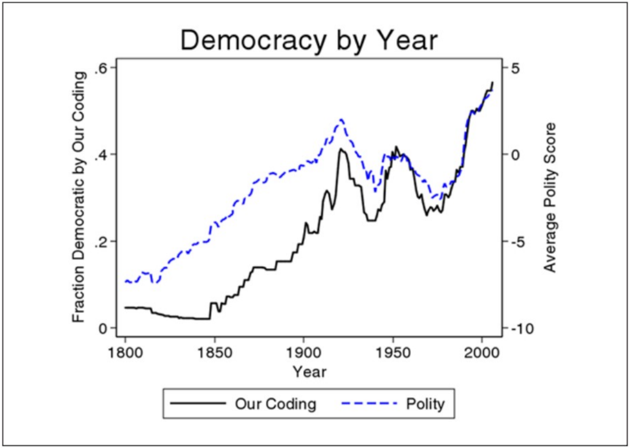
Boix et al. (2012)



Boix et al. (2012)

Variable	BMR	CGV	Polity ≥ 5	FH ≤ 3.5	Golder	HT	Average
BMR	1.000						.942
CGV	.957	1.000					.924
Polity ≥ 5	.939	.921	1.000				.928
FH ≤ 3.5	.934	.902	.933	1.000			.921
Golder	.958	.950	.924	.913	1.000		.931
HT	.921	.891	.921	.924	.910	1.000	.913

Boix et al. (2012)



Measuring Democracy

- Annual panel of 175 countries, 1960–2010.
- Binary measure of democracy Papaioannou and Siourounis (2008)

  $D_{ct} = 1$ if both

  - Freedom House: "free" or "partially free."
  - Polity IV: positive score.

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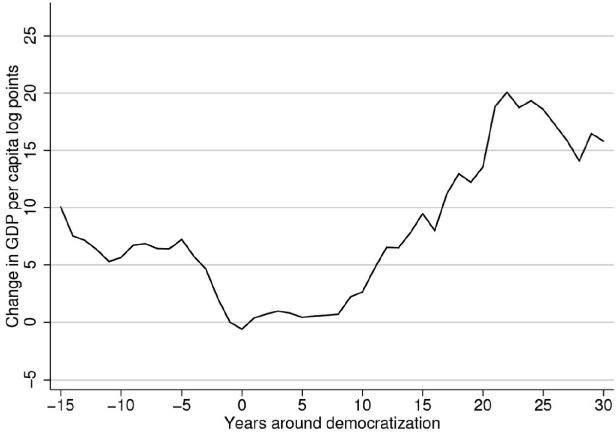
  - Freedom House: "free" or "partially free."
  - Polity IV: positive score.
  - Verify with Cheibub et al (2010) and Boix et al (2012)
- Countries that are democracies: 31.5% in 1960, 64.1% in 2010.
- 122 democratizations and 71 reversals.
- Code permanent and transitory changes in political regime.

Challenges for Causal Identification

GDP per Capita Before and After a Democratization



Data: GDP per Capita and Economic Variables

- Log GDP per capita in 2000 US dollars. WB
- Investment, trade, education, infant mortality. WB
- Financial flows, tax revenues, economic reforms index, social unrests.

Dynamic Panel Estimates

$$y_{ct} = \beta\ D_{ct} + \sum_{j=1}^{p} \gamma_j y_{ct-j} + \alpha_c + \delta_t + \varepsilon_{ct}$$

- y_{ct}: log GDP per capita in country c at time t.
- D_{ct}: dichotomous measure of democracy.
- α_c: country fixed effects.
- δ_t: year fixed effects.
- p: lags (control for dynamics).

Identifying Assumption: Sequential Exogeneity

$$\mathbb{E}\left(\varepsilon_{ct} | y_{ct-1}, \ldots, y_{ct_0}, D_{ct}, \ldots, D_{ct_0}, \alpha_c, \delta_t\right) = 0$$

- Democracy and past GDP are orthogonal to contemporaneous and future shocks to GDP.
- Countries that transition are not on a different GDP trend relative to others with similar levels of GDP in the past (lags) and level of long-run development (country FE).

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- Democracy and past GDP are orthogonal to contemporaneous and future shocks to GDP.
- Countries that transition are not on a different GDP trend relative to others with similar levels of GDP in the past (lags) and level of long-run development (country FE).
- Lags of GDP summarizes factors that affect both D and y.
- Many of these impact future y through their impact on current y.

$\Longrightarrow$ Lags + country FE control for selection into democracy.

Dynamic Panel Estimates

Effect of Democracy on Log GDP per Capita

	Within estimates			
	(1)	(2)	(3)	(4)
Democracy	0.973	0.651	0.787	0.887
	(0.294)	(0.248)	(0.226)	(0.245)
log GDP first lag	0.973	1.266	1.238	1.233
	(0.006)	(0.038)	(0.038)	(0.039)
log GDP second lag		-0.300	-0.207	-0.214
		(0.037)	(0.046)	(0.043)
log GDP third lag			-0.026	-0.021
			(0.028)	(0.028)
log GDP fourth lag			-0.043	-0.039
			(0.017)	(0.034)
p-value lags 5 to 8				[0.565]
Long-run effect of democracy	35.587	19.599	21.240	22.008
	(13.998)	(8.595)	(7.215)	(7.740)
Effect of democracy after 25 years	17.791	13.800	16.895	17.715
	(5.649)	(5.550)	(5.297)	(5.455)
Persistence of GDP process	0.973	0.967	0.963	0.960
	(0.006)	(0.005)	(0.005)	(0.007)
AR2 test p-value				
Unit root test $t-$statistics	-4.79	-3.89	-4.13	-7.00
$p-$value (reject unit root)	[0.00]	[0.00]	[0.00]	[0.00]
Observations	6,790	6,642	6,336	5,688
Countries in sample	175	175	175	175

Dynamic Panel Estimates

- First lag close to 1: large persistence in GDP.
- Short-run effect of democracy: $\uparrow$ 1% per year.
- Cumulative long-run effect of permanent transition:

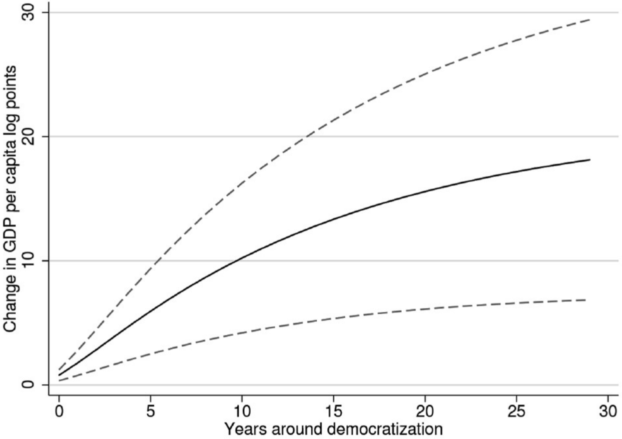
$$\frac{\widehat{\beta}}{1 - \sum_{j=1}^{p} \widehat{\gamma}_j}$$

  - $\uparrow$ 36% over the long-run.
  - $\uparrow$ 18% over 25 years.

- Including 4 lags: smaller effects, but sizable (preferred specification).

Dynamic Panel Estimates

Effect of Democracy on Log GDP per Capita over Time



Dynamic Panel Estimates: Robustness

- Main threat: time-varying factors that simultaneously affect democracy and GDP.
- Country FE absorb time-invariant factors.
- Solutions:
  - Interact indicators for quantile of GDP per capita in 1960 with year FE.
  - Interact indicators for Soviet transition with year FE.
  - Control for 4 lags of unrest, trade exposure, financial flows, population.

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  - Interact indicators for Soviet transition with year FE.
  - Control for 4 lags of unrest, trade exposure, financial flows, population.
- Robust to alternative measures of democracy and GDP.
- Not sensitive to outliers.

Dynamic Panel Estimates

Effect of Democracy on Log GDP per Capita

Covariates included:	(1)	GDP in 1960 quintiles × year effects (2)	Soviet dummies (3)	Lags of unrest (4)	Lags of trade (5)	Lags of financial flows (6)	Lags of demographic structure (7)	Region × regime × year effects (8)
	Panel A: Within estimates.							
Democracy	0.787	0.718	0.911	0.705	0.595	0.926	0.650	0.834
	(0.226)	(0.249)	(0.251)	(0.224)	(0.264)	(0.244)	(0.230)	(0.264)
Long-run effect of democracy	21.240	22.173	24.860	17.000	14.593	23.870	14.153	16.651
	(7.215)	(8.702)	(7.783)	(5.980)	(7.122)	(8.211)	(5.419)	(5.546)
Effect of democracy after 25 years	16.895	16.261	19.587	13.567	11.500	18.149	12.251	14.532
	(5.297)	(5.982)	(5.724)	(4.644)	(5.336)	(5.435)	(4.552)	(4.726)
Persistence of GDP process	0.963	0.968	0.963	0.959	0.959	0.961	0.954	0.950
	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)	(0.006)	(0.005)	(0.005)
Observations	6,336	5,523	6,336	5,643	5,750	4,950	6,262	6,336
Countries in sample	175	149	175	171	172	171	172	175

IV Estimates: Democratization Waves

- Democratizations often occur in regional waves:
  - Latin America and the Carribean: 1980s and early 1990s.
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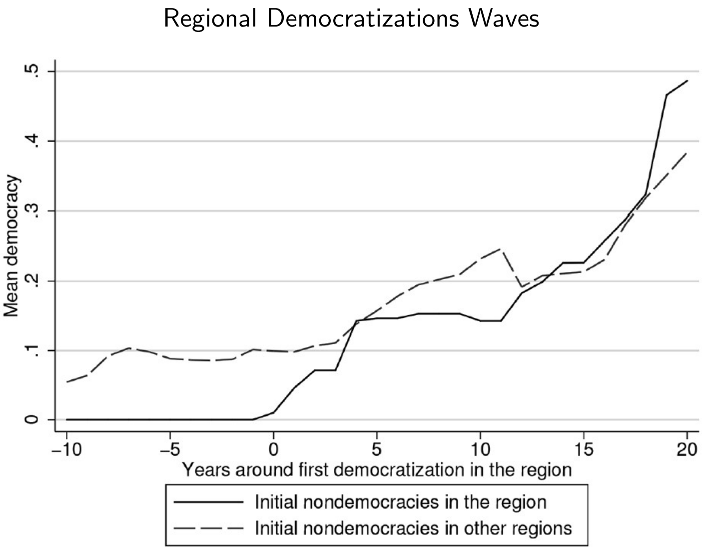
- Seven regions: Africa, East Asia and the Pacific, Eastern Europe and Central Asia, Western Europe and developed countries, Latin America and the Carribean, MENA, South Asia.

IV Estimates: Democratization Waves



IV Estimates: Democratization Waves

- D_{ct_0}: country is democracy or not at start of sample.
- R_c: geographic region.
- $I_c = \{c' : c' \neq c, R_{c'} = R_c, D_{c't_0} = D_{ct_o}\}$: countries of same region that share similar political history.

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- $I_c = \{c' : c' \neq c, R_{c'} = R_c, D_{c't_0} = D_{ct_o}\}$: countries of same region that share similar political history.
- Instrument: $Z_{ct} = \frac{1}{|I_c|} \sum_{c' \in I_c} D_{c't}$.
- Average democracy in a region, excluding own-country observation.
- Instrument democracy with Z_{ct} and its lags.

IV Estimates: Democratization Waves

IV Estimates of the Effect of Democracy on GDP per Capita

Covariates included:	(1)	(2)	GDP in 1960 quintiles× year effects (3)	Soviet dummies (4)	Regional trends (5)	Regional GDP & trade (6)	Regional unrest GDP & trade (7)	Spatial lag of GDP (8)	Spatial lags of GDP and democracy (9)
	Panel A: 2SLS estimates with fixed effects.								
Democracy	0.966	1.149	1.125	1.292	1.697	1.817	1.107	1.335	1.361
	(0.558)	(0.554)	(0.689)	(0.651)	(0.885)	(0.663)	(0.656)	(0.536)	(0.895)
Long-run effect of democracy	26.315	31.521	35.226	35.723	36.788	41.544	25.016	37.482	38.439
	(17.075)	(17.425)	(23.846)	(19.997)	(20.657)	(17.157)	(16.002)	(17.836)	(27.883)
Effect of democracy after 25 years	20.836	24.866	25.618	27.929	32.051	35.350	21.386	29.217	29.011
	(12.862)	(12.978)	(16.538)	(14.944)	(17.703)	(14.017)	(13.342)	(12.894)	(19.692)
Persistence of GDP process	0.963	0.964	0.968	0.964	0.954	0.956	0.956	0.964	0.965
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
Hansen p-value		[0.21]	[0.18]	[0.32]	[0.28]	[0.25]	[0.09]	[0.04]	[0.19]
Observations	6,312	6,309	5,496	6,309	6,309	6,309	6,309	6,181	6,009
Countries in sample	174	174	148	174	174	174	174	173	173
Exc. Instruments F-stat.	119.1	33.2	16.8	26.7	23.7	13.6	16.7	17.5	4.6
	Panel B: First-stage estimates.								
Democracy wave t-1	0.800	0.547	0.503	0.480	0.498	0.522	0.508	0.540	0.586
	(0.073)	(0.101)	(0.130)	(0.099)	(0.092)	(0.104)	(0.102)	(0.103)	(0.101)
Democracy wave t-2		0.133	0.109	0.133	0.129	0.117	0.115	0.136	0.128
		(0.081)	(0.094)	(0.080)	(0.081)	(0.079)	(0.078)	(0.078)	(0.088)
Democracy wave t-3		0.227	0.270	0.223	0.228	0.221	0.223	0.224	0.282
		(0.067)	(0.077)	(0.065)	(0.070)	(0.069)	(0.070)	(0.070)	(0.077)
Democracy wave t-4		-0.087	-0.119	-0.075	-0.123	-0.083	-0.064	-0.072	-0.107
		(0.110)	(0.126)	(0.110)	(0.106)	(0.113)	(0.113)	(0.113)	(0.116)

Mechanism

- Potential hypotheses for intervening variables:
  - Investment
  - TFP
  - Economic reforms
  - Taxes
  - Schooling
  - Child mortality
  - Social unrest

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    - Social unrest

- Specification

$$m_{ct} = \beta\ D_{ct} + \sum_{j=1}^{p} \gamma_j y_{ct-j} + \sum_{j=1^p} \eta_j m_{ct-j} + \alpha_c + \delta_t + \varepsilon_{ct}$$

Mechanism

Effects of Democracy on Potential Mechanisms

Dependent variable:	Log of investment share in GDP (1)	Log of TFP (2)	Index of economic reforms (3)	Log of trade share in GDP (4)	log of tax share in GDP (5)	Log of primary enrollment (6)	Log of secondary enrollment (7)	log of child mortality (8)	Dummy fo unrest (9)
					Panel A: Within estimates.				
Democracy	2.391	-0.205	0.687	0.689	3.311	1.042	1.345	-0.253	-7.832
	(1.114)	(0.276)	(0.348)	(0.676)	(1.409)	(0.338)	(0.610)	(0.063)	(2.185)
Long-run effect of democracy	9.112	-2.883	5.580	5.445	16.062	21.908	18.960	-34.264	-11.944
	(4.255)	(3.858)	(2.883)	(5.253)	(6.650)	(7.624)	(8.622)	(10.747)	(3.329)
Effect of democracy after 25 years	9.089	-2.738	5.359	5.303	15.864	18.892	18.057	-21.400	-11.944
	(4.245)	(3.648)	(2.753)	(5.126)	(6.574)	(6.321)	(8.146)	(5.124)	(3.329)
Persistence of outcome process	0.738	0.929	0.877	0.873	0.794	0.952	0.929	0.993	0.344
	(0.020)	(0.012)	(0.012)	(0.011)	(0.016)	(0.008)	(0.013)	(0.001)	(0.030)
Observations	5,665	3,879	4,692	5,738	4,511	3,714	2,883	6,084	5,646
Countries in sample	169	107	150	172	131	166	158	173	171
					Panel B: 2SLS estimates.				
Democracy	2.211	-0.941	3.224	5.512	8.088	1.757	4.116	-0.715	-5.569
	(2.852)	(0.667)	(0.863)	(2.005)	(3.021)	(0.721)	(1.626)	(0.164)	(5.682)
Long-run effect of democracy	8.440	-12.738	23.775	40.589	38.609	36.693	57.072	-95.728	-8.471
	(10.705)	(8.854)	(6.215)	(13.580)	(14.330)	(15.505)	(21.698)	(26.347)	(8.577)
Effect of democracy after 25 years	8.419	-12.167	23.156	39.817	38.159	31.611	54.252	-58.625	-8.471
	(10.681)	(8.380)	(6.039)	(13.375)	(14.121)	(12.863)	(20.267)	(13.123)	(8.577)
Persistence of outcome process	0.738	0.926	0.864	0.864	0.791	0.952	0.928	0.993	0.343
	(0.020)	(0.012)	(0.012)	(0.012)	(0.017)	(0.008)	(0.013)	(0.001)	(0.030)
Exc. instruments F-stat.	21.7	27.7	43.7	21.5	31.8	12.1	10.4	26.3	28.6
Hansen p-value	[0.29]	[0.06]	[0.22]	[0.09]	[0.69]	[0.09]	[0.12]	[0.02]	[0.84]
Observations	5,640	3,871	4,670	5,714	4,489	3,710	2,879	6,057	5,619
Countries in sample	168	107	149	171	130	164	156	172	170

Does Democracy Need Development?

- Typical argument: democracy is good but only at high level of development and human capital.

Does Democracy Need Development?

- Typical argument: democracy is good but only at high level of development and human capital.
- Implementation: interactions between democracy and levels of development and human capital.
- If theory is valid, expect:
  - Positive interaction terms.
  - Main effect of democracy for low-countries to be negative

Does Democracy Need Development?

Heterogeneous Effects of Demogracy on GDP per Capita

Interaction with:	Log GDP per capita:				Share with secondary:			
Measured at:	1960 (1)	1970 (2)	1980 (3)	Lagged (4)	1960 (5)	1970 (6)	1980 (7)	Lagged (8)
	Panel A: Within estimates.							
Democracy	0.432	0.572	0.687	0.744	0.446	0.340	0.385	0.495
	(0.275)	(0.248)	(0.248)	(0.246)	(0.254)	(0.253)	(0.246)	(0.241)
Interaction	0.001	0.001	0.002	0.001	0.046	0.049	0.038	0.020
	(0.002)	(0.001)	(0.002)	(0.002)	(0.028)	(0.020)	(0.014)	(0.013)
Long-run effect of democracy	16.231	18.631	20.489	19.843	13.785	10.480	11.841	14.597
	(11.160)	(9.073)	(8.608)	(8.255)	(8.550)	(8.275)	(8.118)	(8.432)
Effect of democracy after 25 years	10.013	12.916	14.985	15.877	10.081	7.679	8.687	10.953
	(6.565)	(5.960)	(5.848)	(5.943)	(5.964)	(5.872)	(5.728)	(5.821)
Persistence of GDP process	0.973	0.969	0.966	0.963	0.968	0.968	0.967	0.966
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)
Observations	4,281	4,909	5,525	6,336	5,300	5,300	5,300	5,300
Countries in sample	93	109	131	175	138	138	138	138
	Panel B: 2SLS estimates.							
Democracy	0.500	0.155	0.645	1.326	-0.119	-0.484	-0.474	0.600
	(1.088)	(0.961)	(0.929)	(0.887)	(0.662)	(0.665)	(0.639)	(0.576)
Interaction	-0.002	0.000	-0.000	-0.003	0.174	0.156	0.116	0.049
	(0.005)	(0.004)	(0.004)	(0.004)	(0.060)	(0.047)	(0.033)	(0.023)
Long-run effect of democracy	18.838	4.978	19.275	36.116	-3.649	-14.586	-14.135	17.373
	(43.554)	(31.473)	(30.208)	(29.900)	(19.968)	(19.023)	(18.114)	(18.629)
Effect of democracy after 25 years	11.592	3.486	14.078	28.377	-2.692	-10.843	-10.574	13.133
	(25.784)	(21.795)	(21.085)	(21.317)	(14.837)	(14.524)	(13.901)	(13.312)
Persistence of GDP process	0.973	0.969	0.967	0.963	0.967	0.967	0.966	0.965
	(0.006)	(0.006)	(0.006)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)
Exc. instruments F-stat.	6.6	6.1	7.0	14.0	18.5	17.6	16.0	12.4
Hansen p-value	[0.81]	[0.73]	[0.54]	[0.33]	[0.44]	[0.41]	[0.25]	[0.50]
Observations	4,273	4,901	5,517	6,153	5,292	5,292	5,292	5,218
Countries in sample	93	109	131	174	138	138	138	138

Long-run effects evaluated at the 25th percentile of interacted variable.

Meta-Analysis

Colagrossi et al. (2020)

- Democracy and growth: one of the most researched topic.
- Each study is one piece of evidence (even Acemloglu's).
- Meta-analysis helps summarize findings quantitatively.
- Also test main hypothesis: human capital.

Studies selection

- Search “democracy AND growth” in academic databases (Econlit, Jstor, RePEc, ScienceDirect, SSRN).
- Literature cited in 9 qualitative literature reviews.
- Literature cited and quoting the 4 most cited papers.
- Literature used in previous meta-analysis. Doucouliagos and Ulubasoglu (2008).

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- Included if coefficient and standard error (also on HK).
- Include working papers and unpublished studies.
- Collect all estimates from main specifications and robustness.
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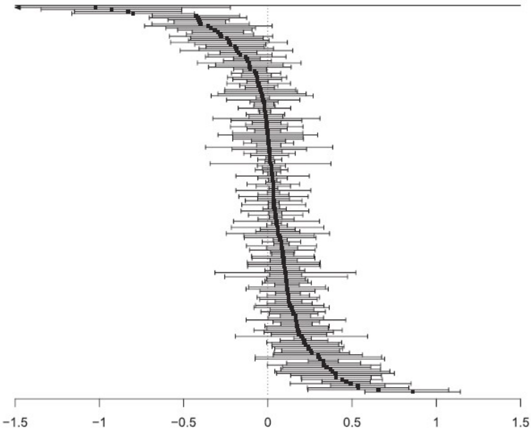
- Include working papers and unpublished studies.
- Collect all estimates from main specifications and robustness.
- Time range: 1983–2019.
- Sample:
  - 2,047 β_{dem} in 188 studies (1,227 main estimates).
  - 875 β_{hc} in 111 studies.
  - 764 $\beta_{dem|hc}$ in 111 studies.
- Standardize coefficients (use partial correlations and Fisher transformation).

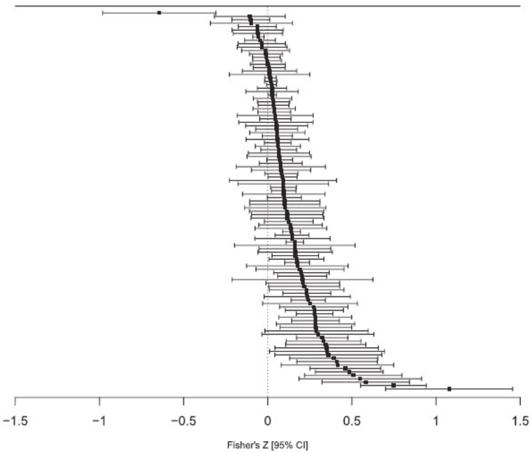
Democracy, human capital, and economic growth

Democracy and economic growth



Democracy, human capital, and economic growth

Human capital and economic growth



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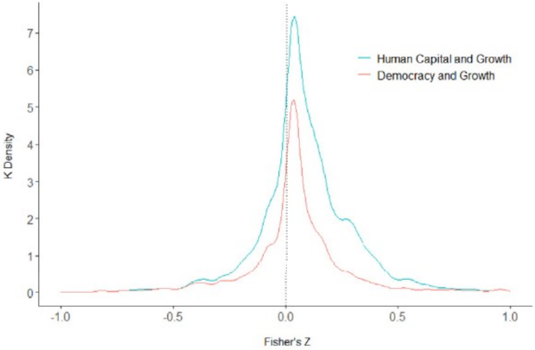

Meta-Analytic Estimates

- Start with a dataset of K estimates across N studies, along with their standard errors.
- Each within-study estimate is standardized for comparability: divide coefficient by s.d. of outcome and multiply by s.d. of treatment.
- Here: Fisher-z (alternative way of standardizing estimates).

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- Weight by precision of estimate.

$$\overline{\theta} = \sum_{k=1}^{K} w_k \widehat{\theta}_k, \quad w_k = \frac{1}{\widehat{\sigma}_k^2} \frac{1}{\sum_{k=1}^{K} 1/\widehat{\sigma}_k^2}$$

Meta-Analytic Estimates

- Effect of democracy on growth:
  - All estimates (188 studies, 2,047 estimates): 0.0440*** (0.0138).
  - Main specifications (180 studies, 1,227 estimates): 0.0430*** (0.0141).
- Effect of HK on growth:
  - All estimates (111 studies, 875 estimates): 0.1348*** (0.0156).
- Democracy-growth is 1/3 of human capital-growth.

Meta-Analytic Estimates: Heterogeneity

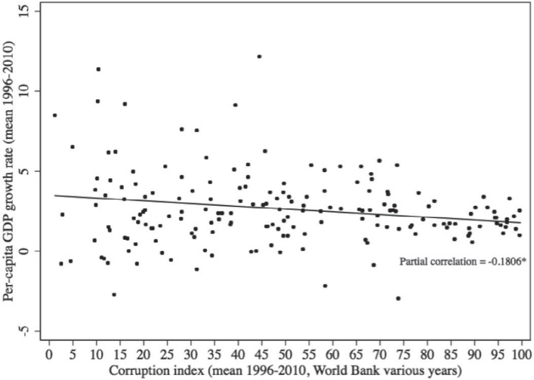
- Does not depend on:
  - Data structure: cross section, time series, panel.
  - Estimation technique.
  - Type of democracy index used.
  - Country characteristics: human capital, investment, government size, corruption, ethnicity, religion, population.
- Depends on:
  - Geography: stronger in Sub-Saharan Africa, weaker in high-income countries and South Asia.
  - Time period: turmoil and decolonizations in the 1950s and 1960s.

Meta-Analytic Estimates: Heterogeneity

Democracy and growth, predicted values for selected regions and periods.

	All regions	Africa	East Asia	East Europe	Latin America	Middle East	South Asia	High-income
All periods	0.1212*	0.2039***	−0.0007	0.0430	0.0162	0.0592	−0.0835	0.0523
	(0.0558)	(0.0582)	(0.0719)	(0.0626)	(0.0607)	(0.0606)	(0.0721)	(0.0583)
1950–2009	0.0660	0.1487***	−0.0559	−0.0122	−0.0390	0.0040	−0.1387*	−0.0029
	(0.0403)	(0.0440)	(0.0591)	(0.0492)	(0.0470)	(0.0478)	(0.0629)	(0.0439)
1960–2009	0.0710	0.1537***	−0.0509	−0.0072	−0.0340	0.0090	−0.1337*	0.0021
	(0.0367)	(0.0407)	(0.0577)	(0.0466)	(0.0440)	(0.0449)	(0.0599)	(0.0409)
1970–2009	0.1315***	0.2143***	0.0096	0.0533	0.0265	0.0695	−0.0732	0.0626
	(0.0377)	(0.0415)	(-0.0583)	(0.0474)	(0.0448)	(0.0457)	(0.0605)	(0.0417)
1980–2009	0.1739***	0.2566***	0.0520	0.0957	0.0689	0.1119*	−0.0308	0.1050
	0.0354	0.0394	(0.0567)	(0.0454)	(0.0428)	(0.0436)	(0.0590)	(0.0395)

Corruption and Development



Corruption and Development

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- Vast literature, sometimes with contradictory findings.
  - Generally negative effect of corruption on growth.
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  - Also varies by type of corruption.
  - Effect dependent upon how affect growth proximates (composition of investment, incentives to invest in physical and human capital. . .)

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$\Longrightarrow$ Run a meta-analysis on this literature. Ugur (2014)

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  - Agent abuses authority by imposing surcharge on delivery of service to principal.
  - Principal cannot hold agent accountable because of high monitoring cost.
- Captures bureaucratic and political corruption, bribes, nepotism, frauds, embezzlement.

Measuring Corruption

- International Country Risk Guide (ICRG): index 0–6 capturing perceptions of corruption.
- Transparency International (TI): index 0–12 capturing information on corruption.
- World Governance Indicators (WGI): index -2.5–+2.5 capturing perceptions of corruption.

Measuring Corruption: Standard Errors

Qu et al. (2019)

- These scores are point estimates per country (averages across responses and data sources).
- They contain a standard error: magnitude of variation in underlying data.
- Large s.e. $\Longrightarrow$ large disagreement in underlying population.

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- Large s.e. $\implies$ large disagreement in underlying population.
- WGI: 22 data sources. TI: 12 data sources.
- E.g. TI ranks Brunei #38 with point estimate of 60 and s.e. of 10.4.
  $\implies$ 90% CI: Brunei as corrupt as Liberia (#83) or Canada (#9).

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- Factors: different information across country, degree of corruption differs across country.
- Important when aggregate indices, when assessing quality of measure.

Measuring Corruption: Standard Errors

$$SE = \frac{1}{\sqrt{N}} \left[\frac{\sum_n^N (S - S_n)^2}{N} \right]^{1/2}$$

- N: number of sources for the country.
- S_n: country score from source n.
- S: country mean score across N sources.

Measuring Corruption: Standard Errors

$$SE_i = \alpha + \beta * Z_i + \theta * \mathrm{SOURCES}_i + \varepsilon_i$$

- Main indicator: WGI.
- Consider all sources in the WGI (5 sources for large coverage).
- 120 countries, separately for 2012, 2013, 2014.
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- $\mathrm{SOURCES}_i$: number of sources used to construct the WGI.
- Z_i:
  - Anchoring: use past values (decrease variation).
  - Economic variables (income, population, education). Halo effect: ambiguity in middle income, low education.
  - Political variables: democracy, media freedom, fractionalization, inequality.

Measuring Corruption: Standard Errors

Ratings Characteristics

Ratings characteristics.

	WGI-CC 2012	2013	2014
Row 1			
Number of Data Sources	−0.0123***	−0.0115***	−0.0202***
	(0.0023)	(0.0021)	(0.0037)
# of Countries	195	195	195
Adjusted R^2	0.2123	0.2148	0.2835
Row 2			
Initial Point Estimate	0.0785***	0.0657***	0.0863***
	(0.0273)	(0.0227)	(0.0310)
Initial Point Estimate Squared	−0.0177***	−0.0161***	−0.0188***
	(0.0045)	(0.0038)	(0.0055)
# of Countries	180	180	180
Adjusted R^2	0.2677	0.3161	0.2779
Row 3			
Initial Point Estimate	0.0666**	0.0569**	0.0681*
	(0.0315)	(0.0266)	(0.0360)
Initial Point Estimate Squared	−0.0150**	−0.0141***	−0.0146**
	(0.0058)	(0.0052)	(0.0070)
# of Countries	171	171	171
Adjusted R^2	0.2351	0.2837	0.2616
Row 4			
Number of Times Covered	0.0052	0.0122***	0.0101*
	(0.0045)	(0.0031)	(0.0055)
# of Countries	195	195	195
Adjusted R^2	0.2107	0.2277	0.2857

Measuring Corruption: Standard Errors

Demographic Characteristics

Demographic characteristics.

	WGI-CC 2012	2013	2014
Row 1			
Population	−0.0119	−0.0083	−0.0237**
	(0.0106)	(0.0098)	(0.0109)
# of Countries	193	193	193
Adjusted R^2	0.2182	0.2186	0.2956
Row 2			
log GDP per capita (PPP)	0.3979**	0.2043	0.5599**
	(0.1689)	(0.1453)	(0.2202)
log GDP per capita (PPP) squared	−0.0557**	−0.0305	−0.0785***
	(0.0223)	(0.0193)	(0.0291)
# of Countries	185	185	185
Adjusted R2	0.2827	0.2730	0.3804
Row 3			
GDP Growth	0.0047	0.0034	0.0038
	(0.0032)	(0.0029)	(0.0026)
GDP Growth Squared	−0.0003	−0.0001	−0.0004
	(0.0003)	(0.0002)	(0.0003)
# of Countries	188	188	188
Adjusted R^2	0.2386	0.2464	0.2900
Row 4			
Education (Bachelor's degree or above)	−0.0036***	−0.0022**	−0.0026**
	(0.0012)	(0.0009)	(0.0013)
# of Countries	84	84	84
Adjusted R^2	0.2185	0.1039	0.2232

Measuring Corruption: Standard Errors

Political Characteristics

Political characteristics.

	WGI-CC 2012	2013	2014
Row 1			
Socialism	0.0067	0.0009	−0.0019
	(0.0097)	(0.0091)	(0.0115)
# of Countries	195	195	195
Adjusted R^2	0.2089	0.2107	0.2798
Row 2			
Democracy	0.0382**	0.0289	0.0318
	(0.0191)	(0.0187)	(0.0300)
Democracy squared	−0.0040**	−0.0034**	−0.0037
	(0.0017)	(0.0017)	(0.0028)
# of Countries	166	166	166
Adjusted R^2	0.1866	0.2337	0.1457
Row 3			
Media Freedom	−0.0613**	−0.0613***	−0.0376
	(0.0247)	(0.0222)	(0.0242)
# of Countries	171	171	171
Adjusted R^2	0.2386	0.2464	0.2900

Measuring Corruption: Standard Errors

Heterogeneity Characteristics

Heterogeneity characteristics.

	WGI-CC 2012	2013	2014
Row 1			
Ethnic Fractionalization	0.0103	0.0350	−0.0261
	(0.0256)	(0.0233)	(0.0312)
# of Countries	182	182	182
Adjusted R^2	0.2325	0.2493	0.2999
Row 2			
Religious Fractionalization	−0.0098	−0.0256	0.0044
	(0.0273)	(0.0246)	(0.0288)
# of Countries	188	188	188
Adjusted R^2	0.2351	0.2580	0.2985
Row 3			
Linguistic Fractionalization	−0.0012	0.0198	0.0109
	(0.0216)	(0.0186)	(0.0262)
# of Countries	181	181	181
Adjusted R^2	0.2151	0.2426	0.2723
Row 4			
Income Inequality	0.0012*	0.0016**	0.0019**
	(0.0006)	(0.0006)	(0.0009)
# of Countries	134	134	134
Adjusted R^2	0.2433	0.2778	0.2320

Meta-analysis

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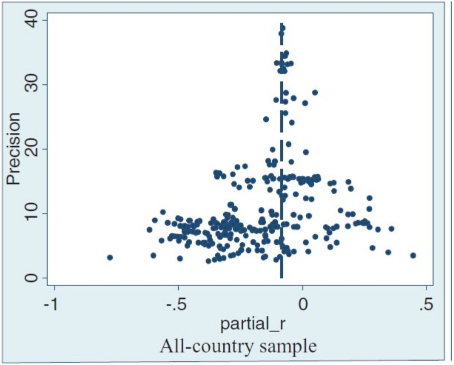
- 1,042 hits: title/abstract screening $\Longrightarrow$ 338 studies.
- Critical evaluation: validity, reliability, applicability criteria.
- Include 40 empirical studies:
  - 32 with estimates on per-capita GDP growth (29 with direct effects).
  - 8 with estimates on per-capita GDP levels. Not used.
- For the 29 studies: extract all direct-effects estimates.

Meta-analysis

Partial correlations of corruption on growth



$\Longrightarrow$ Meta-analytic estimate: -0.019* (0.010).

Meta-Analysis

- What explains heterogeneity in estimates?
- Several potential factors:
    - Method of study (OLS, IV) to solve endogeneity.
    - Averaging period length: effect might take time to materialize.
    - Level of development: less problematic at low levels?
    - Source of data: ICGR directly asks business decision-makers (not anti-corruption groups).
    - Publication type: published results might be biased toward finding strong effects.

Meta-Analysis

Precision	0.017
	(0.036)
Corruption data averaged	– 0.060***
over more than 5 years	(0.015)
Low-income countries	– 0.114***
	(0.020)
ICGR corruption data	0.065***
	(0.022)
Two-stage least-squares	0.023*
	(0.014)
Journal paper	-0.107***
	(0.017)
Constant	– 1.063***
	(0.218)
N	327

Plan of Session

- Does corruption affect development and how can institutions solve this problem?
  - Corrupted politicians and economic outcomes Prakash et al (2019)
  - Electoral accountability and corruption Ferraz and Finan (2011)

Corrupted Politicians and Economic Outcomes

Journal of Development Economics 141 (2019) 102370

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

ELSEVIER

Do criminally accused politicians affect economic outcomes? Evidence from India☆

Nishith Prakash[a,*], Marc Rockmore[b], Yogesh Uppal[c]

Corrupted Politicians and Economic Outcomes

- What is the cost of electing corrupted politicians?

Corrupted Politicians and Economic Outcomes

- What is the cost of electing corrupted politicians?
- What is the aggregate economic cost of electing criminally accused politicians to State Legislative Assemblies in India in 2004–2008?
  - Leverage Supreme Court of India order that all candidates disclose criminal background before 2004 elections.
  - Measure constituency-level economic activity using satellite data on the intensity of night-time lights.
  - Compare outcomes in constituencies that barely elected a criminally accused candidate vs not.
  - Find that criminally accused politicians have large negative effects on economic activity within constituencies.

Background

- Elected representatives in India:
  - Each Indian State has a Legislative Assembly with single member constituencies (5 year terms).
  - MLAs hold legislative, financial, executive powers, control the state bureaucracy, promotions, and job assignments.
  - They play a key role in allocation of funds for development projects, distribution of licenses, and have access to discretionary funds.

Background

- Elected representatives in India:
  - Each Indian State has a Legislative Assembly with single member constituencies (5 year terms).
  - MLAs hold legislative, financial, executive powers, control the state bureaucracy, promotions, and job assignments.
  - They play a key role in allocation of funds for development projects, distribution of licenses, and have access to discretionary funds.
- Corruption and criminality in Indian politics:
  - $100s of bn of corruption.
  - To combat criminalization of Indian politics, all candidates required to issue criminal convictions and charges since 2003.
  - In 2012, 30% of MLAs face criminal charges.

Empirical Strategy

- Main challenge: victory of corrupt unlikely random, hence bias when comparing constituencies.
- Identification strategy:
  - RD design based on victory margin (difference between accused winner and non-accused runner-up, and vice versa).
  - Compare constituencies in which accused barely won vs those in which accused barely lost.
  - Assumption: unobservables vary continuously across threshold.

Empirical Strategy

- Specification:

$$\mathrm{GROWTH}_{i,s,t+1} = \alpha + \gamma \mathrm{ACCUSED}_{i,s,t} + f\left(\mathrm{MARGIN}_{i,s,t}\right) + \mu_{i,s,t+1}$$

  - $\mathrm{MARGIN}_{i,s,t} \in (c-h, c+h)$ where $c=0$ and h is bandwidth.
  - $\mathrm{GROWTH}_{i,s,t+1}$ is yearly growth rate in constituency i, state s, year $t+1$, defined as $\log\left(Y_{i,s,t+1}\right) - \log\left(Y_{i,s,t}\right)$.
  - $\mathrm{ACCUSED}_{i,s,t}$ is the treatment.
  - $f(\cdot)$ is a flexible polynomial in forcing variable.

Data: Night Lights

- Need measurement at the state assembly constituency level.
- Proxy by night lights density:
    - Shown to be a proxy for development in developing countries (correlation with income of 0.6).
    - Available from NASA Meterological Satellites for each year since 1992.
    - Image for 1km squares.
    - Density: sum of light values from all pixels within constituency divided by area (aggregate).
- Also use length of roads built under a rural roads construction program as proxy for public goods provision at constituency level.

Data: Elections and Corruption

- Election Commission of India:
  - Data on constituencies, candidates, turnout, results.
  - Accusation information, along with number of criminal cases and charges.
- Focus on state elections between 2004 and 2008.
- Restrict to constituencies in which top-2 candidates are criminally accused and non-accused.
- Characteristics are balanced within a 5% margin.

Validity of RD Design

Table 2
Balance test on pre-determined characteristics.

	Top-2 Mixed Sample			Top-2 Mixed Sample within 5% margin		
	Criminal	Non-Criminal	Diff.	Criminal	Non-Criminal	Diff.
Growth of Light in (t-1)	21.988	33.736	−11.748**	26.037	24.503	1.534
	(110.02)	(142.45)	(5.98)	(89.16)	(110.66)	(11.39)
Log Light in (t-1)	10.467	10.788	−0.321***	10.7	10.937	−0.237
	(2.33)	(1.65)	(0.12)	(1.40)	(1.41)	(0.16)
Road Length (kms) in (t-1)	11.915	9.52	2.395	8.178	9.777	−1.599
	(25.06)	(10.54)	(1.74)	(6.52)	(9.94)	(1.35)
Log Electorate Size in (t-1)	11.7	12.065	−0.364***	12.085	12.079	0.005
	(0.85)	(0.41)	(0.04)	(0.44)	(0.39)	(0.05)
Log Number Voted in (t-1)	11.277	11.61	−0.332***	11.608	11.617	−0.009
	(0.78)	(0.37)	(0.04)	(0.37)	(0.36)	(0.04)
Turnout in (t-1)	66.665	64.496	2.169***	63.042	64.043	−1.002
	(12.11)	(11.13)	(0.61)	(10.35)	(11.12)	(1.22)
SC Reserved	0.142	0.126	0.016	0.12	0.072	0.048
	(0.35)	(0.33)	(0.02)	(0.33)	(0.26)	(0.03)
ST Reserved	0.136	0.05	0.086***	0.032	0.026	0.005
	(0.34)	(0.22)	(0.02)	(0.18)	(0.16)	(0.02)
Ruling Party in (t-1)	0.572	0.576	−0.004	0.475	0.526	−0.052
	(0.50)	(0.50)	(0.03)	(0.50)	(0.50)	(0.06)
Incumbent in (t-1)	0.376	0.439	−0.063**	0.354	0.375	−0.021
	(0.48)	(0.50)	(0.03)	(0.48)	(0.49)	(0.06)
Winner's Gender in (t-1)	0.065	0.057	0.008	0.07	0.072	−0.003
	(0.25)	(0.23)	(0.01)	(0.26)	(0.26)	(0.03)
Runner-up's Gender in (t-1)	0.067	0.048	0.019	0.051	0.046	0.005
	(0.25)	(0.21)	(0.01)	(0.22)	(0.21)	(0.02)

NOTES: Top-2 mixed sample includes candidates with 1 criminally accused against 1 non-accused in the top 2. Columns (3) and (6) have standard errors of the difference in the means of accused and non-accused MLAs in the parentheses. Asterisks denote significance levels (* = 0.10, ** = 0.05, *** = 0.01).

Validity of RD Design

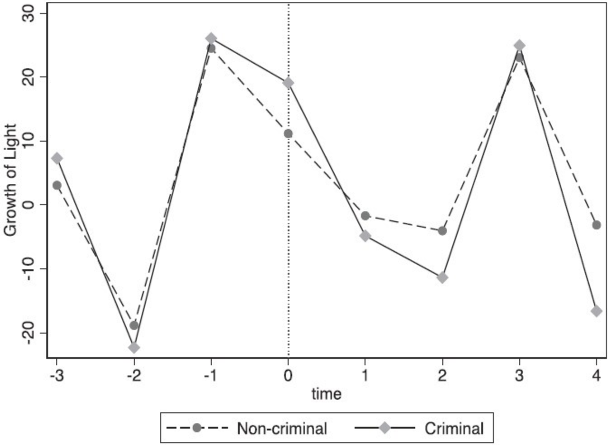
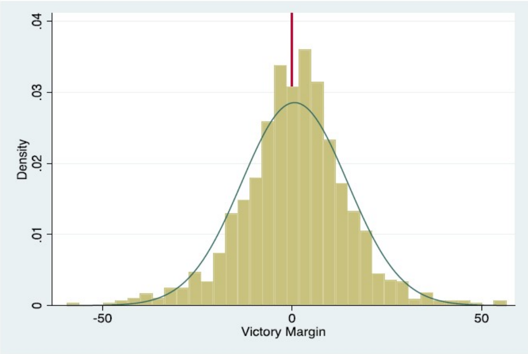


Fig. 1. Event Study: Effect of Electing Criminally Accused Politicians on Growth of Night Lights. Each line plot represents the raw averages of the growth of light density for that year in relation to t = 0, which is the year of the election.

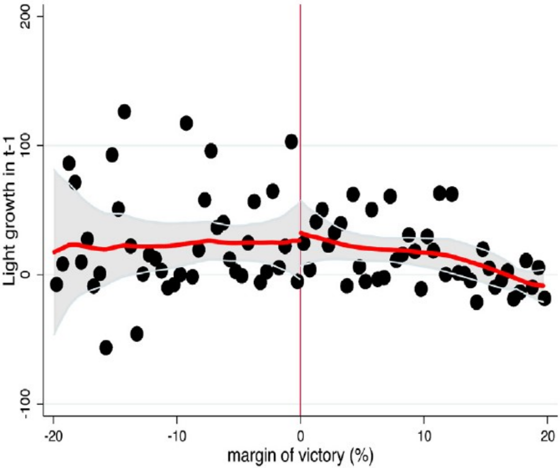
Validity of RD Design



(b) Density of the Victory Margin

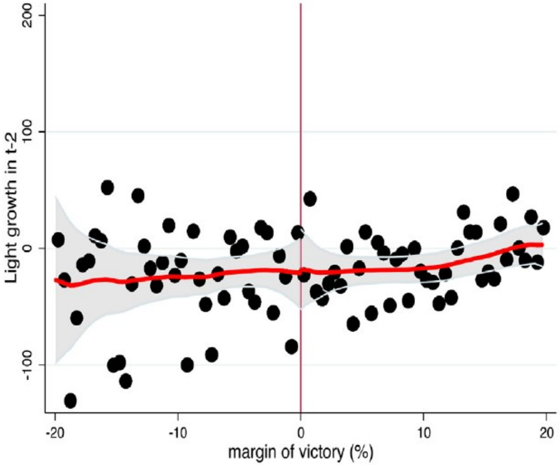
Fig. 2. Continuity of the Victory Margin between Criminally Accused and Non-Accused. The forcing variable is the margin of victory of a criminally-accused candidate. Negative values are the difference in the vote shares of a criminally-accused runners-up and a non-accused winner. Positive values are the differences in the vote shares of a criminally-accused winner and a non-accused runners-up. The estimated size of discontinuity in margin of victory (log difference in height) is -0.041 (se $= 0.089$).

Validity of RD Design



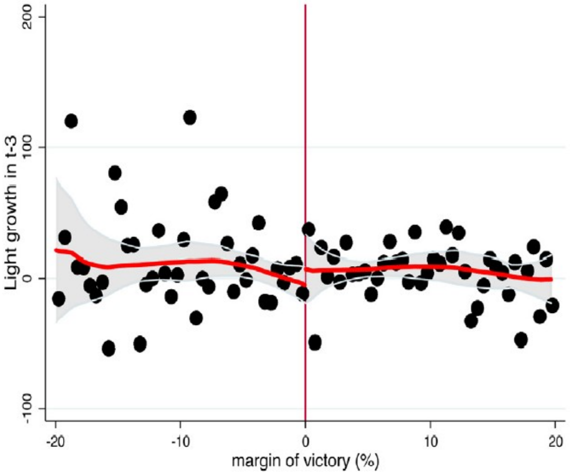
(a) Growth of Light in t-1

Validity of RD Design



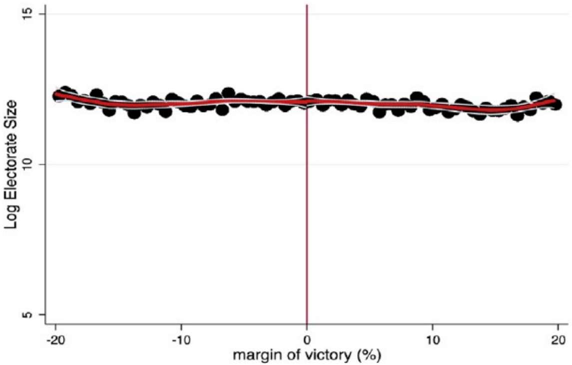
(b) Growth of Light in t-2

Validity of RD Design

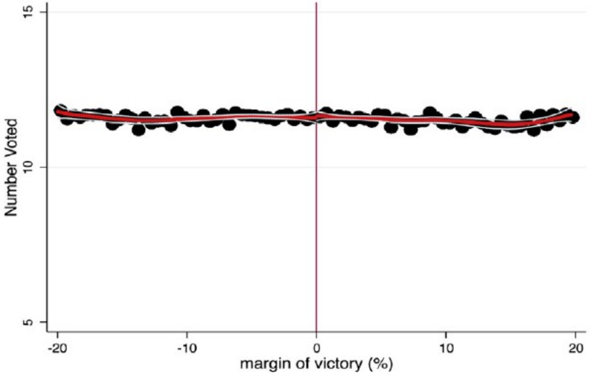


(c) Growth of Light in t-3

Validity of RD Design

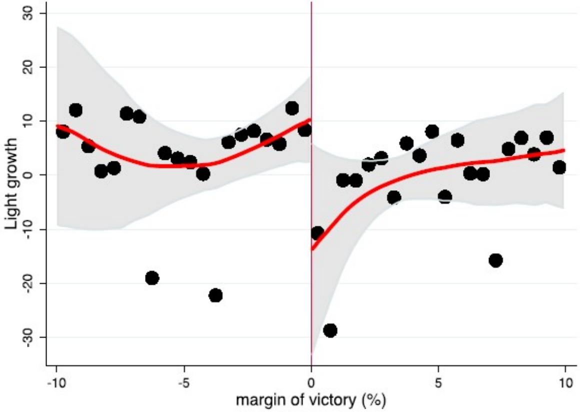


(d) Electorate Size in t-1



(e) Number Voted in t-1

Results



Results

Table 3
Effect of electing criminally accused politicians on growth of night lights.

Dependent Variable	Growth of Night Lights			
	(1)	(2)	(3)	(4)
	Panel A			
Criminally Accused	−24.33**	−21.56**	−28.36*	−14.75**
	(10.23)	(8.83)	(15.52)	(6.30)
Bandwidth Size	6.16	7.79	3.08	12.32
No. of observations	1513	1742	744	2429
Bandwidth Type	IK (h)	CCT	h/2	2h
Polynomial order of control function	Local Linear			
	Panel B			
	Estimated Percentage Change in GDP			
Bickenbach et al. (2016) India-specific elasticity (0.10)	−2.4	−2.2	−2.8	−1.5

Results

Table 4
Effect of electing criminally accused politicians by accusation type.

Dependent Variable	Growth of Night Lights							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PANEL A								
Type of Accusation	Financial Charge				Non-Financial Charge			
Local Linear	−43.84**	−34.73**	−52.01**	−26.29**	−12.19	−12.58	−18.25	−5.76
	(18.77)	(15.87)	(26.29)	(12.20)	(8.91)	(9.37)	(15.51)	(5.27)
Bandwidth Size	8.04	10.27	4.02	16.08	8.59	8.04	4.30	17.19
No. of observations	519	632	278	867	1312	1272	736	2000
PANEL B								
Type of Accusation	Serious Charge				Non-Serious Charge			
Local Linear	−25.98***	−24.80***	−20.31*	−15.09**	−15.28	−15.64	−22.59	−11.49
	(9.82)	(8.97)	(11.65)	(6.83)	(14.18)	(14.81)	(28.27)	(8.43)
Bandwidth Size	5.94	7.05	2.97	11.89	12.72	12.22	6.36	25.44
No. of observations	1016	1125	511	1576	809	785	473	1051
Bandwidth Type	IK (h)	CCT	h/2	2h	IK (h)	CCT	h/2	2h
PANEL C								
Estimated Percentage Change in GDP								
	Financial Charge				Non-Financial Charge			
Bickenbach et al. (2016) Indian-specific elasticity (0.10)	−4.4	−3.5	−5.2	−2.6	−1.2	−1.3	−1.8	−0.6
	Serious Charge				Non-Serious Charge			
Bickenbach et al. (2016) India-specific elasticity (0.10)	−2.6	−2.5	−2.0	−1.5	−1.5	−1.6	−2.3	−1.1

Results

Table 5
Effect of electing criminally accused politicians by multiple cases.

Dependent Variable	**Growth of Night Lights**							
Type of Accusation	Multiple Cases (≥ 2)				Multiple Cases (≥ 5)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local Linear	-32.10^{***}	-27.71^{**}	-32.84^{**}	-19.67^{**}	-66.47^{**}	-51.81^{**}	-90.15^{**}	-43.39^{**}
	(12.30)	(11.25)	(15.86)	(8.36)	(27.09)	(22.99)	(36.57)	(18.88)
Bandwidth Size	7.05	8.47	3.52	14.09	7.29	10.50	3.65	14.58
No. of observations	770	870	393	1193	214	266	106	306
Bandwidth Type	IK (h)	CCT	h/2	2h	IK (h)	CCT	h/2	2h

Results

Table 6
Effect of electing criminally accused politicians by state characteristics.

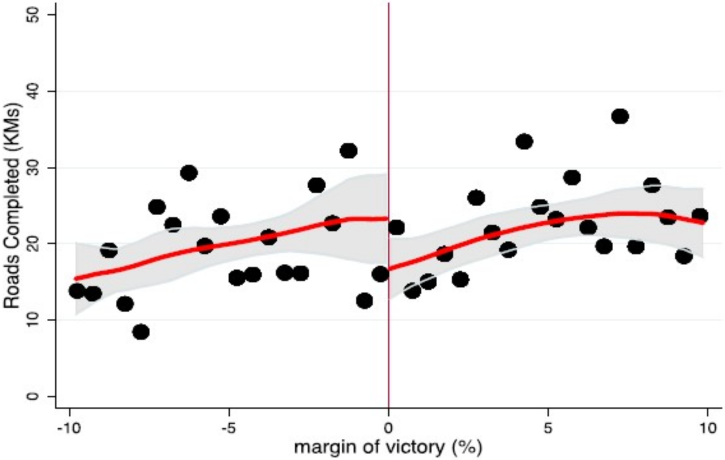
Dependent Variable	Growth of Night Lights			
	(1)	(2)	(3)	(4)
	PANEL A: BIMAROU States			
Criminally Accused	−50.68**	−44.01**	−47.52	−29.52**
	(22.49)	(19.80)	(30.52)	(14.44)
Bandwidth Size	4.90	5.88	2.45	9.80
No. of observations	472	579	269	825
	PANEL B: Least Developed States			
Criminally Accused	−46.34**	−46.08**	−51.37*	−25.59*
	(21.08)	(20.98)	(30.19)	(13.36)
Bandwidth Size	5.92	5.96	2.96	11.83
No. of observations	567	571	308	894
	PANEL C: High Corruption States			
Criminally Accused	−57.07**	−53.87**	−68.34	−36.78**
	(28.57)	(25.86)	(44.57)	(18.08)
Bandwidth Size	6.09	7.37	3.05	12.19
No. of observations	432	478	210	691
Bandwidth Type	IK (h)	CCT	h/2	2h
Polynomial order of control function	Local Linear			

Results

Table 7
Effect of electing criminally accused politicians by candidate characteristics.

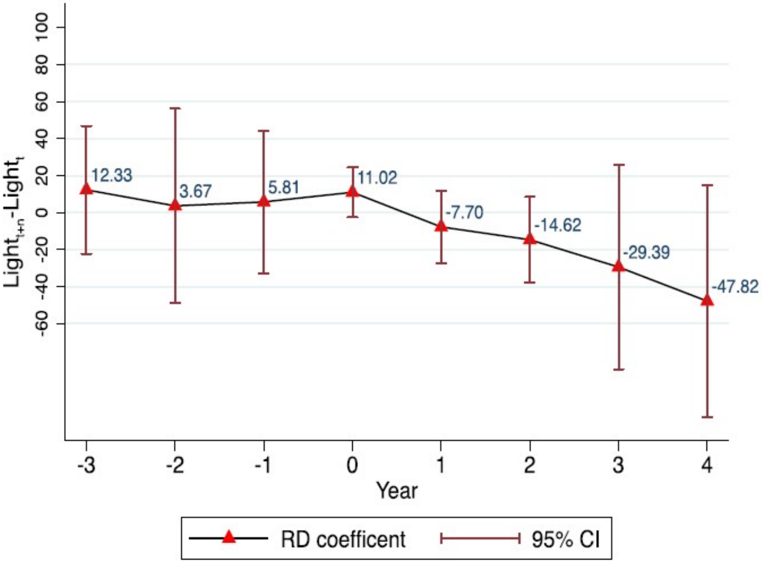
Dependent Variable	Growth of Night Lights							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PANEL A								
	Ruling Party				Non-Ruling Party			
Criminally Accused	1.71	0.48	−1.40	3.05	−53.35**	−41.59***	−61.26*	−34.41***
	(3.86)	(4.11)	(4.94)	(3.42)	(21.42)	(15.74)	(32.48)	(12.85)
Bandwidth Size	11.81	8.48	5.90	23.62	5.08	7.76	2.54	10.15
No. of observations	1150	932	683	1782	659	889	367	1063
PANEL B								
	Above Median Wealth				Below Median Wealth			
Criminally Accused	−11.01	−10.48	−18.15	−7.89	−33.51**	−29.56**	−29.04	−19.92**
	(9.12)	(7.53)	(15.83)	(5.82)	(14.61)	(12.50)	(17.96)	(9.58)
Bandwidth Size	11.21	14.5	5.6	22.42	5.93	7.75	2.97	11.87
No. of observations	1154	1314	698	1570	731	870	379	1151
PANEL C								
	College Educated				Below College Educated			
Criminally Accused	−20.86	−18.55	−26.65	−11.64	−19.39*	−22.04*	−32.23*	−12.64*
	(13.33)	(11.42)	(21.21)	(8.21)	(10.36)	(11.93)	(16.93)	(7.14)
Bandwidth Size	6.61	8.54	3.31	13.22	10.30	8.61	5.15	20.59
No. of observations	887	1041	440	1384	961	821	554	1409
Bandwidth Type	IK (h)	CCT	h/2	2h	IK (h)	CCT	h/2	2h

Results



Roads Completed (KMs)
50
40
30
20
10
0
-10
-5
0
5
10
margin of victory (%)

Results



Light$_{t+n}$-Light$_t$
100
80
60
40
20
0
-20
-40
-60
12.33
3.67
5.81
11.02
-7.70
-14.62
-29.39
-47.82
-3
-2
-1
0
1
2
3
4
Year
RD coefficent
95% CI

Electoral Accountability and Corruption

American Economic Review 101 (June 2011): 1274–1311
http://www.aeaweb.org/articles.php?doi=10.1257/aer.101.4.1274

Electoral Accountability and Corruption: Evidence from the Audits of Local Governments

By Claudio Ferraz and Frederico Finan*

Electoral Accountability and Corruption

Ferraz and Finan (2011)

- Can political institutions mitigate corruption?

Electoral Accountability and Corruption

Ferraz and Finan (2011)

- Can political institutions mitigate corruption?
- Can electoral accountability mitigate corruption in local governments in Brazil in 2001–2004?

Electoral Accountability and Corruption

Ferraz and Finan (2011)

- Can political institutions mitigate corruption?
- Can electoral accountability mitigate corruption in local governments in Brazil in 2001–2004?
    - Measure corruption through audits of municipalities for use of federal funds.
    - Compare mayors serving in first vs second term (term limited).
    - Find that reelection incentives reduce corruption.

Theoretical Framework

- Political agency framework Besley (2006):
  - Two types of political candidates: corrupt and non-corrupt.
  - All provide public goods, but corrupt extract rents.
  - Two periods, with voters infer actions of incumbent in period 1.
  - Corrupt incumbents have incentives to reduce rent extraction to pass for an non-corrupt politician and be reelected.

$\Longrightarrow$ Second term mayors should be more corrupt than first term mayors.

Institutional Background

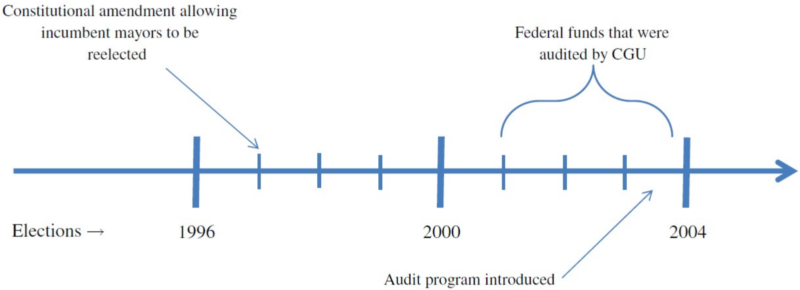


FIGURE 1. TIMELINE OF THE ELECTORAL CYCLES AND AUDIT TIMING

Institutional Background

- Brazilian mayors and their political horizons:
  - Decentralization: \$35 bn federal funds to local governments per year.
  - Mayors decide how to spend these resources subject to some oversight.
  - 73% run for reelection, but only 40% are reelected, so strong incentives to perform well in office.

Institutional Background

- Brazilian mayors and their political horizons:
  - Decentralization: $35 bn federal funds to local governments per year.
  - Mayors decide how to spend these resources subject to some oversight.
  - 73% run for reelection, but only 40% are reelected, so strong incentives to perform well in office.
- Corruption schemes in Brazil's municipalities:
  - Fraud in procurement of goods and services, such as noncompetitive procurement process.
  - Diversion of funds to purchase cars, apartments, pay friends' salaries.
  - Overinvoicing.

Institutional Background

- Brazil's anticorruption audit program:
  - In 2003, anticorruption program: random auditing of municipal government expenditures.
  - Total of 496 audited municipalities, randomly selected in each state ($>$ 450m residents).
  - Audits all federal funds transferred to the municipal government from 2001 onward.
  - Report publicized and officials prosecuted.

Data: Corruption

- Define corruption as any irregularity in fraud, diversion, or overinvoicing per the reports.
- Measures of corruption:
  - Amount of resources related to corrupt activities as a share of total amount of resources audited.
  - Number of irregularities related to corruption.
  - Share of service items associated with corruption.

Data: Corruption

TABLE 1—SUMMARY STATISTICS OF CORRUPTION BY TYPE

	Type of irregularity				
	Diversion of funds	Illegal procurement	Overinvoicing	Corruption indicator	Mismanagement
Proportion of municipalities with at least one irregularity	0.536 (0.499)	0.576 (0.495)	0.071 (0.258)	0.786 (0.411)	0.986 (0.116)
Conditional on at least one irregularity					
Average number of irregularities	1.686 (1.006)	1.657 (0.945)	1.029 (0.171)	2.457 (1.554)	n/a
Average value of irregularity (R$)	159,205.20 (324,303.8)	291,431.50 (578,272.1)	60,670.14 (166,733.8)	327,573.10 (627,514.2)	n/a
Share of audited resources	0.041 (0.072)	0.070 (0.093)	0.015 (0.036)	0.080 (0.109)	n/a
Share of audited items	0.047 (0.036)	0.045 (0.028)	0.029 (0.012)	0.067 (0.050)	1.647 (1.154)

Notes: This table reports descriptive statistics on the various measures of corruption computed from the audit reports. These statistics presented in columns 1–4 were computed for our sample of 476 municipalities. In column 5, the statistics were computed for 366 municipalities. Standard deviations are reported in parentheses.

Data: Corruption

TABLE 2— SUMMARY STATISTICS OF CORRUPTION BY FIRST- AND SECOND-TERM MAYORS

	Share of audited resources			Incidence of irregularities			Share of audited items		
	First term (1)	Second term (2)	Difference (3)	First term (4)	Second term (5)	Difference (6)	First term (7)	Second term (8)	Difference (9)
Diversion of funds	0.021	0.022	0.001 [0.005]	0.852	0.971	0.119 [0.103]	0.024	0.026	0.002 [0.003]
Illegal procurement	0.033	0.050	0.017 [0.007]	0.837	1.107	0.270 [0.100]	0.023	0.029	0.006 [0.003]
Overinvoicing	0.001	0.002	0.001 [0.001]	0.074	0.073	−0.001 [0.025]	0.002	0.002	0.000 [0.001]
Corruption	0.055	0.074	0.019 [0.009]	1.763	2.150	0.388 [0.157]	0.050	0.057	0.008 [0.005]

Notes: This table compares the various measures of corruption between first- and second-term mayors. These statistics were computed only for the 476 municipalities. Columns 1, 4, and 7 report the means for the 270 municipalities with a first-term mayor. Columns 2, 5, and 8 report the mean for the 206 municipalities with a second-term mayor. Columns 3, 6, and 9 report the difference in means, and robust standard errors of the difference are presented in brackets.

Data: Municipal and Mayor Characteristics

- Municipal characteristics: population, share urban, share with secondary schooling, GDP per capita, Gini, transfers.
- Mayor characteristics: gender, schooling, age.
- Political characteristics: legislators per voter, number of parties legislature, margin of victory in 2000, share legislators in mayor's party, number of audited items, total resources audited.
- Very few differences in characteristics between first and second-term mayors.

Empirical Strategy

- Ideal experiment: randomly assign possibility of reelection across municipalities and measure difference in corruption levels across groups among first-term mayors.

Empirical Strategy

- Ideal experiment: randomly assign possibility of reelection across municipalities and measure difference in corruption levels across groups among first-term mayors.

- Here: compare mayor in first term to mayors in second term:

$$r_i = \beta I_i + \mathbf{X}_i \phi + \mathbf{Z}_i \gamma + \varepsilon_i$$

  - r_i: level of corruption in municipality i.
  - I_i: indicator for first-term mayor.
  - $\mathbf{X}_i$: municipal characteristics.
  - $\mathbf{Z}_i$: mayor characteristics.

Empirical Strategy

- Identification challenges:
  - Without random assignment, unobserved characteristics of municipality and mayor may affect both reelection and corruption (political ability or campaigning effort).
  - Effect of experience of second term on corruption.

Empirical Strategy

- Strategy: electoral RDD.
    - Compare municipalities where incumbent mayors barely won reelection in 2000 (term 2 in 2001–2004) to municipalities where incumbent barely lost (term 1 in 2001–2004).
    - Creates quasi-random assignment of municipalities with first vs second term mayors.
    - Control for unobservable characteristics of municipality that determine both reelection and corruption level (ideology of voters).

Empirical Strategy

- Strategy: electoral RDD.
    - Compare municipalities where incumbent mayors barely won reelection in 2000 (term 2 in 2001–2004) to municipalities where incumbent barely lost (term 1 in 2001–2004).
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  - Control for unobservable characteristics of municipality that determine both reelection and corruption level (ideology of voters).
- Control for political ability: compare second-term mayors to first-term mayors who were reelected in 2004.
- Control for experience: gather data on political position held since 1989, and compare second-term mayors to first-term mayors who had previous political experience.

Empirical Results

TABLE 4—THE EFFECTS OF REELECTION INCENTIVES ON CORRUPTION

Dependent variable	Share of audited resources involving corruption							
	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	Matching (7)	Tobit (8)
Mayor in first term	−0.019	−0.020	−0.020	−0.024	−0.026	−0.027	−0.028	−0.042
	[0.009]**	[0.010]**	[0.010]**	[0.011]**	[0.011]**	[0.011]**	[0.010]**	[0.012]**
R^2	0.01	0.08	0.10	0.12	0.14	0.20	n/a	n/a
Observations	476	476	476	476	476	476	476	476
Mayor characteristics	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal characteristics	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Political and judicial institutions	No	No	No	Yes	Yes	Yes	Yes	Yes
Lottery intercepts	No	No	No	No	Yes	Yes	Yes	Yes
State intercepts	No	No	No	No	No	Yes	Yes	Yes

Empirical Results

TABLE 5—THE EFFECTS OF REELECTION INCENTIVES ON ALTERNATIVE MEASURES OF CORRUPTION

Dependent variable	Numbers of irregularities involving corruption				Share of audited items involving corruption			
	OLS (1)	OLS (2)	Matching (3)	Negative bionomial (4)	OLS (5)	OLS (6)	Matching (7)	Tobit (8)
Mayor in first term	−0.388 [0.158]**	−0.471 [0.148]***	−0.339 [0.146]**	−0.456 [0.127]**	−0.008 [0.005]	−0.011 [0.004]**	−0.010 [0.005]*	−0.009 [0.005]*
R^2	0.01	0.43	n/a	n/a	0.01	0.45	n/a	n/a
Observations	476	476	476	476	476	476	476	476
Mayor characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Municipal characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Political and judicial institutions	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Lottery intercepts	No	Yes	Yes	Yes	No	Yes	Yes	Yes
State intercepts	No	Yes	Yes	Yes	No	Yes	Yes	Yes

Empirical Results

TABLE 6— THE EFFECT OF REELECTION INCENTIVES ON CORRUPTION, CONTROLLING FOR UNOBSERVED MUNICIPAL CHARACTERISTICS

Dependent variable	Share of audited resources involving corruption						
	Incumbents who run for reelection in 2000 (1)	Linear (2)	Quadratic (3)	Cubic (4)	Linear spline (5)	Quadratic spline (6)	Cubic spline (7)
Mayor in first term	−0.031	−0.039	−0.040	−0.038	−0.043	−0.047	−0.028
	[0.014]**	[0.019]**	[0.019]**	[0.022]*	[0.019]**	[0.024]*	[0.029]
Observations	328	328	328	328	328	328	328
R^2	0.27	0.27	0.27	0.27	0.27	0.28	0.28
Mayor characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Political and judicial institutions	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lottery intercepts	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State intercepts	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Empirical Results

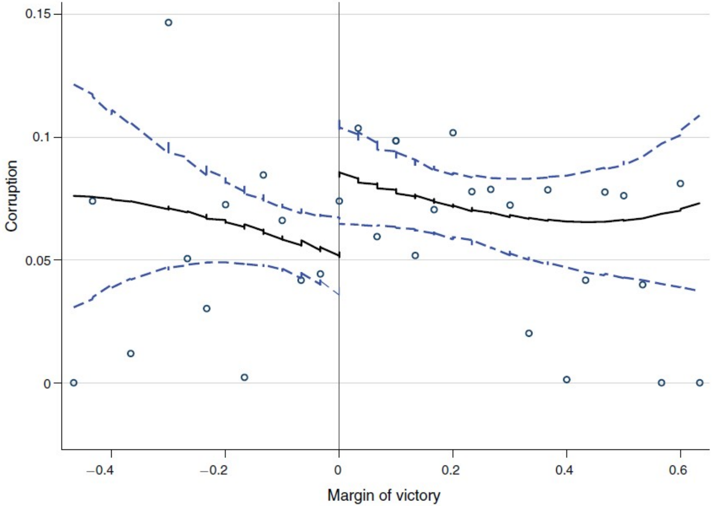

FIGURE 2. THE EFFECTS OF REELECTION INCENTIVES ON CORRUPTION

Empirical Results

Table 7—The Effect of Reelection Incentives on Corruption Controlling for Ability and Experience

Dependent variable	Share of audited resources involving corruption					
	Second-term and first-term later reelected (1)	Second-term and first-term later reelected *predicted* (2)	Full sample (3)	Full sample (4)	Second-term and first-term that served as previous mayors (5)	Second-term and first-term that served as mayor or legislator in past (6)
Mayor in first-term	−0.04 [0.013]***	−0.034 [0.018]*	−0.027 [0.012]**	−0.030 [0.012]**	−0.038 [0.014]***	−0.027 [0.017]
Mayor with political experience			−0.007 [0.011]			
Number of years in political office				0.008 [0.007]		
Number of years in political office²				−0.002 [0.001]		
R^2	0.27	0.29	0.21	0.21	0.30	0.29
Observations	313	294	476	476	287	311
Mayor characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Municipal characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Political and judicial institutions	Yes	Yes	Yes	Yes	Yes	Yes
Lottery intercepts	Yes	Yes	Yes	Yes	Yes	Yes
State intercepts	Yes	Yes	Yes	Yes	Yes	Yes

Conclusion

- Evidence that reelection incentives reduce corruption.
- Electoral rules that enhance political accountability play a crucial role in constraining politicians even in context of pervasive corruption.
- Allowing citizens to have better information about policy information and corruption practices is a possible reform.