Explaining the Industrial Revolution

To be able to talk about theories of the Industrial Revolution and why it happened where it did and when it did, we need to be a bit more specific about the where and when.

▶ First, the timing: when did the Industrial Revolution happen? Was it a sudden change or a more gradual change?

▶ Second, did England look very different from other countries, particularly China, Japan and India?

Once we know when the Industrial Revolution happened and how countries differed on the eve of the revolution, we can assess which theories are consistent with the facts.

Was the Industrial Revolution really a revolution?

- ▶ How abrupt was the Industrial Revolution?
- ▶ Customary to say Industrial Revolution was roughly 1760-1800
- ▶ That's a complete break from a several thousand year Malthusian trap in occurring over the span of less than two generations
- ▶ May be more gradual than this, signs that productivity changes earlier weren't all that different than what happened during the Industrial Revolution
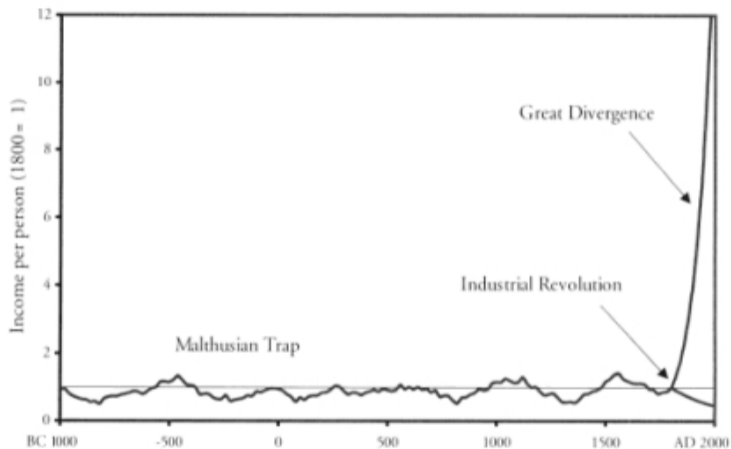
A Long, Long View

Figure 1.1 World economic history in one picture. Incomes rose sharply in many countries after 1800 but declined in others.

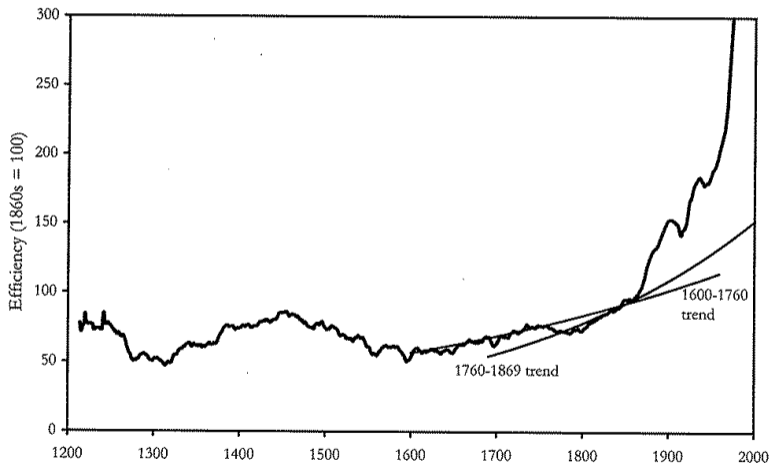# Was it a handful of simultaneous events that jump started everything? British efficiency, 1250-2000.

Figure 12.5 Long-run efficiency of the English economy, 1250–2000.

Historical Timing of Efficiency Gains

- ▶ The previous figure suggests that 1760-1800 wasn't as dramatic a break from efficiency growth rates as people have assume.
- ▶ In fact, looking at the period leading up the the Industrial Revolution, 1600-1760, shows a very similar average trend in efficiency growth.
- ▶ Efficiency growth from 1600-1760: 0.2 percent per year (not spectacular but not too shabby either)
- ▶ Efficiency growth from 1760-1869: 0.33 percent per year (big by Malthusian standards but unimpressive by modern standards)
- ▶ Part of the reason things looked dramatic in 1760-1800 was rapid population growth, not rapid efficiency growth

U.S. Productivity change in the nonfarm business sector, 1947-2015

Time period	Average annual percent change
1947-1973	2.8
1973-1979	1.2
1979-1990	1.5
1990-2000	2.2
2000-2007	2.6
2007-2015	1.3

Source: BLS

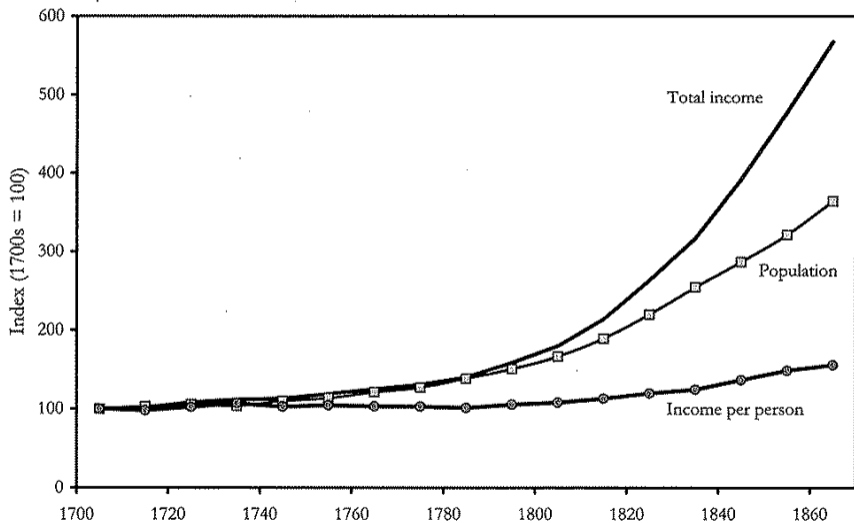# Looking at Output Hides Effects of Population

Figure 12.8   Population and economic growth in England, 1700s–1860s.

Anticipating the Industrial Revolution

- ▶ It's easy to look back and say there were a few textile and iron innovations that were big and led to economic growth.
- ▶ But could you have predicted the Industrial Revolution without the benefit of hindsight?
- ▶ Could you have said, "This new flying shuttle is our ticket out of the Malthusian trap"?

Some revolutionary innovations that did not make an industrial revolution

Innovations Before 0 AD

Date	Innovation
500000	Fire
20000	Bow and arrow
12000	Domestication of animals
7000	Pottery
6000	Weaving
5000	Irrigation systems
3500	Bronze, wheel, writing
3000	Abacus
1100	Iron Age
512	Cast iron
400	Catapult
210	simple machines

Some revolutionary innovations that did not make an industrial revolution

Innovations, 0 AD to 1100 AD	
Date	Innovation
105	Paper
300	Stirrups
600	Heavy plow
810	First description of Arabic numerals
1000	Primitive gunpowder
1041	Movable clay type
1060	Water powered mill

Some revolutionary innovations that did not make an industrial revolution

	Innovations in Europe, 1200-1600	
Date	Innovation	Location
1200	Windmill	Northern Europe
1275	Gunpowder	Germany
1285	Mechanical clock	Northern Europe
1325	Cannon	Northern Europe
1350	Spectacles	Venice
1450	Printing press	Germany
1475	Musket	Italy, Germany
1492	The Americas	Spain
1498	Sea route to India	Portugal
1532	Potato	Spain
1544	Tomato	Italy
1600	Electricity	England
1650	Mechanized silk spinning	Italy
1665	Microscope	England

Some revolutions innovations that did not make an industrial revolution
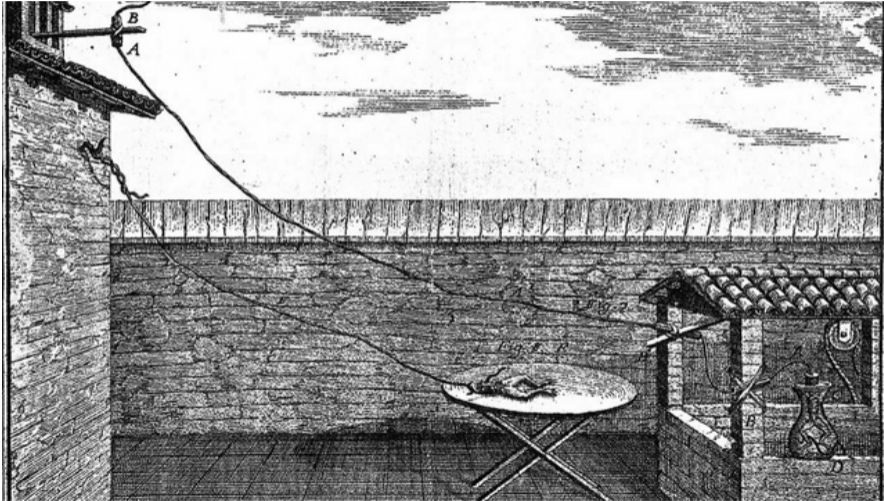
From Galvani's De Viribus Electricitatis in Motu Musculari, 1791

Some revolutionary innovations that did not make an industrial revolution

Invention	China	Europe/America
Silk	1300 BC	582 AD
Wheelbarrow	231 BC	1200 AD
Paper	105	1150
Water-powered mills	100	
Printed Book	868	1456
Compass	1050	1190
Explosives	1151	16th century
Crank-driven engine	1310	1757
Ship building:		
Fore-and-aft rig	3rd century	9th century
Watertight compartments	5th century	1790
Stern-post rudder	8th century	1180

What about the where of the Industrial Revolution?

- ▶ Innovations were occurring all over Europe and all over the world (particularly China).
- ▶ So why England rather than Germany, Italy, China, etc.?
- ▶ Did England look very different than China or Japan right before the Industrial Revolution?

Europe vs China, Japan and India before the Industrial Revolution

- ▶ We've already seen that China had major technological innovations
- ▶ Maybe the difference is transportation and market integration
- ▶ You can't scale up production dramatically if you can't get access to inputs or can't find people to sell products to
- ▶ So, did Europe have better transportation (and therefore better markets)?

Europe vs China, Japan and India before the Industrial Revolution

Erie Canal: first use May 17, 1821, 363 miles

Europe vs China, Japan and India before the Industrial Revolution

Grand Canal: first use early 5th century BC, 1,115 miles

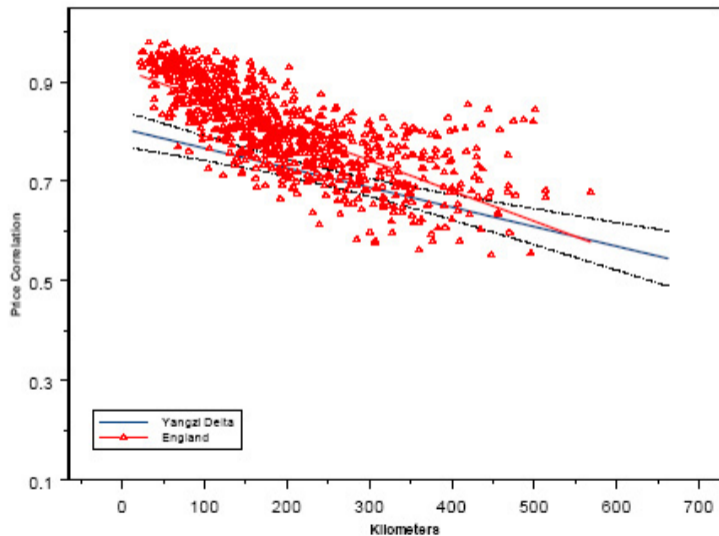# Europe vs China, Japan and India before the Industrial Revolution

Europe vs China, Japan and India before the Industrial Revolution

- ▶ Not really.
- ▶ Animal-borne freight-hauling capacity was similar for north India and Germany in 1800
- ▶ China and Japan had well developed systems of water transport.
- ▶ The share of the grain harvest marketed over long distances was larger in China than in Europe.
- ▶ Large urban populations of China and Japan imply that transportation and markets must have been fairly well developed (22% of Japan's population lived in cities, 10-15% of western Europeans lives in cities)

Grain market prices, China and England

Figure 7. England and the Yangzi Delta, 1770-1794

Europe vs China, Japan and India before the Industrial Revolution

- ▶ So markets seem to function just as well in China as in Europe
- ▶ European capital stock does not appear to be significantly larger than China's
- ▶ Life expectancy: Japanese life expectancy was high relative to Europe, Chinese life expectancy was comparable to Europe, Indian life expectancy was lower than Europe
- ▶ The conclusion of Kenneth Pomeranz: Both Europe and Asia were comparable around 1800 in terms of "commercialization, commodification of goods, land, and labor, market-driven growth"

What was different between Europe and Asia?

- ► So along many important dimensions, Europe and Asia look similar leading up to the Industrial Revolution
- ► However, there were several potentially important differences
- ► A few differences that will motivate some of our theories:
    - ► Colonies and natural resources
    - ► Higher interest rates in Asia (at least for Japan)
    - ► Lower literacy, less education in Asia (true of Japan, China and especially India)
    - ► Differences in the fertility rates of the wealthy

Fertility Rates, China and England

Fertility rates in the late 1700s

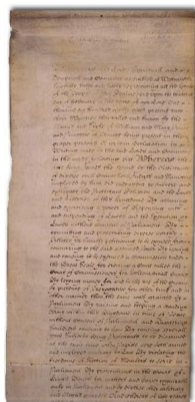| Group	Fertility Rate
All English men	4.75
Rich English men	8.1
All Chinese	4.2
Chinese royals	4.8

Theories of a Revolution

- ► Exogenous Growth Theories: there was a shock to a feature outside of the economy (legal institutions, shock in supply of an input, etc.) that induced investment and innovation leading to growth

- ► Multiple Equilibrium Theories: a shock to the economy (disease, war, discovering new land, etc.) moved the economy from a bad equilibrium to a good equilibrium

- ► Endogenous Growth Theories: something internal to the economy evolved over time to create the conditions for growth (suggests that the Industrial Revolution was bound to happen eventually)

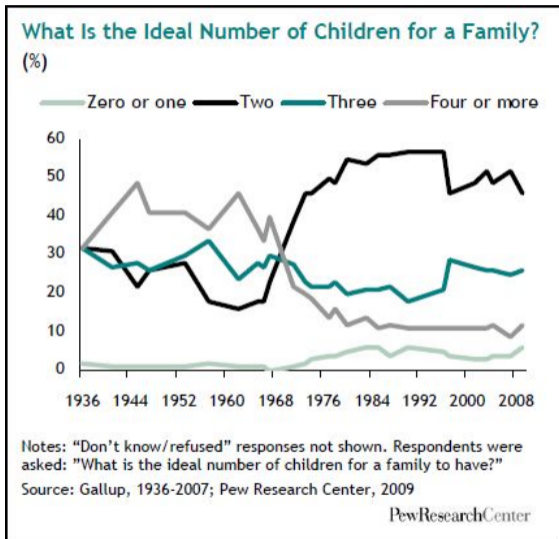# Theories of a Revolution

Examples of each type of theory:

▶ Exogenous Growth Theory: legal structures changed as a result of the Glorious Revolution, this created the incentives to innovate

▶ Multiple Equilibrium Theory: a shock switched families from a high fertility, low investment per child regime to a low fertility, high investment per child regime

▶ Endogenous Growth Theory: children of wealthy families gradually spread throughout income distribution bringing their high productivity traits with them

Theories of a Revolution
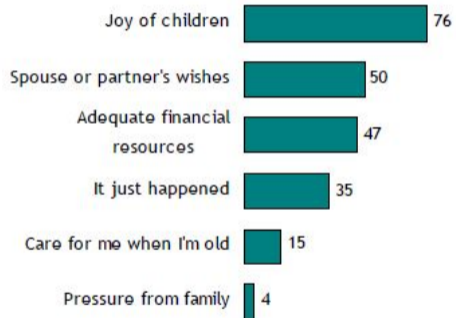

The Bill of Rights of 1689

Theories of a Revolution

What Is the Ideal Number of Children for a Family? (%)

Legend: Zero or one — Two — Three — Four or more

Notes: "Don't know/refused" responses not shown. Respondents were asked: "What is the ideal number of children for a family to have?"
Source: Gallup, 1936-2007; Pew Research Center, 2009

PewResearchCenter

Theories of a Revolution

Why Do Parents Decide to Have Children?
% citing reason as very important

Reason	%
Joy of children	76
Spouse or partner's wishes	50
Adequate financial resources	47
It just happened	35
Care for me when I'm old	15
Pressure from family	4

Notes: Asked of parents (n=770). Respondents were asked how important each reason was for them in deciding to have their first child.

PewResearchCenter

Theories of a Revolution

		Violence	Peace, love and happiness
Country A	Violence	-2, -2	1, -3
	Peace, love and happiness	-3, 1	2, 2

Theories of a Revolution
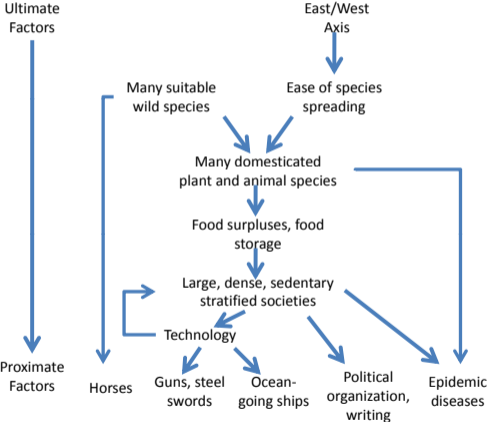
What specific theories are we going to consider?

- ▶ Institutions made the difference (North and Thomas, Acemoglu, Johnson and Robinson)
- ▶ Resources and access to the New World made the difference (Pomeranz)
- ▶ Geography made the difference (Diamond, AJR again)
- ▶ Fertility and the diffusion of good traits made the difference (Clark)

Institutional Change and the Industrial Revolution

- ▶ What are institutions? Why are they relevant to economic performance?
- ▶ Who creates institutions and who can change them?
- ▶ What changed institutions before the Industrial Revolution?
- ▶ How might institutional change explain the Industrial Revolution?
- ▶ Are there flaws in the institutional change story?

What are institutions?

North and Thomas's definition: 'An institution is "an arrangement between economic units that defines and specifies the ways by which these units can co-operate or compete."

A simpler definition: Institutions are the basic rules of the economy.

What are institutions?

What are institutions?

What are institutions?
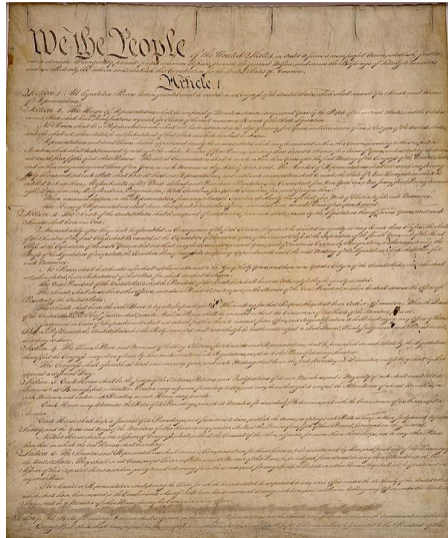
A Few Institutions Around Today

- ► Democracy
- ► Property rights
- ► Usury laws
- ► English language
- ► Patent system
- ► Systems of weights and measurement
- ► Table manners
- ► Tipping
- ► Walking on the right in the Morton stairwell

Formal/governmental institutions vs voluntary institutions

- ▶ We often think of the rules and structure of society as coming from the government. After all, the government has the authority to enforce the rules.
- ▶ However, many institutions are created not by the government but either through evolving social norms, religion, voluntary agreements between groups of people, organizations or firms, etc.
- ▶ The government is in a unique position of coercive power, but there are plenty of ways to punish people that break the rules even without the government's help.

Example of an institution created and protected by the government: property rights

'26

THE UNITED STATES OF AMERICA,

Pre=emption
CERTIFICATE
No. 102

To all to whom these Presents shall come, Greeting:

WHEREAS *Charles St. Antoine, of Dakota County, Minnesota Territory,*

ha_ deposited in the GENERAL LAND OFFICE of the United States, a Certificate of the REGISTER OF THE LAND OFFICE, at *Minneapolis,* whereby it appears that full payment has been made by the said

Charles St. Antoine, according to the provisions of the

Act of Congress of the 24th of April, 1820, entitled " An act making further provision for the sale of the Public Lands," for the East half of the South West quarter of Section thirty-five, in Township twenty-eight, of Range twenty-three, in the district of lands subject to sale at Minneapolis, Minnesota

A non-governmental approach to property rights

A Famous Case of Firms Creating Voluntary Institutions

The Maghribi Traders' Coalition (Greif, 1993)

► The traders had a problem: how do you sell your goods in far away markets?

► Initial solution: hire an agent, but agents were likely to cheat the merchant

► Formal legal institutions didn't help

► Solution: form a coalition of merchants and punish agents that cheat by not employing them in the future

How do institutions change?

- ▶ Institutions can quietly evolve over time (think of social norms)
- ▶ The government can change certain institutions through legislation
- ▶ Firms and other individuals can change voluntary institutions through renegotiating contracts and arrangements
- ▶ Institutional change can also occur through less civil means (think revolution)
- ▶ No matter how it occurs, institutional change involves some cost. For it to happen, the potential benefits have to outweigh the costs for someone with enough power to initiate change

Basic Outline of North and Thomas Argument

1. Malthusian population pressure led to changes in relative product and factor prices.
2. These changes relative prices induced fundamental institutional change.
3. The new institutions channeled incentives toward productivity raising types of economic activity
4. The result was that productivity advance became an internalized feature of the economy.
5. By creating incentives for innovation, these new institutions created the condition for sustained productivity allowing us to escape the Malthusian trap.

North and Thomas's Characterization of the Medieval World

- ► There was an abundance of land available for colonization and settlement that was of equal quality to the land already being settled.
- ► Labor, not land, was the scarce factor of production.
- ► There was little long-distance trade; most trade was confined to the local exchange of goods and services.
- ► The rate of innovative activity was fairly low.

Population Pressure and the Agricultural Sector

- ► Population growth changed the value of feudalism as an institution.
- ► Labor became more abundant and land became more scarce.
- ► Agricultural prices rose relative to non-agricultural prices leading to increased land value and decreased wages.
- ► It became more profitable to control land than to control people.
- ► Developed new notions of private property (for example, the enclosure movement)

Population Pressure and the Agricultural Sector

Plan of a Mediaeval Manor.
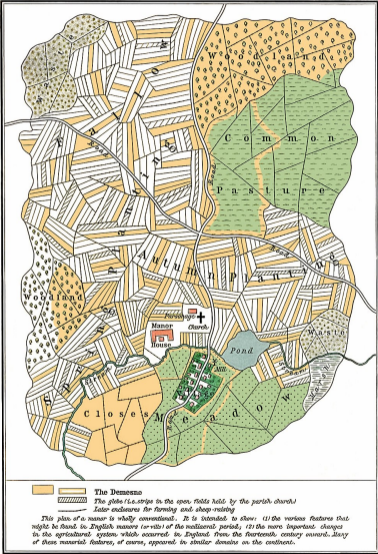
Population Pressure and the Non-Agricultural Sectors

▶ Differences in population pressure throughout Europe led to differences in relative factor endowments of different regions and increased potential gains to trade.

▶ However, trade was obstructed by high transaction costs (lack of information about potential markets, pirates, etc.)

▶ Merchant trading groups develop, people place agents in different cities, deposit banking and insurance institutions are created.

Population Pressure and the Non-Agricultural Sectors
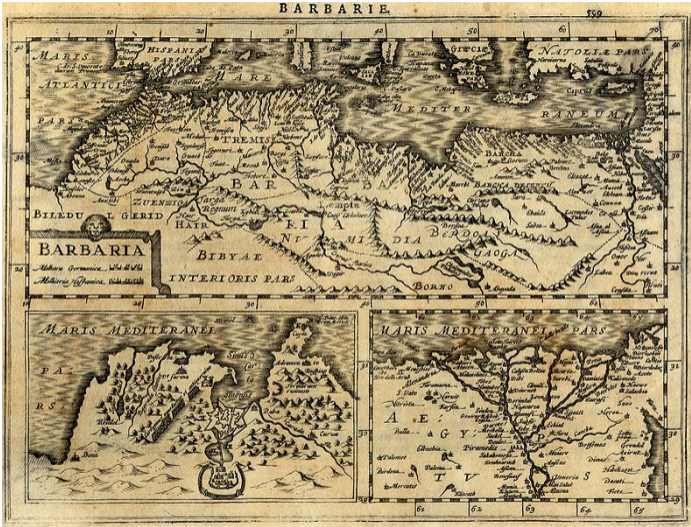
Greif and the Mahgribi Traders

Other Effects of Trade Expansion on Institutions

- ▶ Formal contracts replace informal agreements and trading relationships become more impersonal.
- ▶ Fostering the concept of contractual obligation helps create a foundation for stronger property rights.
- ▶ Creates new firm structures like the joint-stock company.
- ▶ As trade covered larger distances, larger political units were created to handle the needs of traders.
- ▶ International financial markets develop.

Population Pressure and the Non-Agricultural Sectors

Dam square and town hall in 1656 with the Wisselbank (Johannes Lingelbach)

How did these institutional changes lead to steady innovation?

- ▶ The expansion of markets led to greater potential profits from innovation.
- ▶ Institutional changes were made to direct the returns from innovation to the innovator.
- ▶ Development of patents protected innovator's profits.
- ▶ Improvements to land became profitable with the development of property rights.
- ▶ Investment in human capital became profitable when labor became free.
- ▶ Investment in innovation became profitable with the development of property rights (as well as other bounties and subsidies).

# Summary of the North and Thomas Story

- ▶ Institutions are a crucial part of how well economies will function.
- ▶ Institutions like property rights, patent systems, rule of law, international financial institutions, etc. can all help provide incentives for individuals to innovate and invest.
- ▶ As population pressures grew, changes in relative prices between land and labor and between countries led to changes in the value of property relative to people and the potential gains from international trade.
- ▶ New institutions arose to protect private property, to facilitate impersonal contracts and international trade, and to protect innovations.
- ▶ The potential profits from innovation were large due to expanding markets and secured by new institutions. This internalized innovation in the economic system.

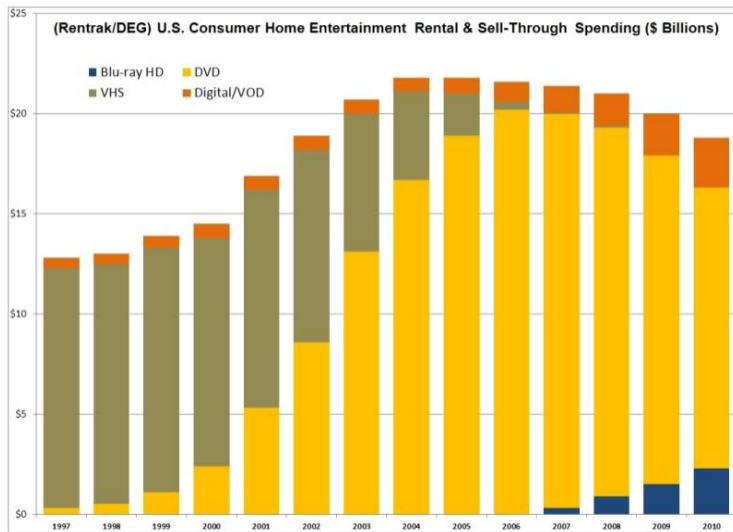# A Modern Example (with far less importance)

2007-2008 Writers Guild of America Strike

A Modern Example (with far less importance)
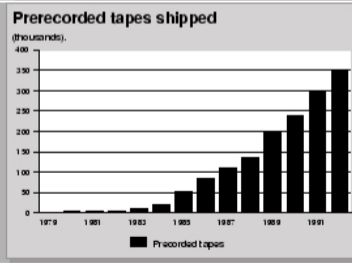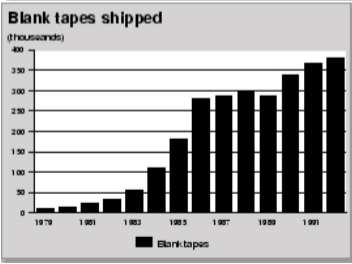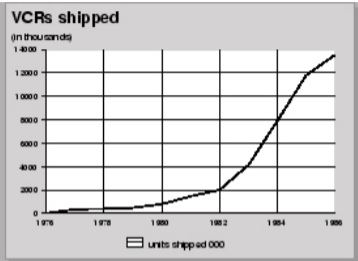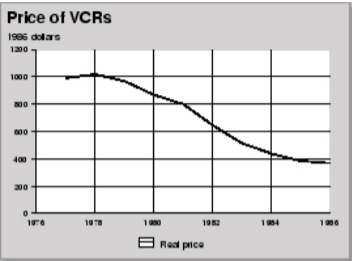
2007-2008 Writers Guild of America Strike

# A Modern Example (with far less importance)

2007-2008 Writers Guild of America Strike

The Importance of Institutions

- ▶ It is a compelling story, but how do we test something like the importance of institutions?
- ▶ Let's start with a very basic approach
- ▶ Is there direct evidence that better institutions are correlated with better economic performance?
- ▶ If so, then we can move on to asking whether there is evidence that better institutions *cause* better economic performance
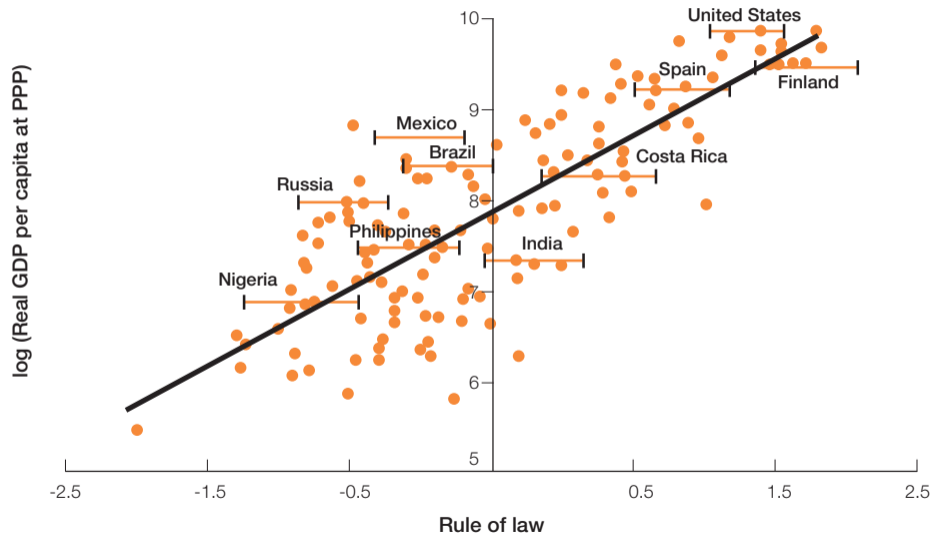
How costly are bad institutions?

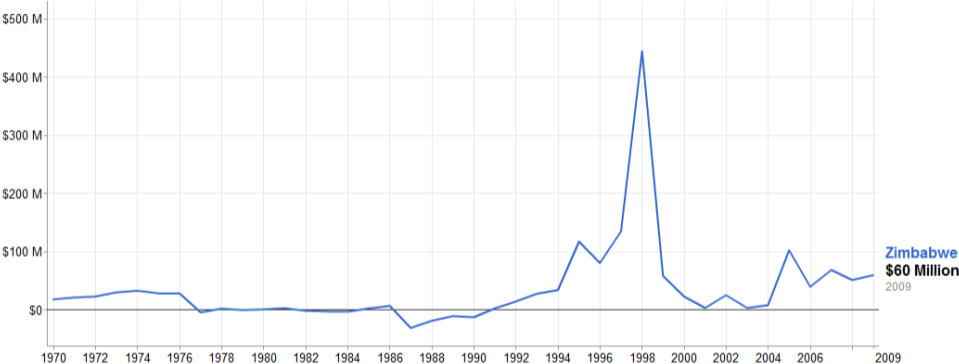**Figure 2.3 Indirect Costs, All Formal Firms—International Comparison**
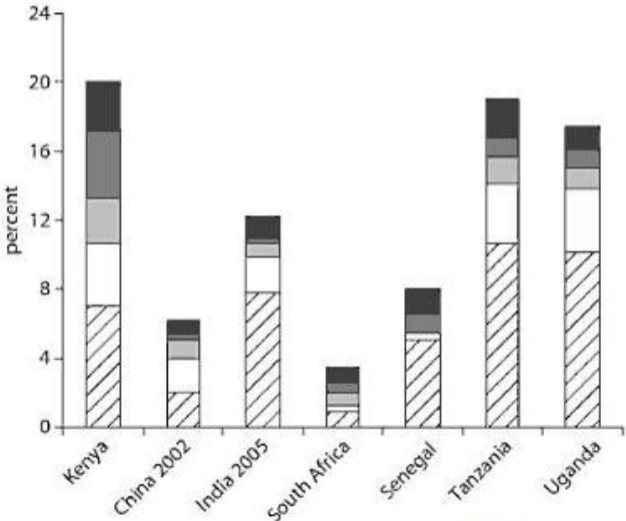
How costly are bad institutions?
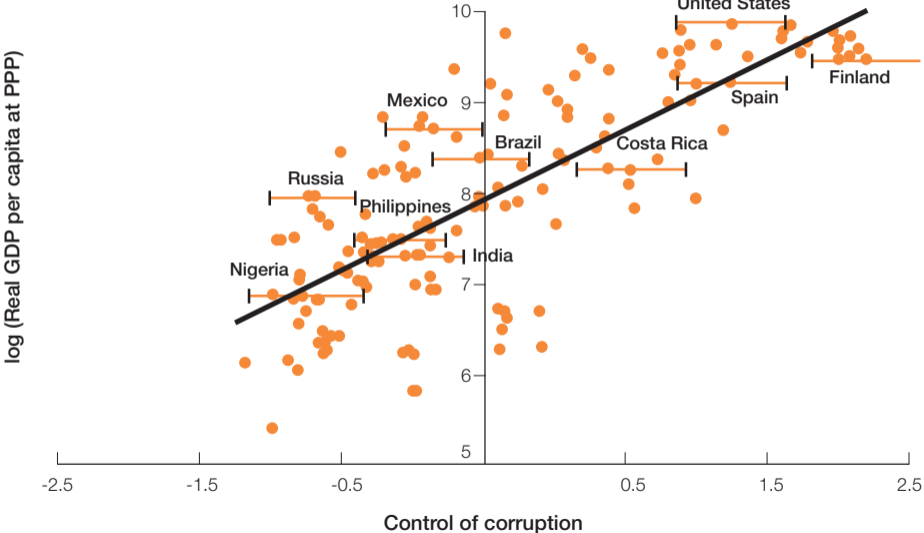
How costly are bad institutions?

How costly are bad institutions?

Foreign direct investment in Zimbabwe, 1970-2009

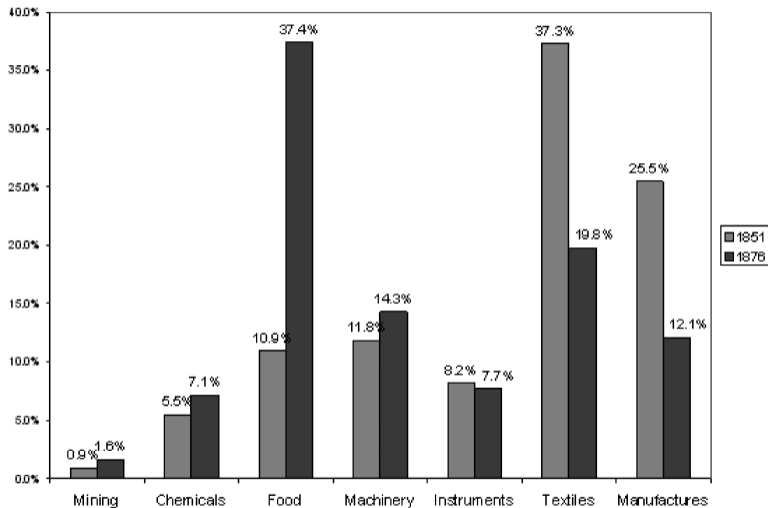# Institutions and the Direction of Innovation

FIGURE 3. DUTCH INNOVATIONS ACROSS INDUSTRIES BEFORE AND AFTER THE ABOLITION OF PATENT LAWS IN 1869

Criticisms of the Institutional Explanation

- ▶ If institutional change is driven by people wanting to improve economic efficiency, institutions themselves aren't that interesting, people will change them when they need changing.
- ▶ People find ways around institutions: consider bans on interest rates (or on scalping)
- ▶ North and Thomas story may help explain 'why Europe' but not necessarily 'why not China, Japan, India, etc.' (more on this later)
- ▶ It's not as clearcut as one might think that the innovations of the Industrial Revolution happened because institutions directed a large part of the returns to the individual

Institutions and Economic Development

Private Returns to Innovation During the Industrial Revolution

Gains from Innovation During the Industrial Revolution

Inventor	Invention	Result
John Kay	flying shuttle	Impoverished by litigation to enforce patent, house attacked by machine breakers, fled to France and died in poverty
James Hargreaves	spinning jenny	Difficulty enforcing patent, forced to flee by machine breakers
Richard Arkwright	water frame	Died wealthy but had trouble enforcing (and keeping) patents
Samuel Crompton	mule	Did not patent invention, did receive an award from parliament but never saw big success
Edmund Cartwright	power loom	Mill repossessed by creditors, factory burned by machine breakers
Eli Whitney	cotton gin	Costly litigation to enforce patent, near bankruptcy
Richard Roberts	self-acting mule	In financial trouble by end of career

Experimental Evidence

- ▶ There are some big questions about institutions as an explanation
- ▶ It could be that societies that develop good institutions develop them because of other traits
- ▶ These other traits may be the truly important causes of economic growth
- ▶ In other words, if institutions are endogenous, they aren't a complete story
- ▶ If we were in the hard sciences, we would set up an experiment: take two Petri dishes with cloned economies in them and put a few drops of good institutions in one and bad institutions in the other

Experimental Evidence

▶ We don't have the luxury of Petri dishes
▶ What we can try to use is a *natural experiment*
▶ From the New Palgrave Dictionary of Economics:

Natural experiments or quasi-natural experiments in economics are serendipitous situations in which persons are assigned randomly to a treatment (or multiple treatments) and a control group, and outcomes are analysed for the purposes of putting a hypothesis to a severe test; they are also serendipitous situations where assignment to treatment approximates randomized design or a well-controlled experiment.

Experimental Evidence

- We don't have the luxury of Petri dishes
- What we can try to use is a *natural experiment*
- A slightly different definition:

  Natural experiments are cases where there is variation in the explanatory variable of interest driven by some random process unrelated to either the dependent variable or important unobserved variables, effectively giving us the equivalent of a randomized trial.

Natural Experiments

- ▶ For example, suppose we want to know how military service affects income later in life
- ▶ The problem is that military service is correlated with lots of other things affecting income
- ▶ It could be that people go into the military because they can't get into college
- ▶ It could be that people go into the military because they want to go to college on the GI Bill
- ▶ Differences in earnings for vets and non-vets may be about these underlying differences in enlistees and non-enlistees, not about the effects of military service
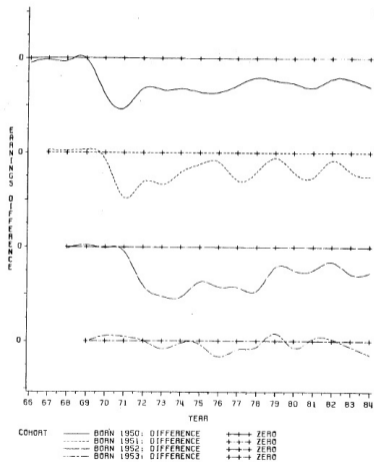
Natural Experiments

Natural Experiments

Natural Experiments

WHITES BORN 1950–1953: SOCIAL SECURITY TAXABLE EARNINGS
DIFFERENCE BY DRAFT ELIGIBILITY STATUS

Natural Experiments

- ▶ Another example, how does having an additional child affect labor force participation?
- ▶ The group of women choosing small families may have different preferences and unobserved characteristics than women choosing large families
- ▶ The difference in labor force participation between these groups may be about preferences for work, family, etc. and not the actual effect of additional children (think back to our Demographic Transition and Industrious Revolution discussions)
- ▶ So how do we get random variation in family size?
- ▶ Is there a draft where if your number is called, you have to have a new kid?

Natural Experiments

Iwatake family, Hawaii, 1930s

Natural Experiments

Child gender and family size (Angrist and Evans, 1998)		
Sex of first two children	Fraction of sample	Fraction who had another child
Boy, girl	0.497	0.331
Two girls	0.239	0.408
Two boys	0.264	0.396
Boy, girl	0.497	0.331
Both same sex	0.503	0.401
Difference		0.07

Natural Experiments

TABLE 7—OLS AND 2SLS ESTIMATES OF LABOR-SUPPLY MODELS USING 1980 CENSUS DATA

	All women			Married women			Husbands of married women		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Estimation method	OLS	2SLS	2SLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS
Instrument for *More than 2 children*	—	*Same sex*	*Two boys, Two girls*	—	*Same sex*	*Two boys, Two girls*	—	*Same sex*	*Two boys, Two girls*
Dependent variable:									
Worked for pay	−0.176 (0.002)	−0.120 (0.025)	−0.113 (0.025) [0.013]	−0.167 (0.002)	−0.120 (0.028)	−0.113 (0.028) [0.013]	−0.008 (0.001)	0.004 (0.009)	0.001 (0.008) [0.013]
Weeks worked	−8.97 (0.07)	−5.66 (1.11)	−5.37 (1.10) [0.017]	−8.05 (0.09)	−5.40 (1.20)	−5.16 (1.20) [0.071]	−0.82 (0.04)	0.59 (0.60)	0.45 (0.59) [0.030]
Hours/week	−6.66 (0.06)	−4.59 (0.95)	−4.37 (0.94) [0.030]	−6.02 (0.08)	−4.83 (1.02)	−4.61 (1.01) [0.049]	0.25 (0.05)	0.56 (0.70)	0.50 (0.69) [0.71]
Labor income	−3768.2 (35.4)	−1960.5 (541.5)	−1870.4 (538.5) [0.126]	−3165.7 (42.0)	−1344.8 (569.2)	−1321.2 (565.9) [0.703]	−1505.5 (103.5)	−1248.1 (1397.8)	−1382.3 (1388.9) (0.549)
ln(*Family income*)	−0.126 (0.004)	−0.038 (0.064)	−0.045 (0.064) [0.319]	−0.132 (0.004)	−0.051 (0.056)	−0.053 (0.056) [0.743]	—	—	—
ln(*Non-wife income*)	—	—	—	−0.053 (0.005)	0.023 (0.066)	0.016 (0.066) [0.297]	—	—	—

Natural Experiments and Institutions

► With this notion of natural experiments, let's rethink the possibility of our Petri dishes and dropper full of institutions

► Perhaps there is a source of exogenous variation in institutions, some variation that is completely independent of the relevant characteristics of the society in question

► The two Acemoglu, Johnson and Robinson papers on the reading list explore this possibility

► Colonized countries will be our Petri dishes

► Colonial powers will be dropping in the institutions

Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution

- ▶ Written by Acemoglu, Johnson and Robinson in the Quarterly Journal of Economics (2002)
- ▶ Argues that countries colonized by Europeans that were rich are now poor
- ▶ The basic argument is the following:
  - ▶ Europeans were more likely to introduce institutions protecting private property in regions that were poor
  - ▶ Europeans were more likely to introduce institutions of extraction in regions that were rich
 - ▶ These institutions led to different development paths and the "reversal of fortune"

Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution

- ▶ If an area was underdeveloped, Europeans had the incentives to encourage development in order to make the colony valuable to the Europeans
- ▶ In these cases, Europeans were likely to introduce *institutions of private property*
- ▶ In AJR's words:
  ...a cluster of institutions ensuring secure property rights for a broad cross section of society...essential for investment incentives
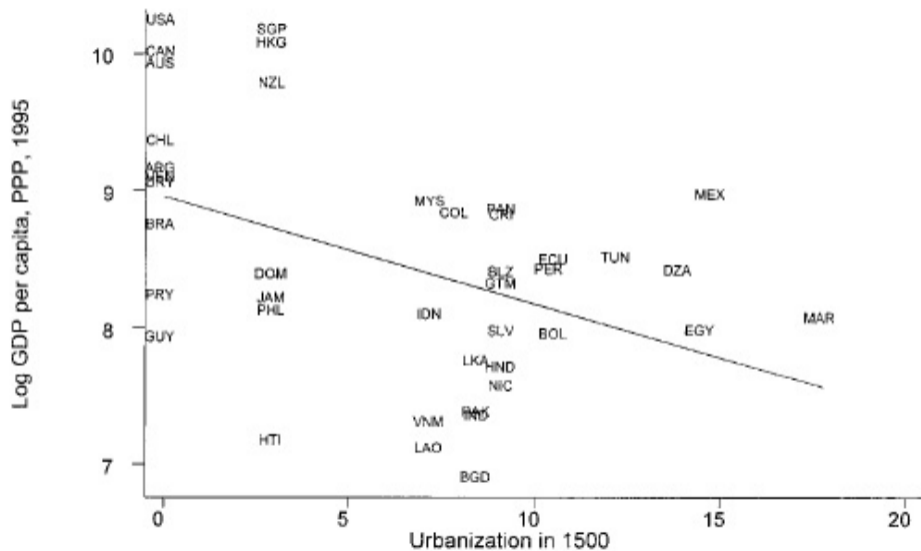
Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution

- ▶ If an area was already well developed, Europeans were more likely to focus on the short term benefits of extracting as much of the wealth and resources as possible
- ▶ In these cases, Europeans were likely to introduce *extractive institutions*
- ▶ In AJR's words:

  ...[institutions] which concentrate power in the hands of a small elite and create a high risk of expropriation for the majority...[and] discourage investment and economic development...
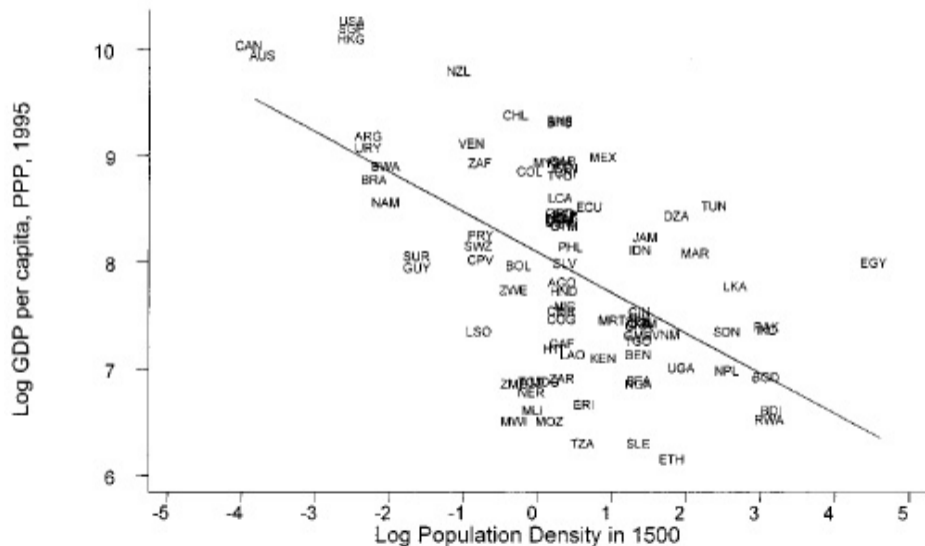
Modern GDP and Urbanization Rates

Urbanization Rates Over Time
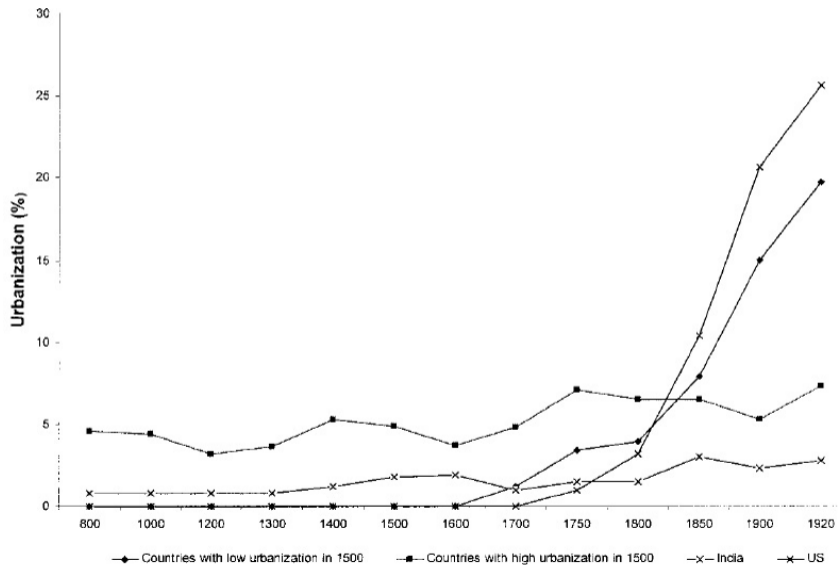
Economic Development and Urbanization in 1500

Economic Development and Population Density in 1500

The Resource Curse

MINERAL EXPORTS AND GROWTH, 1970–2008

Figure axes: AVERAGE ECONOMIC GROWTH RATE % (vertical, -2 to 10%); FUELS, ORES AND METALS EXPORTS AS A PERCENTAGE OF MERCHANDISE EXPORTS (horizontal, 0 to 100%)

The Colonial Origins of Comparative Development

- ▶ Written by Acemoglu, Johnson and Robinson in the American Economic Review (2001)
- ▶ Similar to other argument, development depends on the types of institutions Europeans set up
- ▶ Type of institutions is determined by whether Europeans could settle the area
- ▶ Areas with high mortality rates for Europeans were more likely to get extractive institutions
- ▶ Areas with low mortality rates were better for settling long term and if you want to be there for a while, you want good institutions

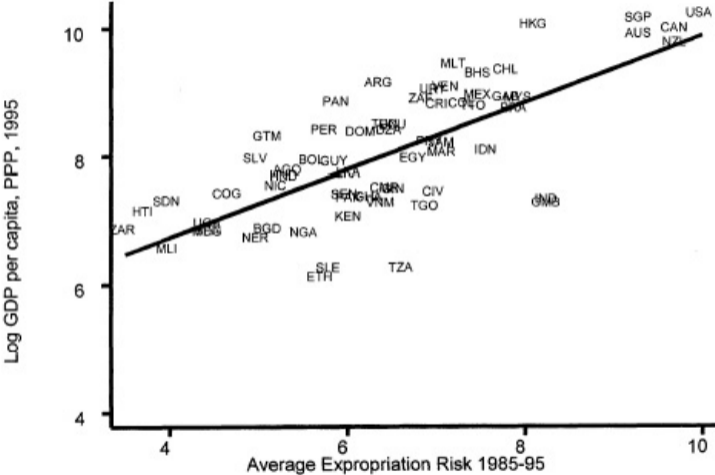# Economic Development and Colonial Mortality


Distribution of Malaria
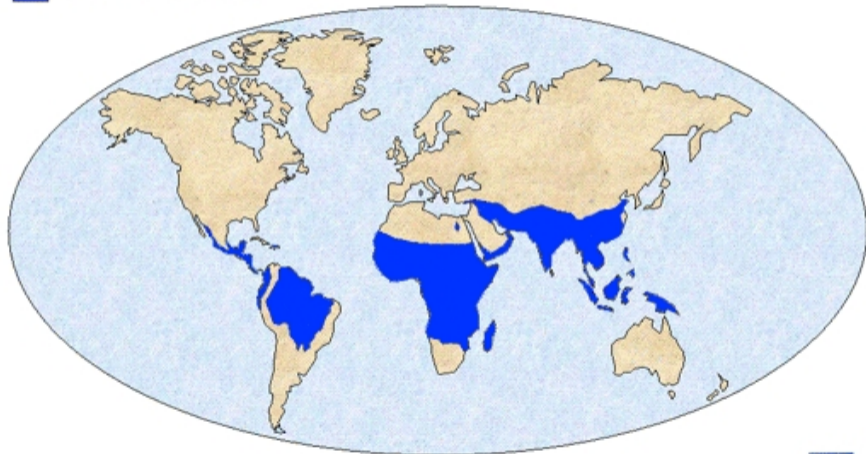
Economic Development, Institutions and Settler Mortality

	Quartiles of settler mortality			
	Bottom	2nd	3rd	Top
Log GDP per capita in 1995	8.9	8.4	7.7	7.2
Average protection against expropriation risk, 1985-1995	7.9	6.5	6	5.9
Constraint on executive in 1990	5.3	5.1	3.3	2.3
Constraint on executive in 1900	3.7	3.4	1.1	1
Democracy in 1900	3.9	2.8	0.19	0
European settler mortality rate	20	74	134	545

Economic Development and Expropriation Risk

Horizontal axis measures protection against expropriation risk, so a higher number means less expropriation risk

Economic Development and Colonial Mortality
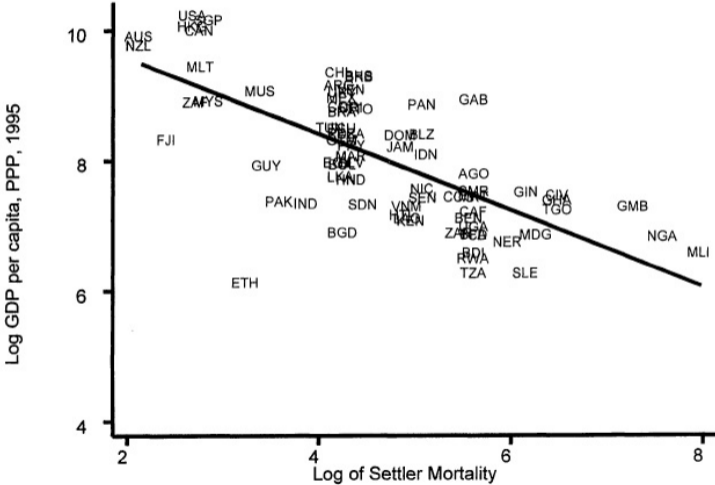
Evidence from Europe

- Acemoglu, Johnson and Robinson offer empirical evidence for institutions and economic growth in colonies, but what about institutions in Europe?
- Is there an exogenous source of institutional change within European countries?
- Let's look at some very recent work by Dittmar and Meisenzahl on Germany in the 1500s
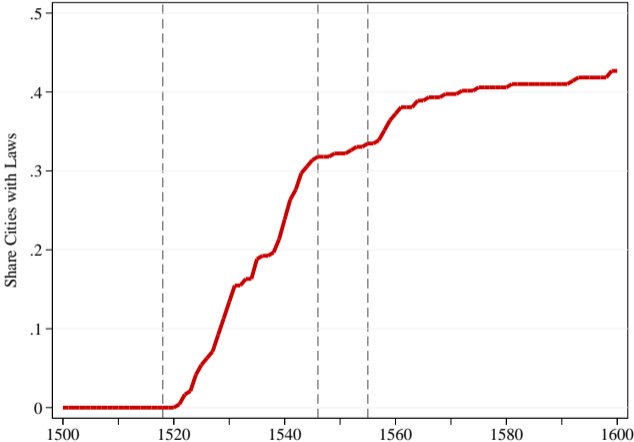
Evidence from Europe
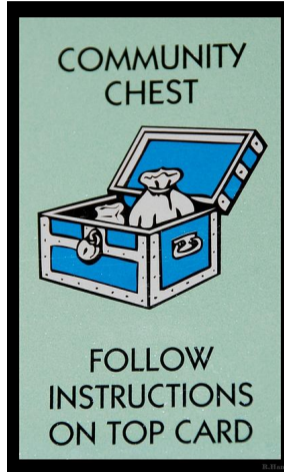
Evidence from Europe
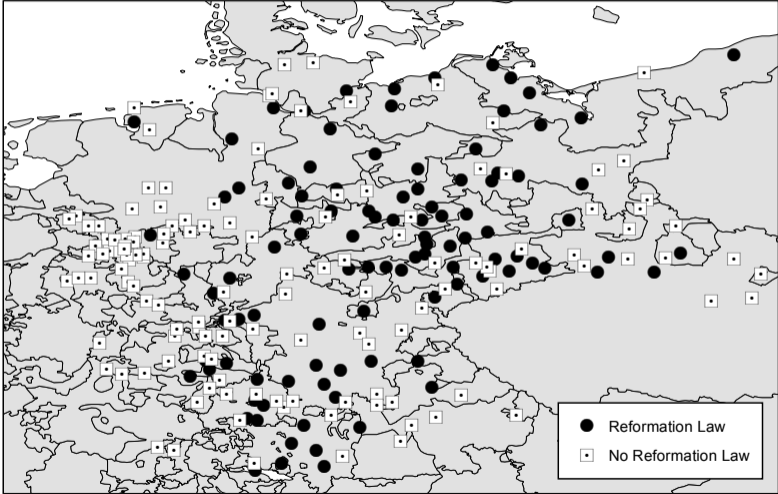
Evidence from Europe

Figure 2: The Share of Cities with Reformation Laws

This graph shows the share of cities with a Reformation Law. Vertical lines mark the mass circulation of Luther's ideas in 1518, the Schmalkaldic War of 1546, and the Peace of Augsburg in 1555.
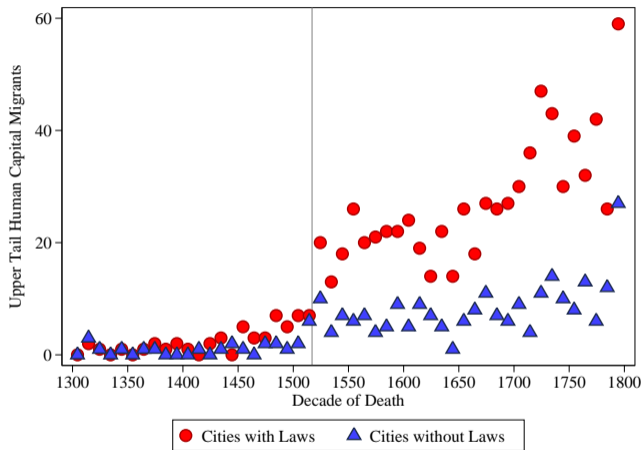
Evidence from Europe

Figure 1: Cities With and Without Reformation Laws

This map shows cities with Reformation Laws (black circles) and without these laws (white squares).

Evidence from Europe

Figure 3: The Migration of Upper Tail Human Capital

This graph plots the number of migrants observed in the *Deutsche Biographie* at the decade level in cities with and without laws. Migrants are identified as people living and dying in town i but born in some other location j. The vertical line is at 1518, the year Luther's theses began circulating.

Evidence from Europe

Figure 5: City-Level Plague Outbreaks
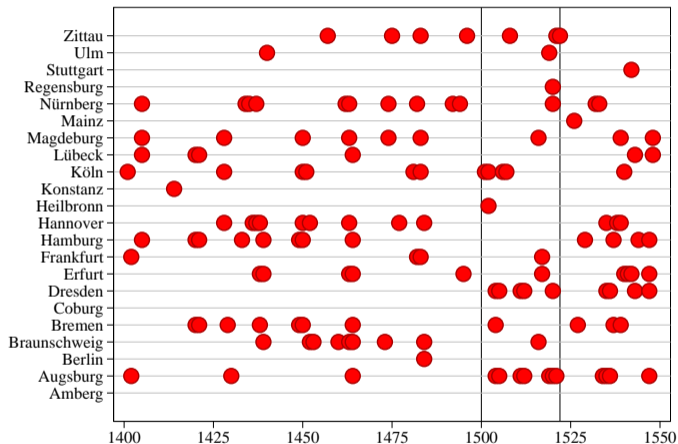
This graph shows the timing of major plague outbreaks in selected cities between 1400 and 1550. Source: Biraben (1975). The vertical lines at 1500 and 1522 delimit the period used in our baseline instrumental variable analysis to construct the early 1500s plague exposure instrument.

Reconciling Institutions Stories

- ▶ So we have some quasi-experimental evidence that institutions matter
- ▶ This would then back up the North and Thomas story about the role of institutions in industrialization
- ▶ But there is a problem, North and Thomas emphasized people altering institutions when it made economic sense to do so
- ▶ If bad institutions led to bad economic outcomes in Africa, why not change them?
- ▶ Another issue with this experiment in institutions, why was Europe able to colonize Africa in the first place?

Reconciling Institutions Stories

- ▶ So new questions emerge from our attempts to answer our big question
- ▶ Why are some bad institutions persistent even when there are big economic incentives to change them?
- ▶ Where did this big differences emerge that led to Europe being in a position to alter African institutions?
- ▶ Is there some bigger picture long run process that the institutional story is just one piece of?
- ▶ To look at these questions, we'll consider work on comparative development by Nathan Nunn and Jared Diamond
- ▶ First, the question of persistent bad institutions

Persistent Bad Institutions

Mobutu Sese Seko, in power 1965 to 1997

Persistent Bad Institutions

Most corrupt leaders, Global Corruption Report 2004 (Transparency International)

Head of State	Country	Time Period	Funds Embezzled	GDP per capita (2001)
Mohamed Suharto	Indonesia	1967-1998	$15 to 35 billion	$695
Ferdinand Marcos	Philippines	1972-1986	$5 to 10 billion	$912
Mobutu Sese Seko	Zaire	1965-1997	$5 billion	$99
Sani Abacha	Nigeria	1993-1998	$2 to 5 billion	$319
Slobodan Milosevic	Serbia/Yugoslavia	1989-2000	$1 billion	n/a
Jean-Claude Duvalier	Haiti	1971-1986	$300 to 800 million	$460
Alberto Fujimori	Peru	1990-2000	$600 million	$2051
Pavlo Lazarenko	Ukraine	1996-1997	$114 to 200 million	$766
Arnoldo Aleman	Nicaragua	1997-2002	$100 million	$490
Joseph Estrada	Philippines	1998-2001	$78 to 80 million	$912

Persistent Bad Institutions

Imelda Marcos' shoe collection, 1986

Persistent Bad Institutions

- ▶ A corrupt leader might resist good institutions for personal gain
- ▶ Counterargument: potential personal gain is bigger if GDP is bigger
- ▶ Counter-counterargument: not if embezzled funds come out of aid (see one of our recent Nobel laureates)
- ▶ Another counterargument: this level of corruption creates strong incentives for revolt
- ▶ This fits in with North and Thomas (and the writers' strike)
- ▶ Institutional change is costly but at some point benefits exceed the costs

Back to Mobutu

Laurent-Desire Kabila and the Alliance of Democratic Forces for the Liberation of Congo

Back to Mobutu

Fall of the Berlin Wall, 1989

Back to Mobutu

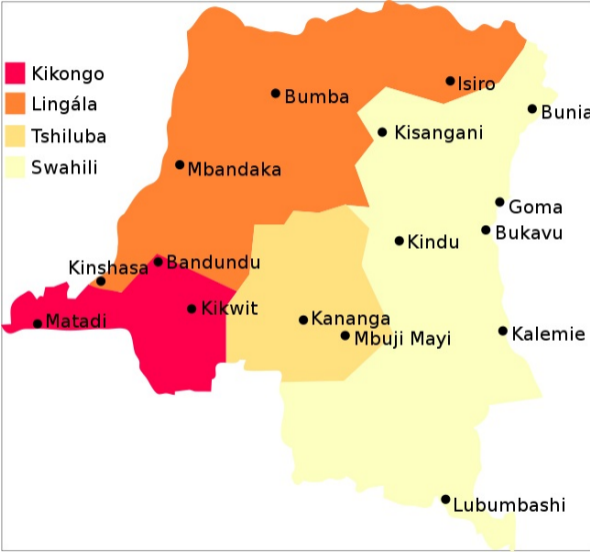Copper futures prices, USD per metric ton

Back to Mobutu

Rwandan refugee camp in East Zaire

Back to Mobutu

Languages in the Democratic Republic of the Congo

The Persistence of Bad Institutions

- ▶ In the case of Mobutu, bad institutions seemed to persist for a couple of reasons
- ▶ A big one was the backing of more powerful governments
- ▶ A second was the nature of the sources of wealth
- ▶ When conditions changed, revolt finally happened
- ▶ However, this revolt didn't automatically lead to good institutions and economic prosperity for all
- ▶ The Democratic Republic of the Congo still had major issues stemming from ethnic fractionalization, highlighting the important role of social institutions

A Slightly Different Take on African Development

- ▶ This brings us to another economist's approach to the issues of institutions and African development
- ▶ Nathan Nunn and "The Long Term Effects of Africa's Slave Trade"
- ▶ Nunn looks at the effects of slave trading in Africa on modern economic outcomes of African countries
- ▶ He explores the argument of whether slave trades and colonialism are an explanation of African underdevelopment
- ▶ This argument has elements of governmental institutions but also social institutions and helps explain the persistence of bad institutions

Quick Overview of the Slave Trade

- ▶ Slave trade lasted from roughly 1400 to 1900
- ▶ Colonial rule in Africa lasted roughly between 1885 to 1960
- ▶ Four different slave trades:
  - ▶ Trans-Atlantic: slaves taken from West Africa, West-Central Africa and Eastern Africa to European colonies in the New World
  - ▶ Trans-Saharan: slaves taken from south of the Saharan desert to Northern Africa
  - ▶ Red Sea: slaves taken from inland Africa and shipped to Middle East and India
  - ▶ Indian Ocean: slaves taken from Eastern Africa and shipped to Middle East, India and plantation islands in the Indian Ocean

Quick Overview of the Slave Trade

AFRICAN SLAVE TRADE, 1500–1870
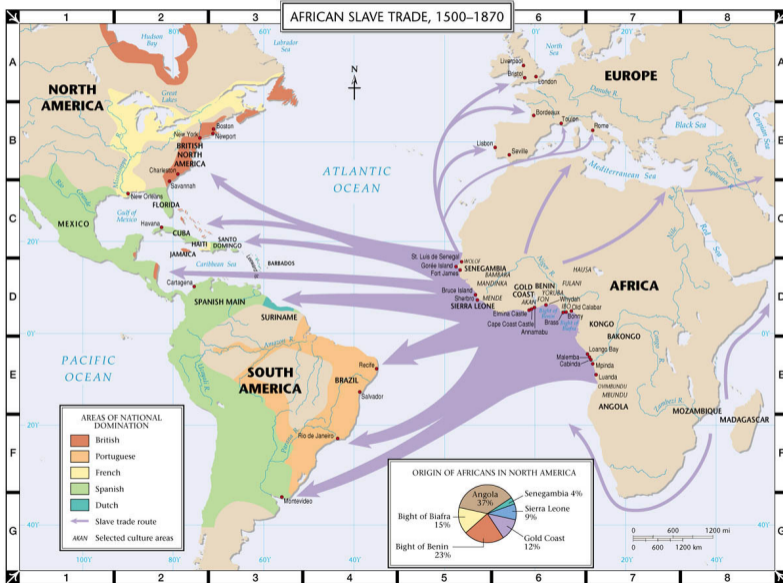
Quick Overview of the Slave Trade

- ▶ Over 18 million slaves were exported (12 million were through trans-Atlantic trade)
- ▶ Estimated that by 1850, Africa's population was half of what it would have been without the slave trade
- ▶ Slave trade led to social and ethnic fragmentation, political instability, weakening of states, corruption of judicial institutions

Countries Exporting the Most Slaves, 1400-1900

ESTIMATED TOTAL SLAVE EXPORTS BETWEEN 1400 AND 1900 BY COUNTRY

| Isocode	Country name	Trans-Atlantic	Indian Ocean	Trans-Saharan	Red Sea	All slave trades
AGO	Angola	3,607,020	0	0	0	3,607,020
NGA	Nigeria	1,406,728	0	555,796	59,337	2,021,859
GHA	Ghana	1,614,793	0	0	0	1,614,793
ETH	Ethiopia	0	200	813,899	633,357	1,447,455
SDN	Sudan	615	174	408,261	454,913	863,962
MLI	Mali	331,748	0	509,950	0	841,697
ZAR	Democratic Republic of Congo	759,468	7,047	0	0	766,515
MOZ	Mozambique	382,378	243,484	0	0	625,862
TZA	Tanzania	10,834	523,992	0	0	534,826
TCD	Chad	823	0	409,368	118,673	528,862

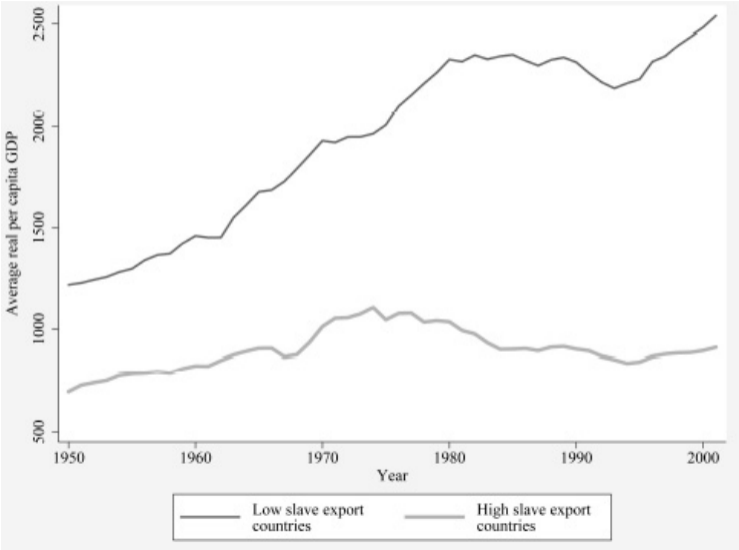# Countries Exporting the Most Slaves, 1400-1900
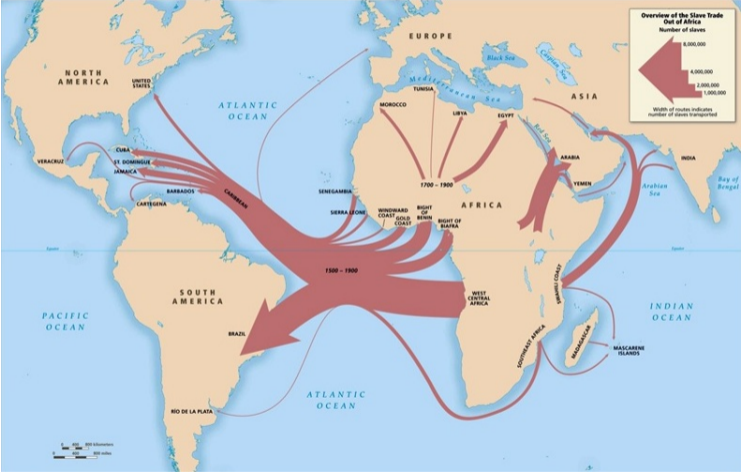
Countries Exporting the Most Slaves, 1400-1900
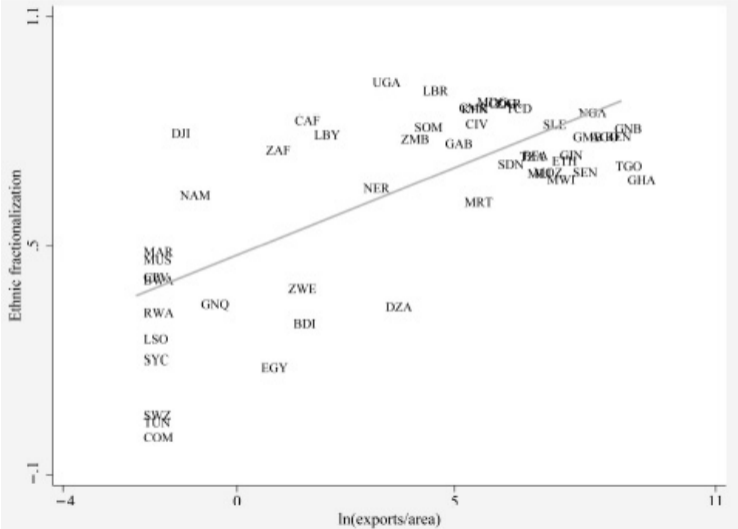
Slaves Exports and Modern GDP per Capita
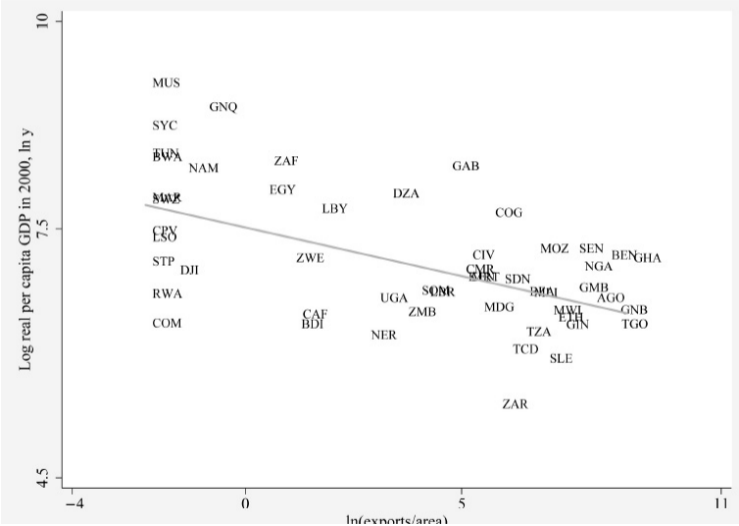
Economic Growth for Countries with the Lowest and Highest Slave Exports

The Long Term Effects of Conquest

- ▶ Clearly some areas of Africa were far more affected by slavery than others
- ▶ Today, those areas that exported the most slaves are less economically developed
- ▶ So why is this an institutions story?
- ▶ Nunn's answer is that the slave trade had profound impacts on several features of institutional development:
  - ▶ Ethnic fractionalization
  - ▶ State development
  - ▶ Levels of distrust

Slaves Exports and Modern Ethnic Fractionalization

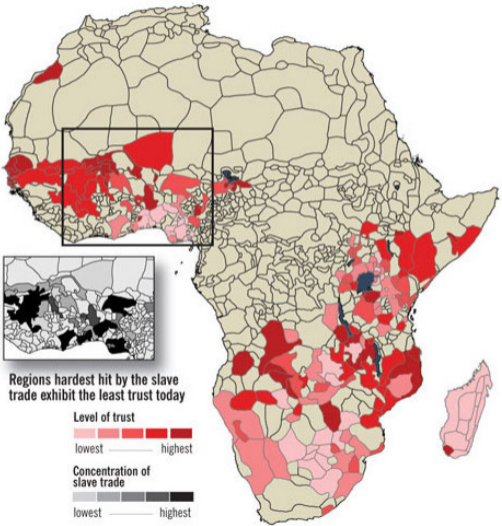# Slaves Exports and 19th Century State Development
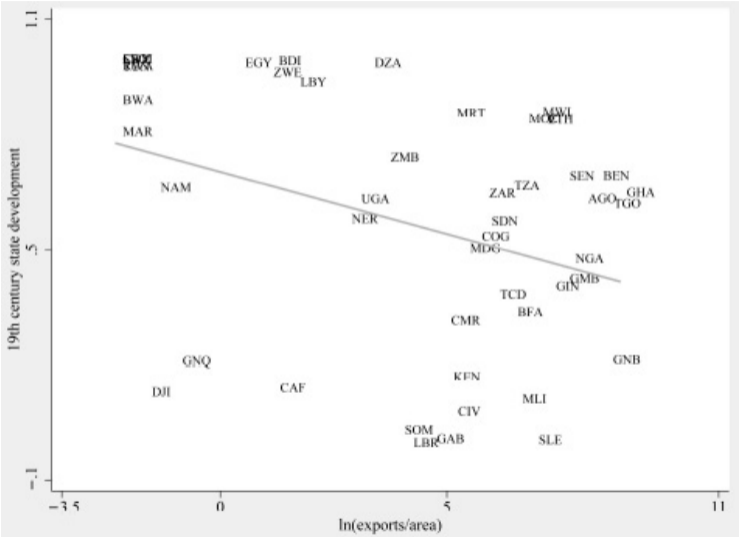
Slaves Exports and Modern Distrust

Regions hardest hit by the slave trade exhibit the least trust today

Level of trust
lowest — highest

Concentration of slave trade
lowest — highest

Returning to Europe

Plünderung der Judengassen zu Franckfurt am Main den 22 August 1614. Nach Mittag umb 8 uhr von den Handtwerck gesellen angefangen, und die gantze Nacht durch Continuirt, da doch ein Burger und 2 Luden gar tods plieben, viel ober beiderseits beschedigt worden, biß sie entlich als sie biß in die helfft der gassen komen, von der Burgerschafft zuruckhgetrieben und gentzlich abge- wehret worden.
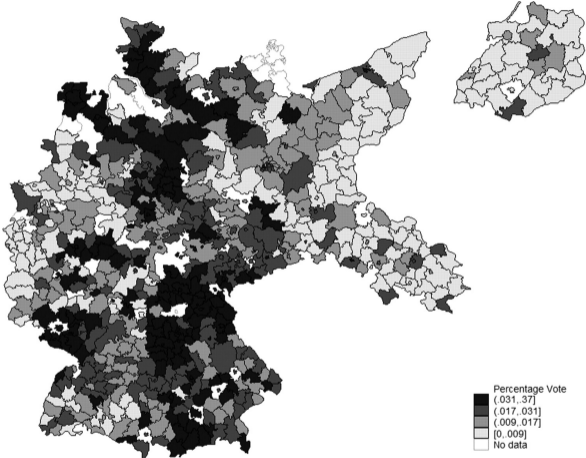
Returning to Europe

Returning to Europe

Percentage of votes for the NSDAP in the German National Election of 1928
(Voigtlander and Voth, 2012)

Returning to Europe

Returning to Europe

Trust and Corruption in Courts and Police: Border Specification

	Trust in courts	Trust in police	Bribes to courts	Bribes to traffic police
	(1)	(2)	(3)	(4)
Part of Habsburg Empire	0.229	0.169	−0.373	−0.342
	(0.132)*	(0.109)	(0.205)*	(0.174)**
Age of respondent	−0.00009	0.009	−0.006	−0.018
	(0.002)	(0.002)***	(0.004)*	(0.003)***
Male respondent	−0.018	−0.035	0.026	0.275
	(0.067)	(0.066)	(0.097)	(0.080)***
Native language	−0.240	0.004	0.030	0.116
	(0.188)	(0.152)	(0.311)	(0.274)
Ethnic minority	−0.330	−0.309	−0.149	−0.178
	(0.135)**	(0.125)**	(0.203)	(0.171)
Controls for religious affiliation (6 categories)	Yes	Yes	Yes	Yes
Used service in last 12 months			0.936	1.104
			(0.194)***	(0.142)***
Country-fixed effects	Yes	Yes	Yes	Yes
No. of observations	3,359	3,409	3,572	3,574
No. of PSUs	180	180	180	180
Pseudo-R^2	0.019	0.015	0.038	0.054

Institutions as an Explanation

- ▶ So Nunn's work gives us insight into why a bad shock to institutions may have persistence
- ▶ These social dimensions of the effects of slavery can make it difficult for good government institutions to take hold and be effective
- ▶ These issues were compounded by the political boundaries drawn by colonial powers
- ▶ One takeaway from Nunn: dropping in good institutions may not be sufficient
- ▶ One question remaining from Nunn and AJR: why were Europeans able to alter African institutions?
- ▶ Why wasn't it Africa colonizing Europe?
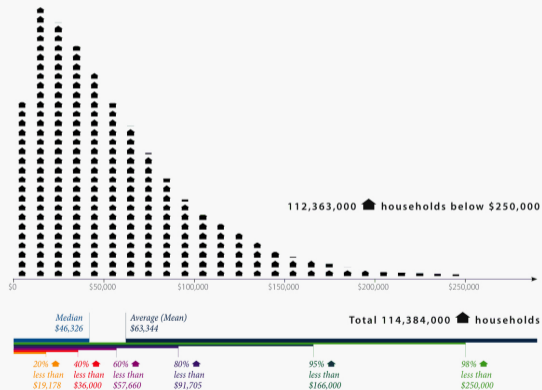
Population-Weighted Country Centers
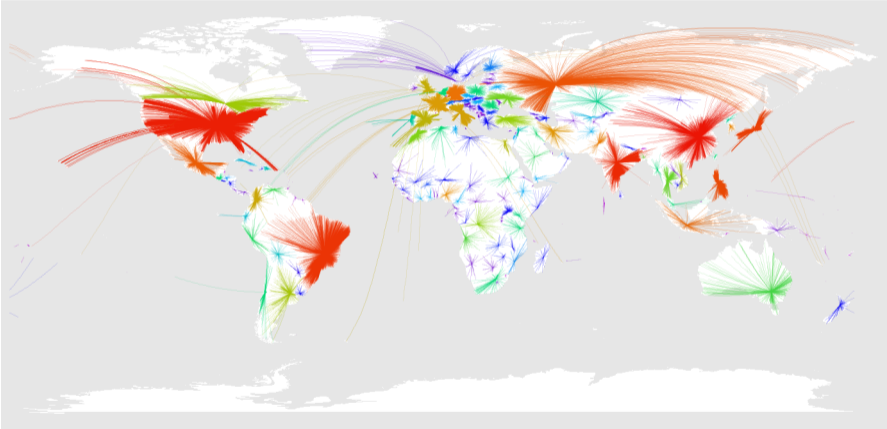
Population-Weighted Country Centers

Midterm Details

- ▶ The midterm is on Thursday in class
- ▶ The exam will cover lecture material up to and including the 2/22 lecture
- ▶ The covered readings are: Clark (2008), Steckel (2008), Bocquet-Appel (2011), Mokyr (2008), De Vries (1994)
- ▶ You will be allowed to bring hard copies of anything you want (readings, notes, slides) but they must be hard copies
- ▶ You will not be allowed to access any electronic devices

Midterm Details

A few study tips:

- ▶ If you haven't already, look at past midterms (including recent Econ 341 exams) to get a sense of the style of questions, this helps guide your approach to studying

- ▶ That also helps guide your approach to notes and materials to bring with you

- ▶ When looking at past midterms, keep in mind that they might cover some material that we haven't reached yet and might cover papers that I've cut

- ▶ When grading, I'm looking primarily for logic and a grasp of the big elements of readings and lectures, not minute details

- ▶ I'm also typically asking you to extend or critique a concept from class or a reading, not to just regurgitate it

- ▶ Make certain you can explain the various arguments from class and readings in your own words

Announcements

- ▶ Today we'll start in on explanations of the Industrial Revolution
- ▶ Required readings:
  - ▶ North and Thomas (1970) "An economic theory of the growth of the Western World." *Economic History Review* (next two weeks)
  - ▶ Acemoglu, Johnson and Robinson (2001) "The colonial origins of comparative development." *American Economic Review* (next two weeks)
- ▶ I'm about halfway through your second homework assignments, grades should be up soon

Announcements

- ▶ Today we're hitting the ground running with explanations of the Industrial Revolution
- ▶ Required readings:
  - ▶ North and Thomas (1970) "An economic theory of the growth of the Western World." *Economic History Review* (next two weeks)
  - ▶ Acemoglu, Johnson and Robinson (2001) "The colonial origins of comparative development." *American Economic Review* (next two weeks)
- ▶ I'm hoping to have your midterms graded by Thursday (emphasis on the hopeful aspect of that)
- ▶ You do have your comments on the second homework assignment up on Blackboard
- ▶ Let's spend a few minutes talking about the upcoming homework assignments

Homework Assignments

▶ Your third assignment is upping the difficulty level one more notch (the final two are going to go in totally different directions)

▶ What accounts for the step up in difficulty? Making maps!

▶ We'll take a bit of lecture today to help get you prepped for this by focusing on two ultra-useful things:

  ▶ Merging data from different sources
  ▶ Mapping that data with Datawrapper (a great option if you are not comfortable with GIS software)

Merging Datasets

- One thing that I have fielded multiple questions on over the first two assignments is how to merge two different datasources together
- Let's go over a couple different approaches that I would take
- First, the fancy-pants econ professor approach:
  - I'd convert both data sources to Stata datasets
  - Sort and save each dataset in Stata based on the common variable (state name, county FIPS code, etc.)
  - Use Stata's merge command with the 1:1 option
  - Fix errors and then embrace a merged dataset

Merging Datasets

- One thing that I have fielded multiple questions over the first two assignments is how to merge two different datasources together
- Let's go over a couple different approaches that I would take
- Now, the approach for 99.99% of people:
  - Open both of your datasets in two separate Excel windows
  - For both, sort on the variable that matches observations across datasets (be certain to sort all columns, not just one)
  - Now, copy the data from one dataset into the sheet for the other (both the common column and the new data series)
  - Create a function that checks with the common column matches
  - Use that column to go through and add/delete cells as necessary, being careful to keep numbers associated with the right ID

Merging Datasets and Mapping Data

▶ Let's give the Excel approach a shot and then use the result to also get a little practice making maps

▶ Here's what we're going to do:
  ▶ Pull a dataset on Bigfoot sightings in the US
  ▶ Merge that with a dataset on UFO sightings using Excel
  ▶ Create maps of both using Datawrapper

Announcements

- ► More discussion of institutions today, including Acemoglu, Johnson and Robinson (2001)
- ► When we get back from spring break, we'll tackle more on geography-based stories
- ► Required readings coming up after break:
  - ► Diamond (2004) "Economics: The Wealth of Nations" *Nature*
  - ► Clark (2008) *A Farewell to Alms: A Brief Economic History of the World* (Chapter 13 excerpt)
- ► Still working on the midterm grading but hope to have grades posted soon
- ► Start working on assignment 3, due 3/21 (note that the assignment instructions were updated last week to ask for a second paragraph of interpretation)

Announcements

- ► Welcome back!
- ► We're going to wrap up our initial discussion of institutional stories today and move on to geography-based stories
- ► Required readings for this week and next:
  - ► Diamond (2004) "Economics: The Wealth of Nations" *Nature*
  - ► Clark (2008) *A Farewell to Alms: A Brief Economic History of the World* (Chapter 13 excerpt)
- ► Hopefully you've taken a look at the comments on your midterm (should be with your grade on Blackboard), let me know if you have any questions
- ► Wrap up Assignment 3, due 3/21, and swing by office hours or email with any questions
- ► On Thursday, we'll talk about Assignment 4 which will take us to the Special Collections