Thinking about the Rise and Decline of Nations

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June 2005

Introduction

- Many scholars have noted a pattern of "rise and decline"; previously advanced civilizations collapse, while others prosper.
- Prominent examples include:
  - The declines of the Roman Empire, the Egyptian empire, the Chinese Empire in the ancient times.
  - The decline of Venice and Genoa and the rise of England and the Dutch Republic (and then the decline of the Dutch Republic).
  - The decline of Inca and Aztec empires and the rise of the civilizations in North America in the New World.
- Existing theories:
  - Building up of social rigidities (Olson).
  - Military over-expansion (Kennedy).

This Talk

- A different perspective on the rise and decline.
- Main idea: institutions appropriate (or only marginally costly) under certain circumstances become more costly later.
- Thus a theory of interactions between institutions and economic opportunities.
- Indirectly about:
  - the costs and benefits of the different economic (political) systems?
  - the potential for change and flexibility within given institutional environments.

Plan of Talk

- Two examples of "rise and decline".
  - Caribbean versus Northeast America (within a broader "reversal of fortune" among former European colonies).
  - Venice and Spain versus England and the Dutch Republic.
- A Model of oligarchy versus democracy.
  - Key trade-off between protecting the property rights of incumbents versus creating a level playing field for non-incumbents.
  - Dynamic distortion of "oligarchy".

The Reversal of Fortune

- Use of urbanization and density of population before European colonization as a proxy for income per capita and how advanced pre-colonial civilizations are.
- Robust negative relationship between income today and urbanization in 1500 among the former colonies.
- Robust negative relationship between income today and log population density in 1500.
- Not due to any geographic variable, or identity of colonial power.
- When urbanization and population density both included, population density is the main determinant.

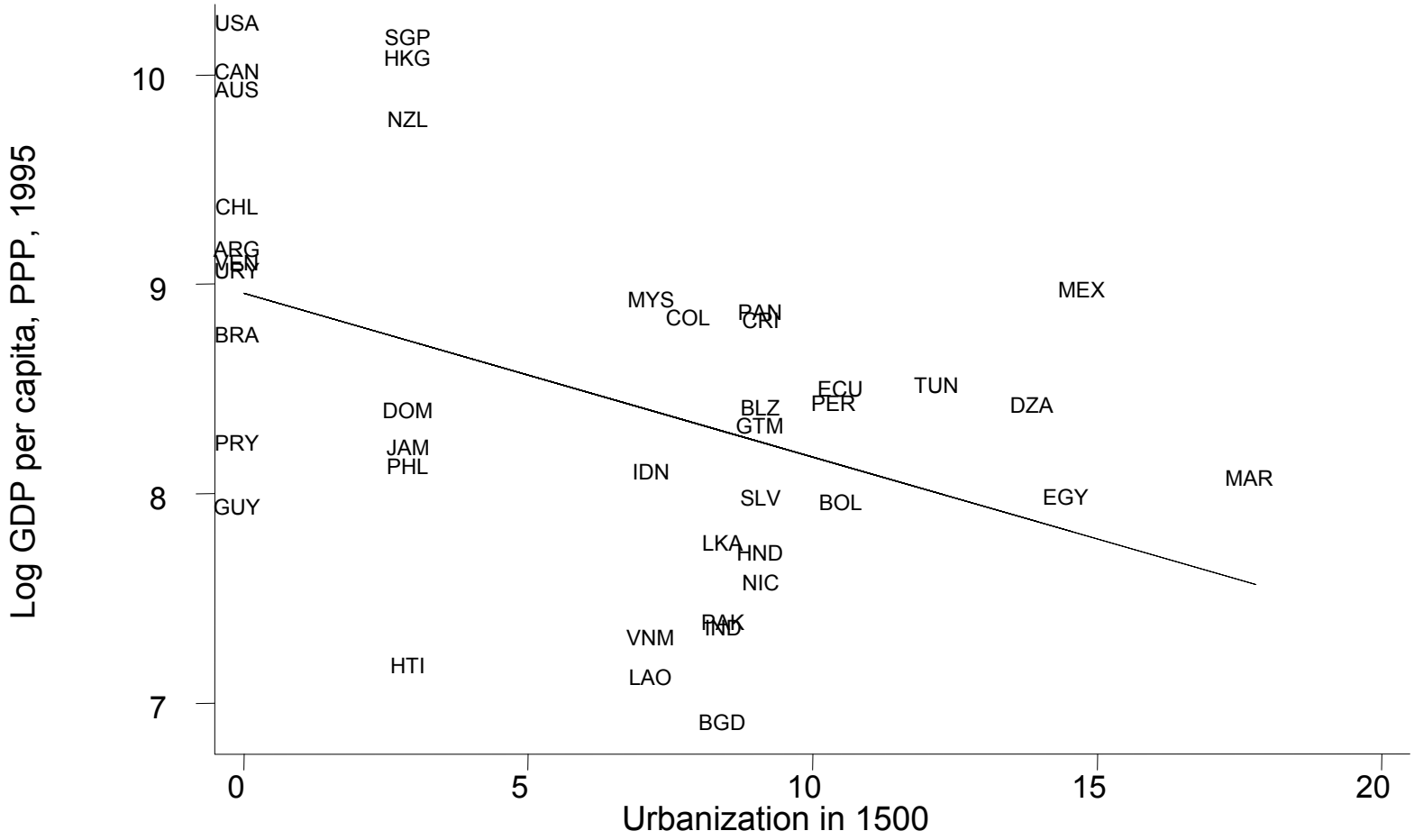


Figure I. Log GDP per capita (PPP) in 1995 against Urbanization rate in 1500

Note: GDP per capita is from the World Bank (1999); urbanization in 1500 is people living in towns with more than 5,000 inhabitants divided by total population, from Bairoch (1988) and Eggimann (1999). Details are in Appendix A and Appendix Table A1.

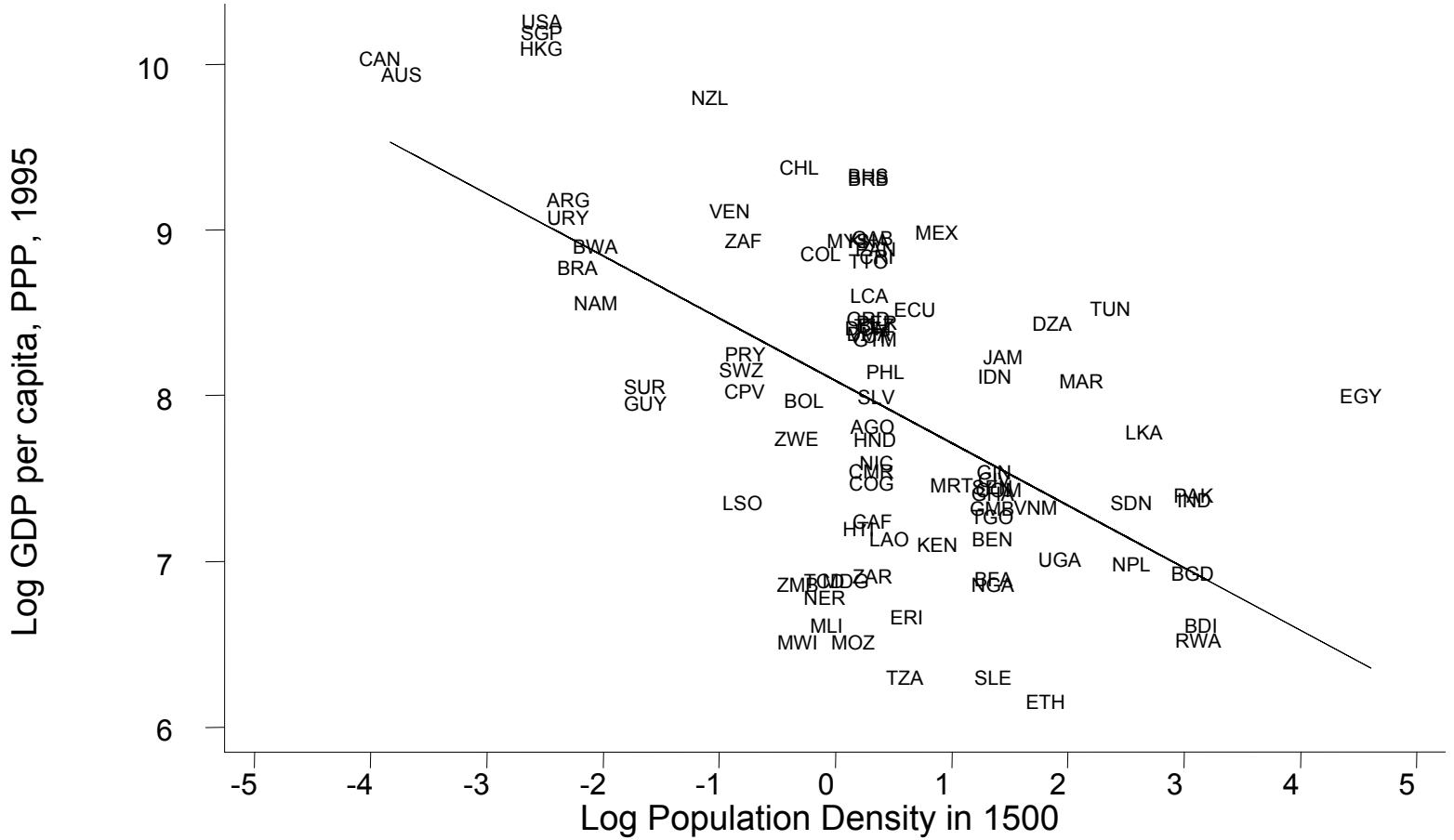


Figure II. Log GDP per capita (PPP) against log population density in 1500.

Note: GDP per capita from the World Bank (1999); log population density in 1500 from McEvedy and Jones (1978). Details are in Appendix Table A1.

The Timing and Nature of the Reversal

- When did the reversal take place?
- Not when the Europeans plundered the previously rich societies or killed of their populations.
- In the 19th century, and intimately related to industrialization.

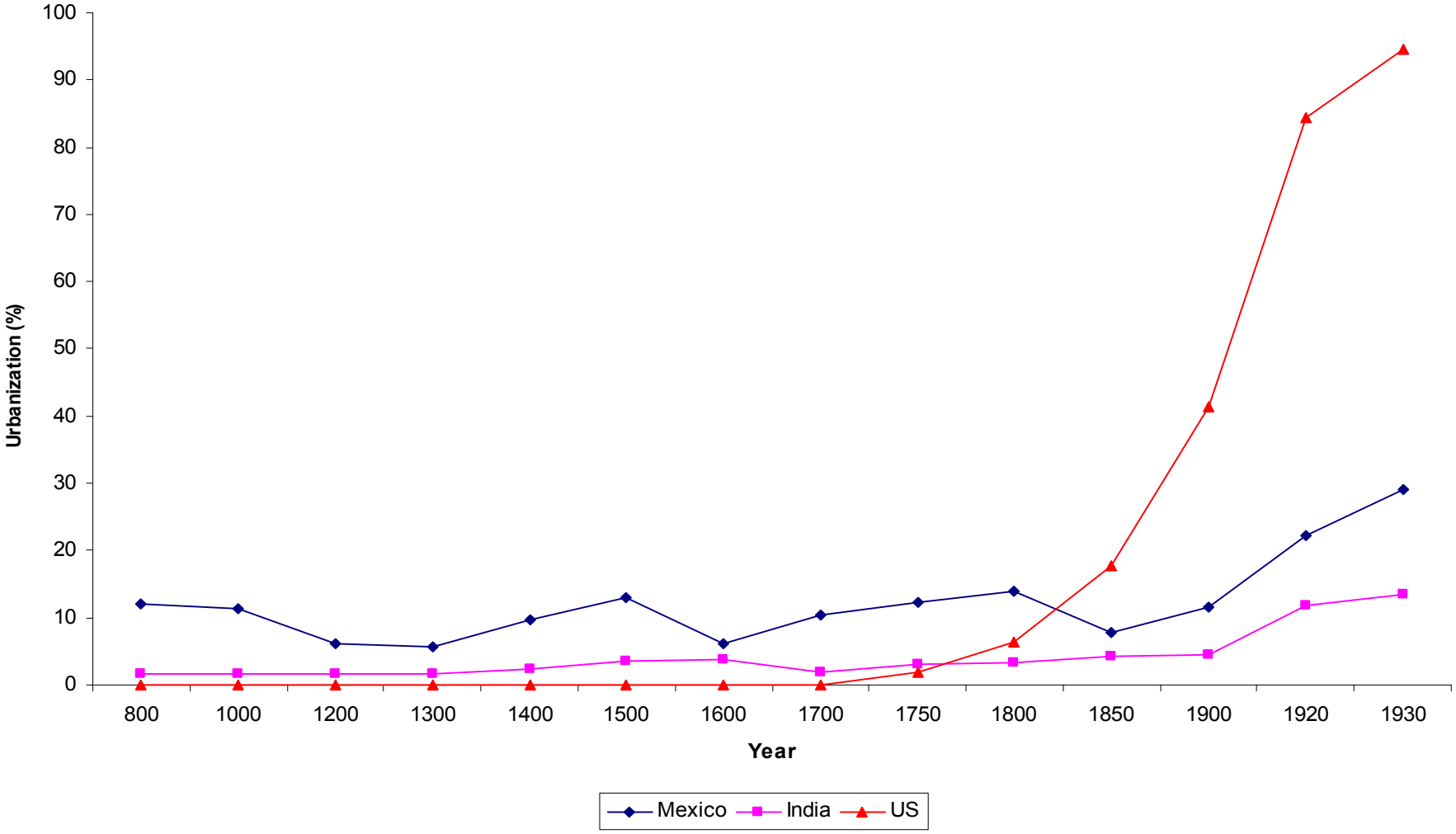


Figure IVA. Urbanization rate in Mexico, India and the USA, 800-1930

Note: Urbanization is population living in urban areas divided by total population, from Chandler (1987), Mitchell (1993 and 1995), and the UN (1969).

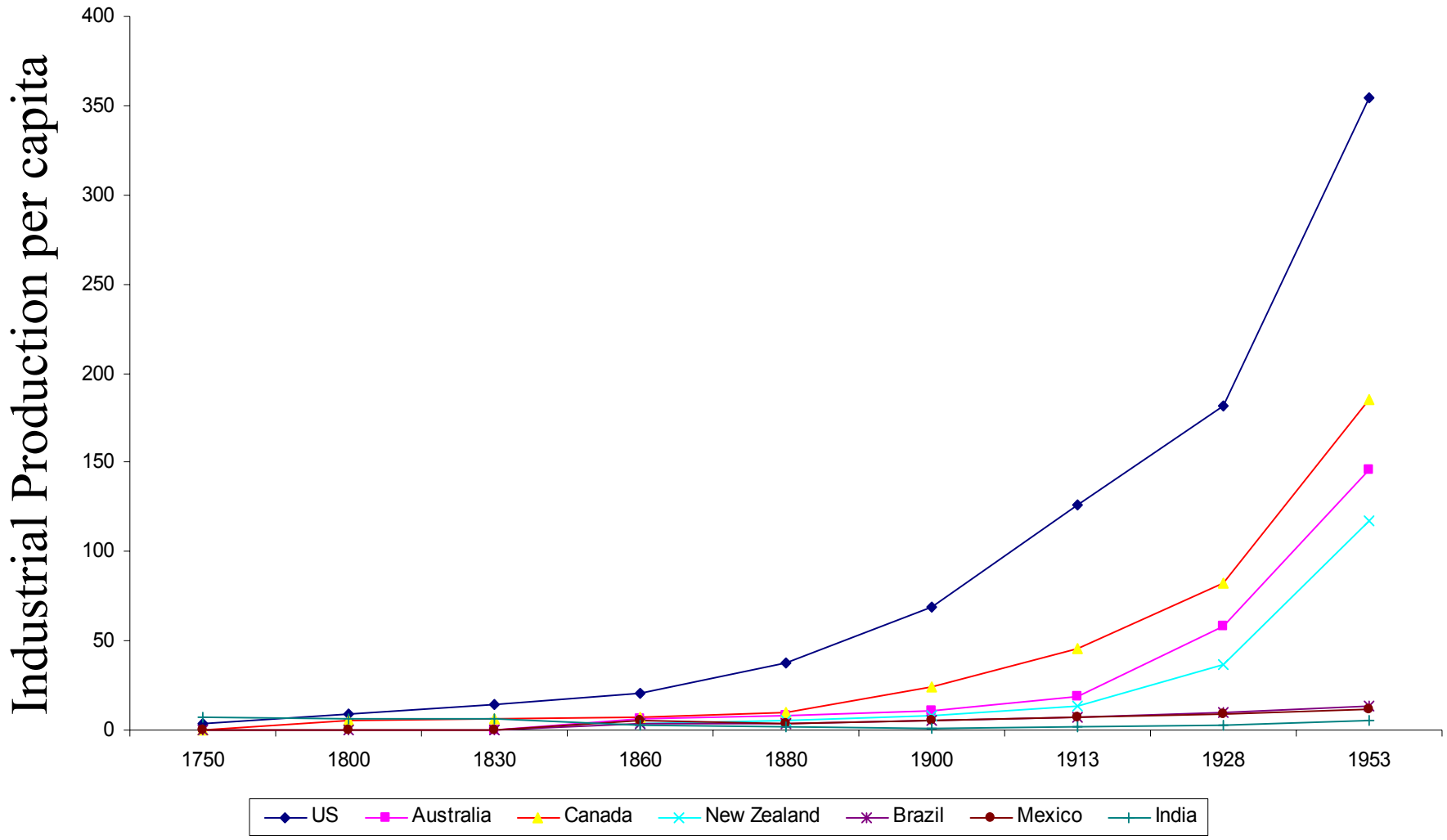


Figure IVB. Industrial Production per capita, 1750-1953

Note: Index of industrial production with UK per capita industrialization in 1900 equal to 100. From Bairoch (1982).

Plantation Versus Industrialization

- Specific example of the nature ande timing of the reversal:
- The Caribbean Plantation societies in the 17th and 18th centuries initially prosperous, but then falling behind Northeastern United States.
- Caribbean plantation societies rich from sugar. Highly oligarchic societies, dominated by the richest plantation owners. Supported by repressive political institutions.
- Relatively efficient for production and processing of sugar for the plantation owners. But no room for change.
- In contrast, the more "democratic" Northeast United States, more flexible to take advantage of new economic opportunities.
- In fact, 19th century growth in the U.S., fueled by industry and entrepreneurs not previously part of the ruling elite.

Institutions and Industrialization

- Whether a society has institutions of private property or extractive institutions may matter much more when new technologies require broad-based economic participation.
- Industrialization is such a process, requiring investments from a large number of agents who were not previously part of the ruling elite.
- Therefore, there are natural reasons to expect that institutional differences will matter much more during the age of industry.
- We find that there is a strong interaction between institutions and industrialization: institutions start mattering much more in the age of industry.
- This explains why the reversal took place during the 19th century.

Table IX

The Interaction of UK Industrialization and Institutions

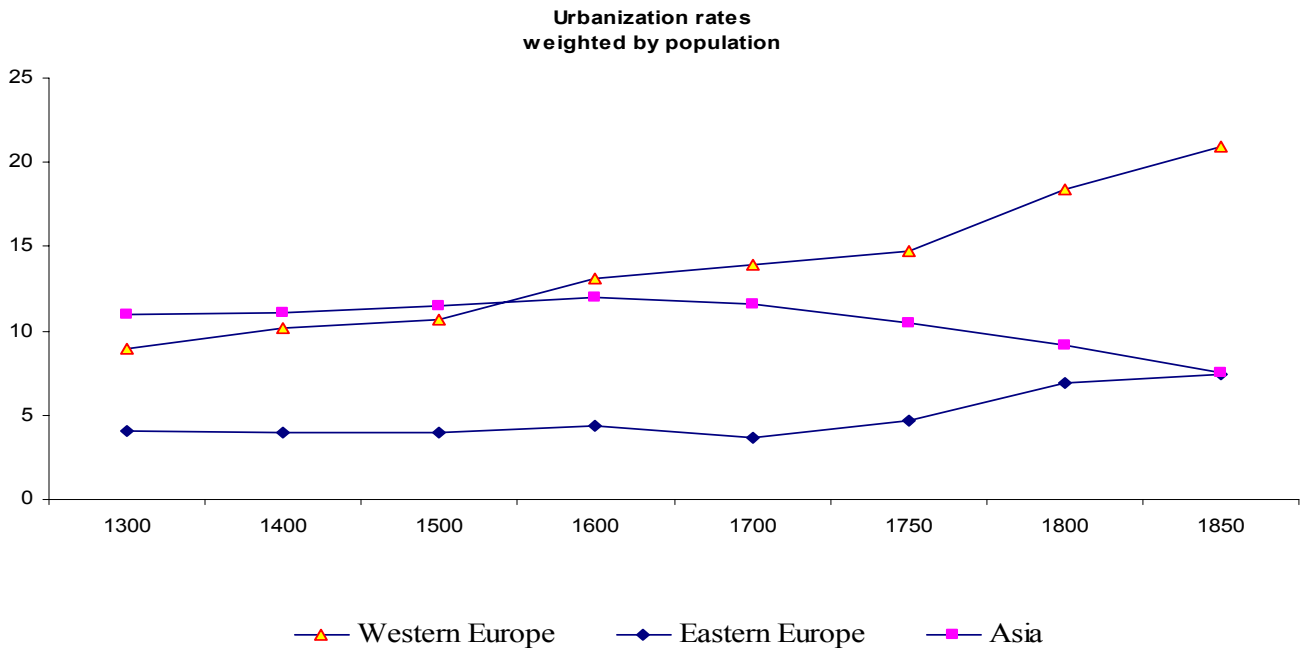
	Former Colonies, using only pre-1950 data	Former Colonies, using only pre-1950 data	Former Colonies, using data through 1980 (all data)	Former Colonies, using average institutions for each country, using only pre-1950 data	Former Colonies, using average institutions for each country, using all data	Former Colonies, using average institutions for each country, instrumenting using settler mortality, only pre-1950 data	Former Colonies, using average institutions for each country, instrumenting using settler mortality, all data	Former Colonies, using average institutions for each country, instrumenting using settler mortality, only pre-1950 data	Former Colonies, using average institutions for each country, instrumenting using settler mortality, all data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Dependent Variable is Industrial Production Per Capita									
UK Industrialization*Institutions	0.13	0.08	0.13	0.21	0.28	0.16	0.25	0.13	0.20
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)	(0.06)	(0.05)
Institutions	8.97	9.71	-3.36						
	(2.30)	(2.58)	(4.46)						
UK Industrialization*Latitude								0.30	0.52
								(0.49)	(0.36)
R-Squared	0.75	0.44	0.74	0.87	0.94	0.85	0.94	0.83	0.93
Number of Observations	59	59	75	59	75	59	75	59	75
Panel B: Dependent Variable is Log GDP Per Capita									
Log UK Industrialization*Institutions	0.08	0.10	0.06	0.13	0.12	0.15	0.10	0.09	0.07
	(0.02)	(0.05)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.05)	(0.05)
Institutions	-0.03	0.16	-0.08						
	(0.03)	(0.04)	(0.03)						
Log UK Industrialization*Latitude								0.59	0.27
								(0.40)	(0.38)
R-Squared	0.95	0.59	0.92	0.96	0.93	0.96	0.93	0.96	0.93
Number of Observations	79	79	131	79	131	79	131	79	131
Country Dummies	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

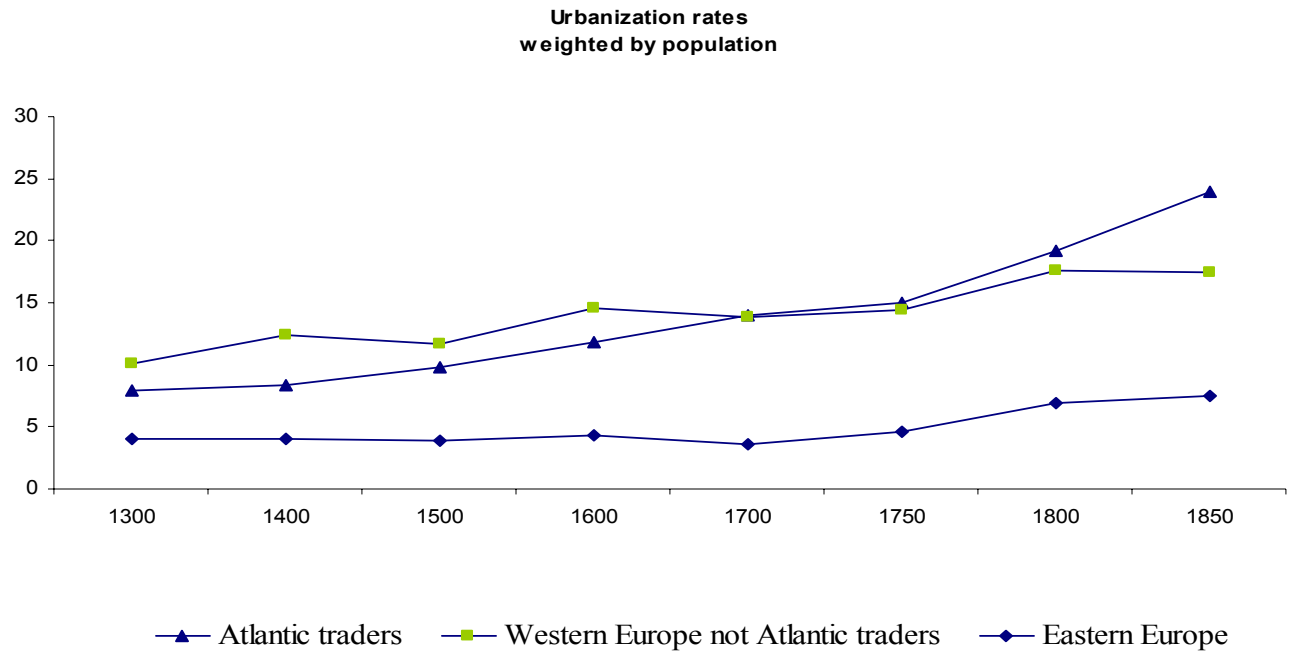
Standard errors are in parentheses. All columns report panel regressions with country and period dummies included as indicated at the foot of each column. Dependent variable in Panel A is industrial output per capita 1750-1980 from Bairoch (1982). Dependent variable in Panel B is log GDP per capita from Maddison (1995). The institutions variable is "Constraints on the Executive," which is an assessment of the constitutional limitations on executive power. The independent variable of interest is total UK industrial output interacted with constraints on the executive in each country from the Polity III dataset. The main effect of institutions is evaluated at the mean value of UK industrialization. Polity III provides information only for independent countries; if a country was a colony at a particular date, we assign the lowest value of constraints on the executive.

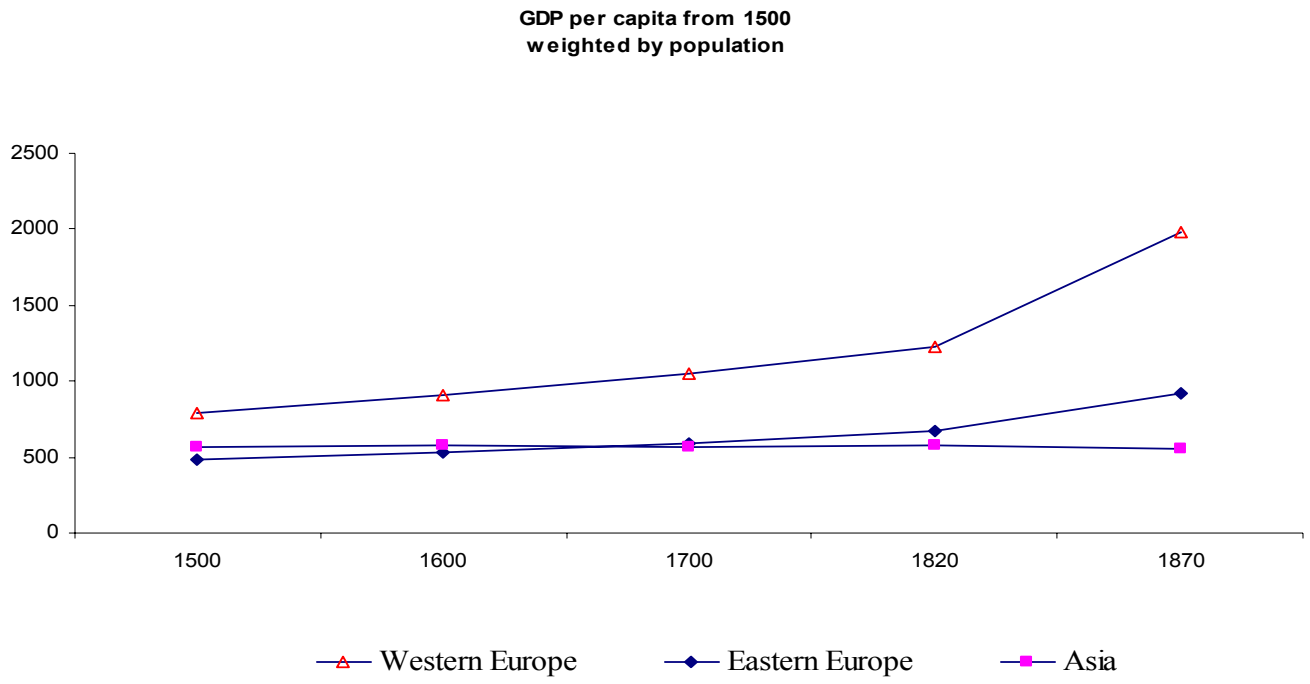
We have an unbalanced panel with the following observations. For industrial output, we have data on the US, Canada, New Zealand, Australia, South Africa, Brazil, Mexico and India. For GDP per capita we have data on these countries plus Argentina, Bangladesh, Burma/Myanmar, Chile, Colombia, Egypt, Ethiopia, Ghana, India, Indonesia, Ivory Coast, Kenya, Morocco, Nigeria Pakistan, Peru, Tanzania, Venezuela, and Zaire. We have data on the following dates: 1830, 1860, 1880, 1913, 1928, 1953 and 1980, although not for all countries for all dates. For detailed sources and descriptions see Appendix Table A1.

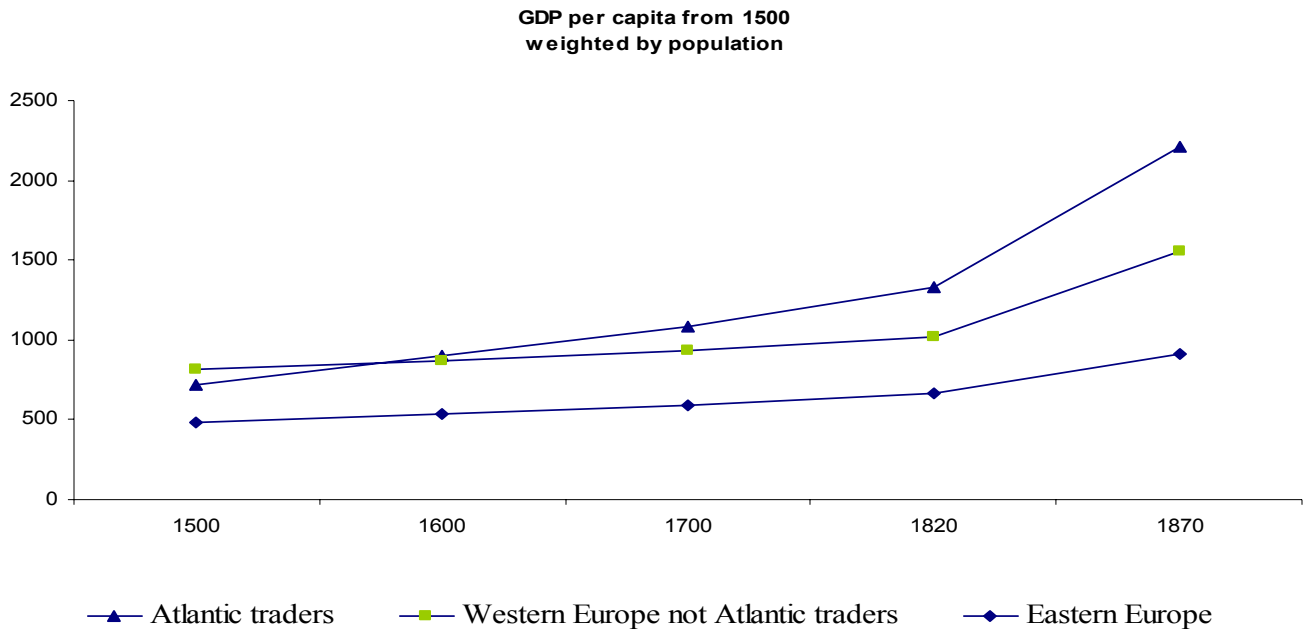
Rise of Europe

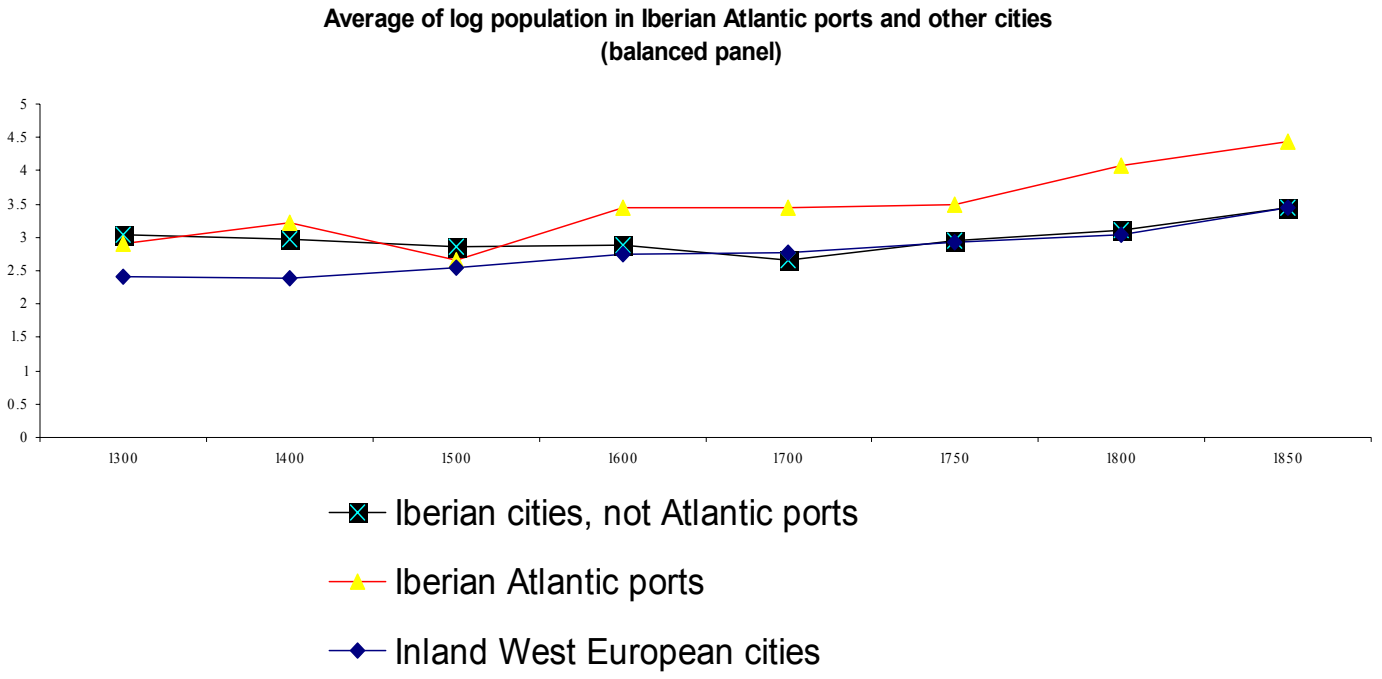
- Western Europe grows faster than Eastern Europe and Asia after 1500 using either urbanization rates as proxy for income or Maddison's estimates for GDP.
- When we break things out into Atlantic vs. non-Atlantic Western Europe, almost all of the faster growth is driven by growth in Atlantic nations (Belgium, Britain, Denmark, France, Ireland, the Netherlands, Portugal and Spain).
- Same pattern when we look at city growth.
- The timing of takeoff of various Atlantic ports consistent with timing of involvement in Atlantic trade by individual countries.
- Among Atlantic countries, early growth in Spain and Portugal, but short lived. Major growth in Britain and Dutch Rep.
- Related to institutional change in Britain and Dutch Rep.


Urbanization rates
weighted by population
25
20
15
10
5
0
1300
1400
1500
1600
1700
1750
1800
1850
Western Europe
Eastern Europe
Asia


Urbanization rates
weighted by population
30
25
20
15
10
5
0
1300
1400
1500
1600
1700
1750
1800
1850
Atlantic traders
Western Europe not Atlantic traders
Eastern Europe


GDP per capita from 1500
weighted by population
2500
2000
1500
1000
500
0
1500
1600
1700
1820
1870
Western Europe
Eastern Europe
Asia


GDP per capita from 1500
weighted by population
2500
2000
1500
1000
500
0
1500
1600
1700
1820
1870
Atlantic traders
Western Europe not Atlantic traders
Eastern Europe


Average of log population in Iberian Atlantic ports and other cities
(balanced panel)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1300
1400
1500
1600
1700
1750
1800
1850
Iberian cities, not Atlantic ports
Iberian Atlantic ports
Inland West European cities

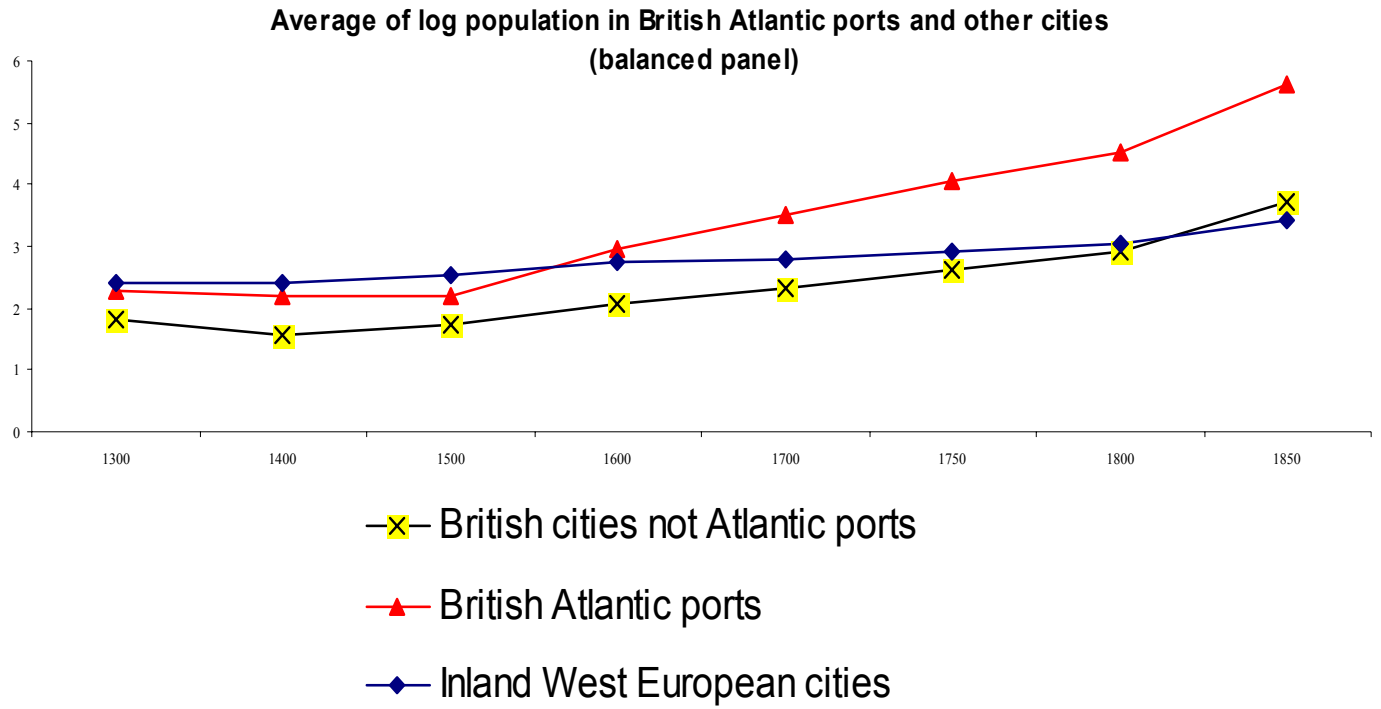

Average of log population in British Atlantic ports and other cities
(balanced panel)
6
5
4
3
2
1
0
1300
1400
1500
1600
1700
1750
1800
1850
British cities not Atlantic ports
British Atlantic ports
Inland West European cities

Table 7
Interaction Between Initial Institutions and Atlantic Trade

	Using Atlantic trader dummy as measure of Atlantic trade									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Panel A: Dependent Variable is Urbanization									
	Panel, 1300-1850	Panel, 1300-1850	Panel, 1300-1850	Panel, 1300-1850	Panel, 1300-1850, unweighted	Panel, 1000-1850	Panel, 1000-1850	Panel, 1000-1850	Panel, 1000-1850	Panel, 1000-1850, unweighted
Atlantic Trader Dummy x Volume of Atlantic Trade		0.011	0.011	-0.0090	-0.0026		0.0082	0.0084	-0.012	-0.009
		(0.002)	(0.002)	(0.0049)	(0.0062)		(0.0020)	(0.0020)	(0.004)	(0.005)
p-value for Initial Institutions x year (1600, 1700, 1750, 1800, 1850)	[0.61]		[0.51]	[0.71]	[0.85]	[0.12]		[0.08]	[0.42]	[0.92]
Volume of Atlantic Trade x Initial Institutions x Atlantic Trader Dummy				0.021	0.017				0.021	0.022
				(0.004)	(0.005)				(0.004)	(0.004)
R-Squared	0.87	0.88	0.89	0.90	0.83	0.86	0.86	0.87	0.87	0.81
Number of Observations	192	192	192	192	192	240	240	240	240	240
	Panel B: Dependent Variable is Log GDP per capita									
	Panel, 1500-1820	Panel, 1500-1820	Panel, 1500-1820	Panel, 1500-1820	Panel, 1500-1820, unweighted	Panel, 1500-1870	Panel, 1500-1870	Panel, 1500-1870	Panel, 1500-1870	Panel, 1500-1870, unweighted
Atlantic Trader Dummy x Volume of Atlantic Trade		0.069	0.068	-0.068	-0.079		0.004	0.039	-0.122	-0.110
		(0.016)	(0.016)	(0.028)	(0.028)		(0.017)	(0.017)	(0.030)	(0.028)
p-value for Initial Institutions x year (1600, 1700, 1750, 1800, 1850)	[0.40]		[0.31]	[0.004]	[0.08]	[0.66]		[0.64]	[0.01]	[0.58]
Volume of Atlantic Trade x Initial Institutions x Atlantic Trader Dummy				0.14	0.12				0.16	0.11
				(0.03)	(0.02)				(0.03)	(0.02)
R-Squared	0.94	0.96	0.96	0.97	0.97	0.95	0.95	0.95	0.96	0.96
Number of Observations	96	96	96	96	96	120	120	120	120	120
	Panel C: Dependent Variable is Constraint on the Executive									
	Panel, 1300-1850	Panel, 1300-1850	Panel, 1300-1850	Panel, 1300-1850	Panel, 1300-1850, unweighted	Panel, 1500-1850	Panel, 1500-1850	Panel, 1500-1850	Panel, 1500-1850	Panel, 1500-1850, unweighted
Atlantic Trader Dummy x Volume of Atlantic Trade		0.42	0.42	-0.001	-0.096		0.35	0.34	-0.11	-0.15
		(0.06)	(0.06)	(0.12)	(0.12)		(0.05)	(0.05)	(0.10)	(0.09)
p-value for Initial Institutions x year (1600, 1700, 1750, 1800, 1850)	[0.27]		[0.14]	[0.008]	[0.69]	[0.43]		[0.33]	[0.01]	[0.95]
Volume of Atlantic Trade x Initial Institutions x Atlantic Trader Dummy				0.44	0.26				0.47	0.29
				(0.11)	(0.09)				(0.09)	(0.07)
R-Squared	0.76	0.81	0.82	0.84	0.76	0.72	0.77	0.78	0.70	0.71
Number of Observations	192	192	192	192	192	240	240	240	240	240

Standard errors are in parentheses. Weighted panel regressions with full set of country and year dummies. Weights are total population in each country in each year, from McEvedy and Jones. Dependent variable is urbanization in Panel A, log GDP per capita in Panel B, and constraint on the executive in Panel C. Western Europe dummies interacted with years (from 1600) are included in all columns, but not reported to save space. Urbanization in Europe is from Bairoch, Batou and Chèvre, and urbanization in Asia is from Bairoch. Log GDP per capita is from Maddison. Constraint on the executive is coded from Langer; initial institutions are the average of institutions in 1400 and 1500. We use the Atlantic trader dummy as the measure of potential for Atlantic trade. Volume of Atlantic Trade is the log average number of voyages per year and is demeaned. Main effects are evaluated at initial institutions equal to one. For data definitions and sources see Appendix Table 1.

Interpretation

- Caribbean plantation economies did well initially because they provided the right incentives to the major asset holders in society.
- Similar to Venice in the 15th century or even to Spain after the discovery of the New World.
- But long-run growth requires a process of "creative destruction" with new entrance and new blood coming in.
- Difficult when the regime dominated by incumbents.
- Thus industrialization more likely in Northeast United States.
- Also, institutional change supporting sustained economic growth more likely in places where incumbents weaker; institutional change in England and the Dutch Republic but not in Spain.

Ingredients of Model

- Construct a simple theoretical model to emphasize and clarify the trade-offs.
- Consider an economy where agents enter entrepreneurship or production work.
  - Heterogeneity in entrepreneurship.
  - Entrepreneurial talent imperfectly correlated over time.
- Two types of policy distortion:
  - Redistributive taxation with incentive costs.
  - Entry barriers protecting incumbents.

Trade-off Between Oligarchy and Democracy

- Entry in democracy, sclerosis in oligarchy.
- Lower investment in democracy.
- Worse allocation of talent in oligarchy.
- Democracy more equal, oligarchy more unequal (lower wages higher profits).
- Oligarchy gets worse over time as the comparative advantage of incumbents gets worse.
- Oligarchy and democracy creating different types of distortions.
- But long-run growth may be slower in oligarchy because of dynamic costs of entry barriers.

Understanding Rise and Decline of Nations

- oligarchy less harmful initially, even encouraging investment because less redistribution away from major producers.
- but harmful as comparative advantage of oligarchs disappears.
- oligarchy particularly harmful when new technologies shift investment opportunities from insiders to newcomers.
- oligarchy less flexible than democracy

Regime Dynamics

- When does oligarchy transition to democracy?
- Two possibilities:
  1. Smooth transition to democracy because of within-elite conflict (small producers disbanding oligarchy).
  2. Conflict over regimes.
     - Incumbents richer, can maintain the system that serve their interests.
     - Path dependence in equilibrium regimes possible.
     - Caribbean vs. United States in the 18th and 19th centuries.

Model

- Infinite horizon economy, with the unique non-storable good, y.
- Preferences

$$U_0^j = E_0 \sum_{t=0}^{\infty} \beta^t c_t^j, \tag{1}$$

- Assume each agent dies with a small probability ε, consider the limit of this economy with $\varepsilon \to 0$.

Model (continued)

- Choice between entrepreneurship and production work.
- Entrepreneurial talent $a_t^j \in \{A^L, A^H\}$ with $A^L < A^H$.
- Either already own an active firm, or set it up (costly when there are entry barriers).
- Each agent starts period t with entrepreneurial talent $a_t^j \in \{A^H, A^L\}$, and $s_t^j \in \{0, 1\}$ which denotes the individual possesses an active firm.
- Agent with $s_t^j = 1$ member of the elite.
- Each agent takes the following decisions: c_t^j, $e_t^j \in \{0, 1\}$.
- If $e_t^j = 1$, then he also makes investment, employment, and hiding decisions, k_t^j, l_t^j and h_t^j, where h_t^j denotes whether he decides to hide his output in order to avoid taxation.

Model (continued)

- Three policy choices: a tax rate τ_t on firms, lump-sum transfer, T_t, and a cost B_t to set up a new firm (pure waste).
- Production function for talent a_t^j:

$$\frac{1}{1-\alpha}(a_t^j)^{\alpha}(k_t^j)^{1-\alpha}(l_t^j)^{\alpha},$$

- To simplify assume that $l_t^j = \lambda$, and that entrepreneur himself can work in his firm as one of the workers.
- Denote: $b_t \equiv B_t/\lambda$.

Model (continued)

- Denote the wage rate by $w_t \geq 0$.
- Profit function (without hiding):

$$\pi\left(\tau_t, k_t^j, a_t^j, w_t\right) = \frac{1-\tau_t}{1-\alpha}(a_t^j)^\alpha (k_t^j)^{1-\alpha}(l_t^j)^\alpha - w_t l_t^j - k_t^j, \quad (2)$$

- With hiding:

$$\tilde{\pi}\left(\tau_t, k_t^j, a_t^j, w_t\right) = \frac{1-\delta}{1-\alpha}(a_t^j)^\alpha (k_t^j)^{1-\alpha}(l_t^j)^\alpha - w_t l_t^j - k_t^j \lambda.$$

- Thus

$$\tau_t \leq \delta,$$

- Labor market clearing: $\int_0^1 e_t^j \lambda dj = \int_{j \in S_t^E} \lambda dj \leq 1$, where S_t^E is the set of entrepreneurs at time t.
- For agents with $s_t^j = 0$, setting up a new firm may entail an additional cost B_t because of entry barriers.

Model (continued)

- Law of motion of individual states:

$$s_{t+1}^j = i_t^j, \tag{3}$$

$$a_{t+1}^j = \begin{cases} A^H & \text{with probability } \sigma_H & \text{if } a_t^j = A^H \\ A^H & \text{with probability } \sigma_L & \text{if } a_t^j = A^L \\ A^L & \text{with probability } 1-\sigma_H & \text{if } a_t^j = A^H \\ A^L & \text{with probability } 1-\sigma_L & \text{if } a_t^j = A^L \end{cases}, \tag{4}$$

- Stationary distribution fraction of high-productivity agents:

$$M \equiv \frac{\sigma_L}{1-\sigma_H+\sigma_L}.$$

- Assume

$$M\lambda > 1,$$

Model (continued)

- Timing of events:
  1. Entrepreneurial talents, $\left[a_t^j\right]$, are realized.
  2. The entry barrier for new entrepreneurs B_t is set.
  3. Agents make occupational choices, $\left[e_t^j\right]$.
  4. Entrepreneurs make investment decisions k_t^j.
  5. The labor market clearing wage rate, w_t, is determined.
  6. The tax rate on entrepreneurs, τ_t, is set.
  7. Entrepreneurs make hiding decisions, $\left[h_t^j\right]$.
- where $\left[a_t^j\right]$ shorthand for the mapping $\mathbf{a}_t : [0,1] \rightarrow \left\{A^L, A^H\right\}$, etc.

Analysis

- Economic equilibrium: subgame perfect equilibrium given a policy sequence $\{b_t, \tau_t\}_{t=0,1,\ldots}$.
- Equilibrium investments:

$$k_t^j = (1-\tau_t)^{1/\alpha} a_t^j \lambda. \tag{5}$$

$$\Pi\left(\tau_t, w_t \mid s_t^j, a_t^j\right) = \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} a_t^j \lambda - w_t \lambda. \tag{6}$$

- Tax revenues:

$$T_t = \tau_t \frac{(1-\tau_t)}{1-\alpha}^{\frac{1-\alpha}{\alpha}} \lambda \sum_{j \in S_t^E} a_t^j, \tag{7}$$

Analysis (continued)

- Who will become an entrepreneur?
  1. *Entry equilibrium* where all entrepreneurs have $a_t^j = A^H$.
  2. *Sclerotic equilibrium* where agents with $s_t^j = 1$ become entrepreneurs irrespective of their productivity.
- An entry equilibrium will emerge only if the net gain to a high-skill non-entrepreneur of incurring the entry cost and setting up a firm (at a given wage) is positive.
- This net gain takes into account the future benefit of becoming an elite protected from competition (as a function of future entry barriers etc.).
- Determined by simple dynamic programming taking equilibrium policies as given.

Analysis (continued)

- Let the value function of a worker of type z as a function of the sequence of future policies and equilibrium wages, $(\mathbf{p}^t,\mathbf{w}^t)$:

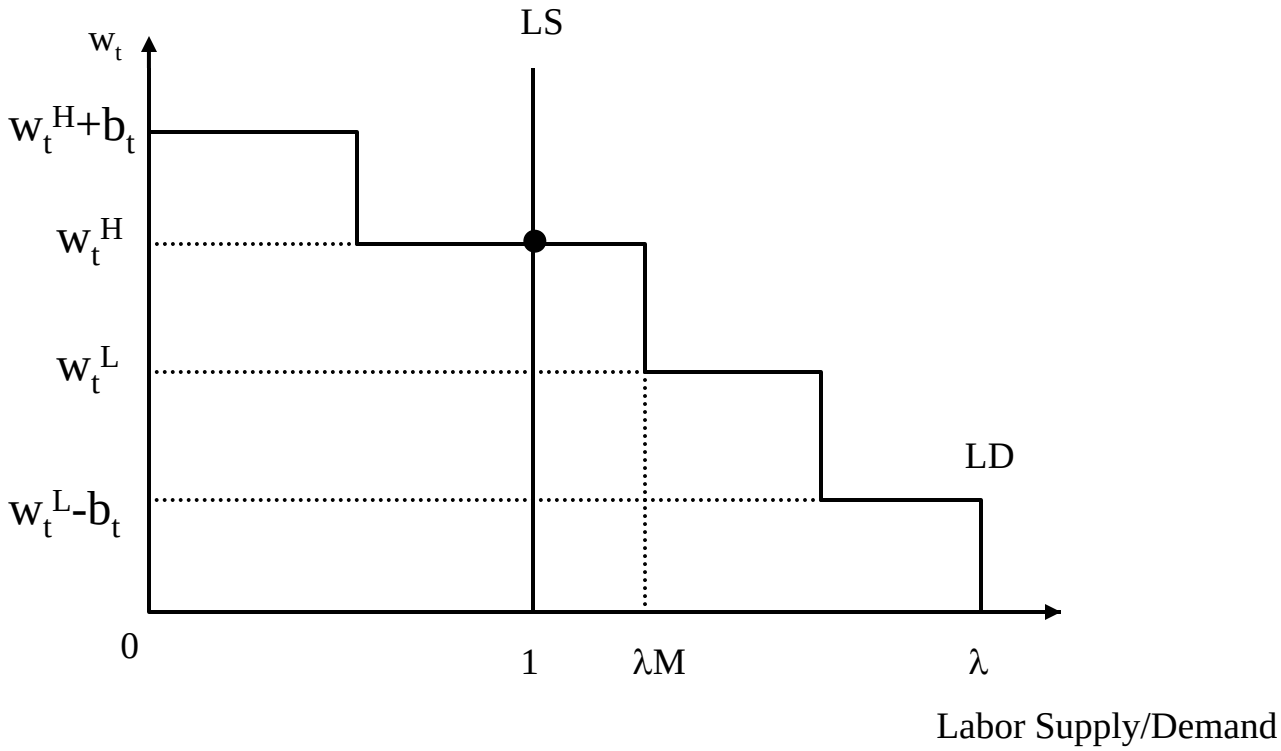
$$W^z\left(\mathbf{p}^t,\mathbf{w}^t\right) = w_t + T_t + \beta CW^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), \tag{8}$$

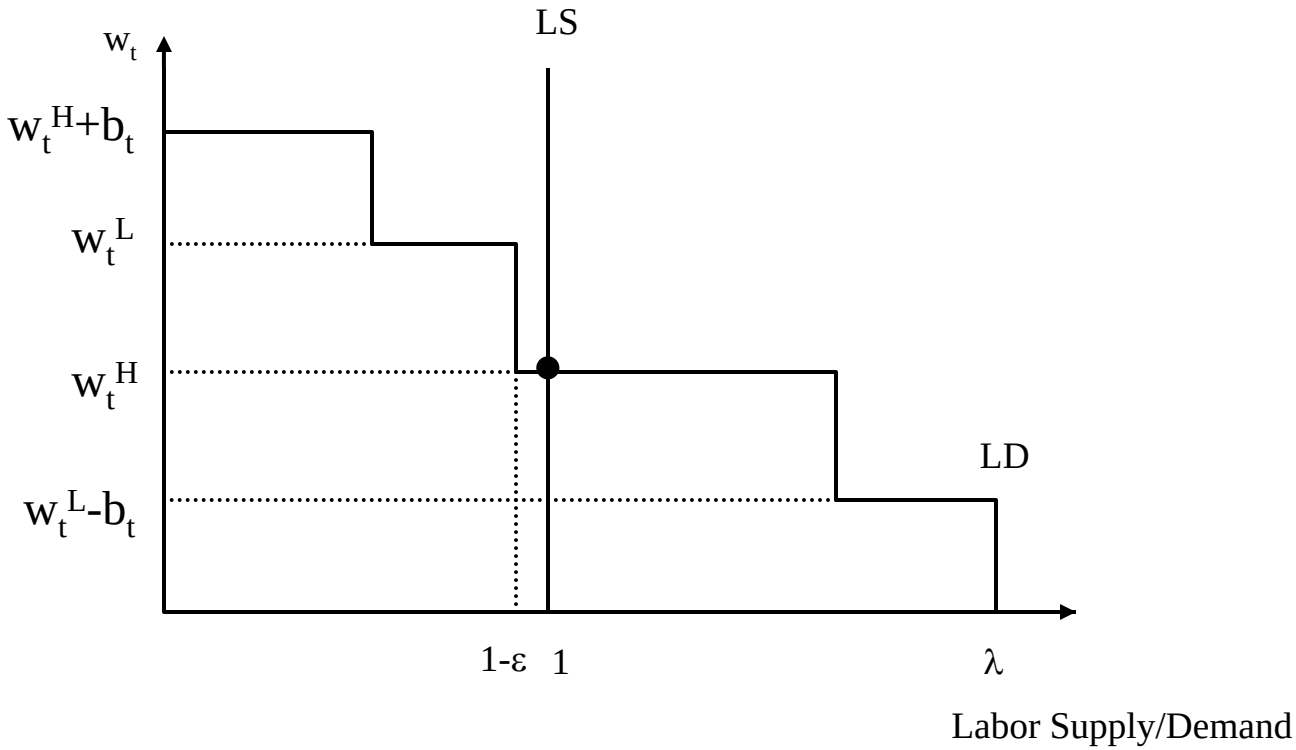
  where the continuation values from time $t+1$ onwards are:

$$\begin{aligned} &CW^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) = \\ &\sigma^z \max\left\{W^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - \lambda b_{t+1}\right\} \\ &+ (1-\sigma^z)\max\left\{W^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - \lambda b_{t+1}\right\}. \end{aligned} \tag{9}$$

- These incorporate optimal occupational choice from time t+1 onwards.
- Similarly, for a current entrepreneur

$$V^z\left(\mathbf{p}^t,\mathbf{w}^t\right) = w_t + T_t + \Pi^z\left(\tau_t, w_t\right) + \beta CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), \tag{10}$$


LS
w_t
$w_t^H+b_t$
w_t^H
w_t^L
LD
$w_t^L-b_t$
0
1
λM
λ
Labor Supply/Demand


LS
w_t
$w_t^H+b_t$
w_t^L
w_t^H
LD
$w_t^L-b_t$
1-ε
1
λ
Labor Supply/Demand

Analysis (continued)

- Define the *net value* of entrepreneurship as a function of an individual's skill a and ownership status, s,

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid A^z, s\right) = V^z\left(\mathbf{p}^t, \mathbf{w}^t\right) - W^z\left(\mathbf{p}^t, \mathbf{w}^t\right) - (1-s)\,\lambda b_t,$$

where the last term is the entry cost for agents with $s = 0$.

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid A^H, s_t^j = 1\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j, s\right)$$

and

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j, s\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid A^L, s_t^j = 0\right).$$

- Therefore, high-skill incumbents remain entrepreneurs and low-productivity workers never become entrepreneurs.
- Whether low-productivity incumbents remain entrepreneurs depends on taxes, wages and entry barriers.

Analysis (continued)

- Define entry equilibrium wage such that $NV\left(\mathbf{p}^t, \left[w_t^H, \mathbf{w}^{t+1}\right] \mid a_t^j = A^H, s_t^j = 0\right) = 0.$
- So

$$\begin{aligned} w_t^H \quad &\equiv \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^H - b_t \\ &+ \frac{\beta\left(CV^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - CW^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right)}{\lambda}, \end{aligned}$$

- Similarly, sclerotic wage is

$$\begin{aligned} w_t^L \quad &\equiv \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^L \\ &+ \frac{\beta\left(CV^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - CW^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right)}{\lambda}. \end{aligned}$$

- An entry equilibrium only when

$$w_t^H \geq w_t^L. \tag{11}$$

Analysis (continued)

- Therefore, in equilibrium $w_t^e = w_t^H$.
- Define fraction of high-productivity entrepreneurs:

$$\mu_t = \Pr\left(a_t^j = A^H \mid e_t^j = 1\right) = \Pr\left(a_t^j = A^H \mid j \in S_t^E\right)$$

- Since no entry barriers initially, $\mu_0 = 1$.
- Law of motion of μ_t:

$$\mu_t = \begin{cases} \sigma_H \mu_{t-1} + \sigma_L(1 - \mu_{t-1}) & \text{if (11) does not hold} \\ 1 & \text{if (11) holds} \end{cases}. \quad (12)$$

Political Equilibrium

- Consider two simple extreme political regimes:
  1. Democracy: the policies b_t and τ_t are determined by majoritarian voting, with each agent having one vote.
  2. Oligarchy (elite control): the policies b_t and τ_t are determined by majoritarian voting among the elite at time t.
- Focus on Markov perfect equilibria.

Democracy

- Non-elites in the majority.
- Majoritarian voting: taxes will be chosen to maximize per capita transfers,

$$T_t\left(b_t,\tau_t\right)=\begin{cases}\tau_t\frac{\left(1-\hat{\tau}_t\right)}{1-\alpha}^{\frac{1-\alpha}{\alpha}}\lambda\sum_{j\in S_t^E}a_t^j & \text{if } \tau_t\leq\delta\\ 0 & \text{if } \tau_t>\delta\end{cases}, \qquad (13)$$

  where $\hat{\tau}_t$ is the tax rate expected by the entrepreneurs and τ_t is the actual tax rate set by voters.
- Since 0 profits, entry barriers will be chosen to maximize equilibrium wages, thus $b_t=0$.
- Intuitively, entry barriers reduce labor demand and depress wages.

Democracy (continued)

Proposition 1 A democratic equilibrium always features $\tau_t = \delta$ and $b_t = 0$, and $e_t^j = 1$ if and only if $a_t^j = A^H$, and $\mu_t = 1$. The equilibrium wage rate is given by

$$w_t^D = \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha} A^H,$$

and the aggregate output is

$$Y_t^D = Y^D \equiv \frac{1}{1-\alpha}(1-\delta)^{\frac{1-\alpha}{\alpha}} A^H. \tag{14}$$

- Perfect equality.

Oligarchy

- Policies determined by majoritarian voting among the elite.
- To simplify this talk, assume

$$\lambda \geq \frac{1}{2}\frac{A^H}{A^L} + \frac{1}{2}, \tag{15}$$

  which ensures that low and high-skill elites prefer low taxes.
- Otherwise, low-skill elites side with the workers to tax the high-skilled elites.

Oligarchy (continued)

- Then entry barriers will be set

$$b_t \geq b_t^E \equiv \frac{\alpha A^H}{1-\alpha} + \beta \left(\frac{CV^H\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right) - CW^H\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right)}{\lambda} \right). \tag{16}$$

  so as to prevent entry.

- Imposing $w_{t+n}^e = 0$ for all $n \geq 0$,

$$\tilde{V}^L = \frac{1}{1-\beta} \left[\frac{\alpha\lambda}{1-\alpha} \frac{\left(1-\beta\sigma^H\right) A^L + \beta\sigma^L A^H}{\left(1-\beta\left(\sigma^H - \sigma^L\right)\right)} \right], \tag{17}$$

  and

$$\tilde{V}^H = \frac{1}{1-\beta} \left[\frac{\alpha\lambda}{1-\alpha} \frac{\left(1-\beta\left(1-\sigma^L\right)\right) A^H + \beta\left(1-\sigma^H\right) A^L}{\left(1-\beta\left(\sigma^H - \sigma^L\right)\right)} \right]. \tag{18}$$

Oligarchy (continued)

- Using these equilibrium relationships,

$$b_t = b^E \equiv \frac{1}{1-\beta}\left[\frac{\alpha\lambda}{1-\alpha}\frac{\left(1-\beta\left(1-\sigma^L\right)\right)A^H+\beta\left(1-\sigma^H\right)A^L}{\left(1-\beta\left(\sigma^H-\sigma^L\right)\right)}\right]. \tag{19}$$

- Wages are zero and aggregate output is

$$Y_t^E = \mu_t \frac{1}{1-\alpha}A^H + (1-\mu_t)\frac{1}{1-\alpha}A^L \tag{20}$$

where

$$\mu_t = \sigma_H \mu_{t-1} + \sigma_L(1-\mu_{t-1})$$

with

$$\lim_{t\to\infty} Y_t^E = Y_\infty^E \equiv \frac{1}{1-\alpha}\left(A^L + M(A^H - A^L)\right). \tag{21}$$

Oligarchy (continued)

Proposition 2 Suppose that condition (15) holds. Then an oligarchic equilibrium features $\tau_t = 0$ and $b_t = b^E$ as given by (19), and the equilibrium is sclerotic, with equilibrium wages $w_t^e = 0$, and fraction of high-skill entrepreneurs $\mu_t = \sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1})$ starting with $\mu_0 = 1$. Aggregate output is given by (20) and decreases over time starting at $Y_0^E = \frac{1}{1-\alpha} A^H$ with $\lim_{t \to \infty} Y_t^E = Y_\infty^E$ as given by (21).

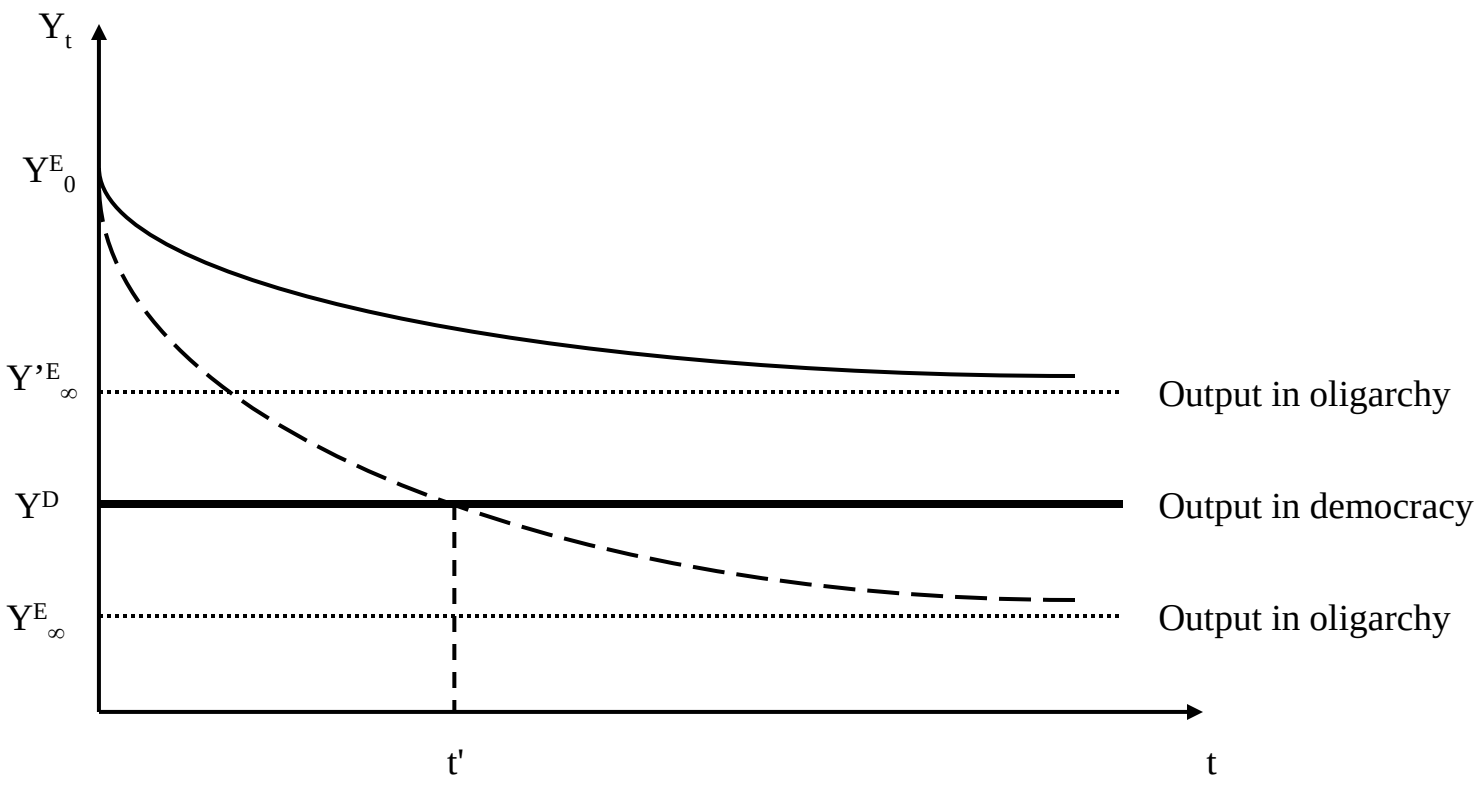
Comparison of Oligarchy and Democracy

- We always have that initially:

$$\frac{1}{1-\alpha}(1-\delta)^{\frac{1-\alpha}{\alpha}}A^H < Y_0^E = \frac{1}{1-\alpha}A^H.$$

- Will oligarchy fall behind democracy?
  - If (1) democratic taxes are low and not very distortionary; (2) selection of entrepreneurs is difficult, and (3) comparative advantage in entrepreneurship is important, then oligarchy ultimately worse than democracy:
  - Condition for this:

$$(1-\delta)^{\frac{1-\alpha}{\alpha}} > \frac{A^L}{A^H} + M\left(1-\frac{A^L}{A^H}\right). \tag{22}$$


Y_t
Y^E_0
Y'^E_∞
Y^D
Y^E_∞
Output in oligarchy
Output in democracy
Output in oligarchy
t'
t

Comparison of Oligarchy and Democracy (continued)

- Workers always worse off in oligarchy than in democracy.
- What about entrepreneurs?
- High-skill entrepreneurs always better off. But

  Proposition 3 If

$$\alpha\lambda\frac{\left(1-\beta\sigma^{H}\right)A^{L}/A^{H}+\beta\sigma^{L}}{\left(1-\beta\left(\sigma^{H}-\sigma^{L}\right)\right)}<\left(\left(\alpha+\left(1-\delta\right)\delta\right)\left(1-\delta\right)^{(1-\alpha)/\alpha}\right), \tag{23}$$

  then low-skill elites would be better off in democracy.
- Low-skill entrepreneurs still willing to remain in entrepreneurship, however, taking equilibrium prices and future policies as given.

New Technologies

- At $t' > 0$ a new technology arrives.
- Productivity with new technology:

$$\frac{1}{1-\alpha}(\psi \hat{a}_t^j)^{\alpha}(k_t^j)^{1-\alpha}(l_t^j)^{\alpha},$$

  where $\psi > 1$

- Law of motion of $\hat{a}_t^j$ orthogonal to a_t^j, and given by

$$\hat{a}_{t+1}^j = \begin{cases} A^H & \text{with probability } \sigma_H & \text{if } \hat{a}_t^j = A^H \\ A^H & \text{with probability } \sigma_L & \text{if } \hat{a}_t^j = A^L \\ A^L & \text{with probability } 1-\sigma_H & \text{if } \hat{a}_t^j = A^H \\ A^L & \text{with probability } 1-\sigma_L & \text{if } \hat{a}_t^j = A^L \end{cases}, \quad (24)$$

New Technologies (continued)

- In democracy, aggregate output jumps from Y^D to

$$\hat{Y}^D \equiv \frac{1}{1-\alpha}(1-\delta)^{\frac{1-\alpha}{\alpha}}\psi A^H.$$

- In oligarchy, elites will stay in entrepreneurship despite their worse comparative advantage
- For example, if $\psi A^L > A^H$, then aggregate output jumps to and remains at

$$\hat{Y}^E \equiv \frac{1}{1-\alpha}\left(\psi A^L + M(\psi A^H - \psi A^L)\right),$$

- Potential explanation for why oligarchic societies don't adjust well to new opportunities/technologies.

Regime Dynamics

- Two cases to consider:
  1. Conflict within the elite—when low-skill elites worse off in oligarchy than in democracy (when condition (23) holds), they disband oligarchy when they become the majority within the elite.
  2. Conflict between classes over regimes—the elite prefer oligarchy and the citizens democracy; income distribution matters for regime dynamics; possibility of path dependence.

Regime Dynamics (continued)

- Suppose that, in oligarchy, current elite can legislate a permanent transition to democracy. Then

  Proposition 4 Suppose (15) holds and the society starts oligarchic.

  - If (23) does not hold, then for all t the society remains oligarchic.
  - If (23) holds, then the society remains oligarchic until date $t = \tilde{t}$ where $\tilde{t} = \min t' \in \mathbb{N}$ such that $\mu_{t'} \leq 1/2$ (whereby $\mu_t = \sigma^H \mu_{t-1} + \sigma^L(1 - \mu_{t-1})$ for $t < \tilde{t}$ starting with $\mu_0 = 1$). At $\tilde{t}$, the society transitions to democracy.

- The low-skill elites disband the oligarchy when they become the majority.

Conflict over Regimes

- Different set of issues arise when no smooth transition to democracy.
- Under many plausible scenarios, wealth influences political power. Consider a reduced-form model of this.
- Suppose that the probability that an oligarchy switches to democracy is $q_t^D = q^D(\Delta \mathcal{W}_{t-1})$, where $\Delta \mathcal{W}_{t-1} = \mathcal{W}_{t-1}^E - \mathcal{W}_{t-1}^W$ is the difference between the levels of wealth of the elite and the citizens at time $t-1$.
- Assume $q^D(\cdot)$ decreasing.

Conflict over Regimes

- Similarly, when democratic, a society becomes oligarchic with probability

$$q_t^O = q^O\left(\Delta \mathcal{W}_{t-1}\right)$$

  where now $q^O(\cdot)$ is a non-decreasing function, with $q^O(0) = 0$, so that with perfect equality, there is no danger of switching back to oligarchy.

- Here $\Delta \mathcal{W}_t$ refers to the income gap between the initial elite (those with with $s_1^j = 1$) and the citizens.

Conflict over Regimes (continued)

- Then regime dynamics are:

$$D_t = \begin{cases} 0 & \text{with probability } 1 - q^D\left(\Delta \mathcal{W}_{t-1}\right) & \text{if } D_{t-1} = 0 \\ 1 & \text{with probability } \quad q^D\left(\Delta \mathcal{W}_{t-1}\right) & \text{if } D_{t-1} = 0 \\ 0 & \text{with probability } \quad q^O\left(\Delta \mathcal{W}_{t-1}\right) & \text{if } D_{t-1} = 1 \\ 1 & \text{with probability } 1 - q^O\left(\Delta \mathcal{W}_{t-1}\right) & \text{if } D_{t-1} = 1 \end{cases}, \tag{25}$$

- Suppose that each agent saves out of current income at a constant (exogenous) rate $\nu < 1$.
- Therefore

$$\Delta \mathcal{W}_t = \nu\left(\Delta \mathcal{W}_{t-1} + \lambda Y_{t-1}^E\right).$$

Conflict over Regimes (continued)

- This implies that in oligarchy

$$\Delta \mathcal{W}_t = \lambda \sum_{n=1}^{t} \nu^n Y_{t-n}^E \tag{26}$$

and

$$\lim_{t \to \infty} \Delta \mathcal{W}_t = \Delta \mathcal{W}_\infty \equiv \frac{\lambda Y_\infty^E}{1-\nu}, \tag{27}$$

where Y_∞^E is given by (21).

Conflict over Regimes (continued)

- This implies that starting from low wealth levels, wealth inequality will increase in oligarchy.
- Therefore, transition from oligarchy to democracy may become harder as oligarchy persists.
- In particular, if there exists $\overline{\Delta\mathcal{W}} < \Delta\mathcal{W}_\infty$ such that $q^D\left(\overline{\Delta\mathcal{W}}\right) = 0$, then after a certain number of periods, the society will be stuck in oligarchy.
- In contrast, in democracy, all agents earn the same amount, so when $D_{t+k} = 1$ for all $k \geq 0$,

$$\Delta\mathcal{W}_{t+1} = \nu\Delta\mathcal{W}_t \text{ and } \lim_{t\to\infty} \Delta\mathcal{W}_t = 0. \tag{28}$$

- The implication is that a switch back to oligarchy is most likely soon after a switch from oligarchy to democracy.

Shortcomings and Future Directions

- No managerial delegation. In practice, it may be possible to remain a member of the elites while delegating control of firms to high-skill agents.
- Entry barriers do not generate direct revenue. If they did, the oligarchy may want to allow some entry while democracy may also want to use entry barriers.
- Develop less reduced-form models of why wealth may influence political power.