The Very Long Run

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The Very Long Run

• Economist want to understand the growth experience of ALL human history (*Big History Movement*).

• What are the big puzzles:
  1. Why are there so big differences in income today?
  2. Why did the West develop first? or Why not China? or India?

• Data Considerations.
Where Does Data Come From?

- Statistics: Customs, Tax Collection, Census, Parish Records.

- Archeological Remains: Farms, Skeletons.

- Literary Sources: Memories, Diaries, Travel Books.
Some Basic Facts I

• For most human history, income per capita growth was glacially slow.

• Before 1500 little or no economic growth.

Paul Bairoch (Economics and World History: Myths and Paradoxes)

1. Living standards were roughly equivalent in Rome (1st century A.D.), Arab Caliphates (10th Century), China (11th Century), India (17th century), Western Europe (early 18th century).

2. Cross-sectional differences in income were a factor of 1.5 or 2.
Some Basic Facts II

- Angus Maddison (The World Economy: A Millenial Perspective) calculates 1500-1820 growth rates:

  1. World GDP per capita: 0.05%.

  2. Europe GDP per capita: 0.14%.

- After 1820: great divergence in income per capita.
**Figure 1.8**
World Inequality and Its Components, 1820–1992

Inequality

- **Total world inequality**
- **Inequality between countries**
- **Inequality within countries**

Year

1820 1840 1860 1880 1900 1920 1940 1960 1980 2000

Source: Bourguignon and Morrison (2002).
Europe Becomes Dominant

• From 1492 to 1770, different human populations come into contact. European countries expand until early 20th century:

1. American and Australia: previous cultures were nearly wiped out.

2. Asia: partial control.

3. Africa: somehow in the middle.

• Proximate causes: weaponry and social organization of Europeans was more complex.

• Ultimate causes: why?
Possible Explanations

- Geography.
- Colonies.
- Culture.
Geography

• How can Geography be important?

• Examples:

  1. Europe is 1/8 of the size of Africa but coastline is 50% longer.


• Let’s look at a map.
Figure 9.
Populations remote from coastline or major navigable river
Figure 15.2
Regional Variation in Income and Access to the Sea

Jared Diamond (*Guns, Germs, and Steel*): geography.

- Euroasia is bigger (50% than America, 250% as Sub-saharian Africa, 800% than Australia):

  1. More plants i.e. out of 56 food grains, 39 are native to Euroasia, 11 to America, 4 to Sub-saharian Africa, and 2 to Australia.


- Euroasia is horizontal: transmission of technology, plants, and animals.

- Consequence: higher population density→guns and germs.
Why Not China?

- But, how can Diamond explain China?

- Between the 8th and the 12th century, China experienced a burst of economic activity: gunpowder, printing, water-powered spinning wheel


- With the arrival of the Ming dynasty (1368), China stagnates.

- Europe gets ahead.
Eric Jones (*The European Miracle*): geography, hypothesis 1.

- China was first unified around 221 B.C. Since then, except for relatively short periods, unified state (last partition ended with arrival of Mongols in 13th century).

- Europe has never been unified since the fall of Roman Empire (476 a.d.).

- Why? Dispersion of core areas.
Figure 15.3
Core Areas in Preindustrial Europe

Source: Pounds and Ball (1964).
FIGURE 15.4
Core Areas in PreIndustrial China


- Coal:
  1. Far away from production centers
  2. Steam engine versus ventilations.

- Environmental limits.
Colonies

Immanuel Wallerstein (The Modern World System).

- Small initial differences in income.

- Patterns of labor control and trade policies created “plantation” economies.

- Trade: primary goods for manufacturing.

- Forward and Backward linkages.
Differences across Colonies


• Differences in settlers mortality.

• Differences in outcomes:

  1. British America: 9 universities for 2.5 million people.

  2. Spanish and Portuguese America: 2 universities for 17 million people.
(first-stage) relationship between settler mortality rates and current institutions, which is interesting in its own right. The regression shows that mortality rates faced by the settlers more than 100 years ago explains over 25 percent of the variation in current institutions. We also document that this relationship works through the channels we hypothesize: (potential) settler mortality rates were a major determinant of settlements; settlements were a major determinant of early institutions (in practice, institutions in 1900); and there is a strong correlation between early institutions and institutions today. Our two-stage least-squares estimate of the effect of institutions on performance is relatively precisely estimated and large. For example, it implies that improving Nigeria’s

institutions,\(^4\) including constraints on government expropriation, independent judiciary, property rights enforcement, and institutions providing equal access to education and ensuring civil liberties, that are important to encourage investment and growth. Expropriation risk is related to all these institutional features. In Acemoglu et al. (2000), we reported similar results with other institutions variables.

\(^4\) Differences in mortality rates are not the only, or even the main, cause of variation in institutions. For our empirical approach to work, all we need is that they are a source of exogenous variation.

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

The exclusion restriction implied by our instrumental variable regression is that, conditional on the controls included in the regression, the mortality rates of European settlers more than 100 years ago have no effect on GDP per capita today, other than their effect through institutional development. The major concern with this exclusion restriction is that the mortality rates of settlers could be correlated with the current disease environment, which may have a direct effect on economic performance. In this case, our instrumental-variables estimates may be assigning the effect of diseases on income to institutions. We believe that this is unlikely to be the case and that our exclusion restriction is plausible. The great majority of European deaths in the colonies were caused by malaria and yellow fever. Although these diseases were fatal to Europeans who had no immunity, they had limited effect on indigenous adults who had developed various types of immunities. These diseases are therefore unlikely to be the reason why many countries in Africa and Asia are very poor today (see the discussion in Section III, subsection A). This notion is
Cultural Differences: Yes

- Max Weber (*The Protestant Ethic and the Spirit of Capitalism*)

- Letter from the Chinese emperor Qian Long to King George III of England:

  “Our dynasty’s majestic virtue has penetrated unto every country under Heaven...As your Ambassador can see for himself, we possess all things. I set no value on objects strange or ingenious, and have no use for your country’s manufactures”.

- Leibniz’s Instructions to a European traveler to China:

  “Not too worry so much about getting things European to the Chinese, but rather about getting remarkable Chinese inventions to us”.

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Cultural Differences: No

- A Western traveler, 1881
  “The Japanese are a happy race, and being content with little, are not likely to achieve much”.

- Karen Kupperman (*Providence Island, 1630-1641: The Other Puritan Colony*):
  Documents differences between Providence Island and New England.

- Philip Benedict (*The Faith and Fortunes of France’s Huguenots*):
  Differences between Catholics and Huguenots in France.
An Empirical Application:

Population Growth and Technological Change since 1 Million B.C.

- Basic lesson so far: growth depends on technology progress.

- Intuition: more people probably must imply higher knowledge accumulation.

- Growth and population may be closely linked.

- Empirical evidence.
A Simple Model

- Production function:
  \[ Y = T^\alpha (AL)^{1-\alpha} \]

- Technology progress:
  \[ \dot{A} = BAL \]

- Malthusian assumption:
  \[ \frac{Y}{L} = y^* \]
Solving the Model

• We find the level of population allowed by a technology:

\[ T^\alpha (AL)^{1-\alpha} L = y^* \Rightarrow L^* = \left( \frac{1}{y^*} \right)^{\frac{1}{\alpha}} A^{\frac{1-\alpha}{\alpha}} T \]

• Growth rate of population:

\[ \frac{\dot{L}^*}{L^*} = \frac{1 - \alpha \dot{A}}{\alpha A} \]

• Then:

\[ n_t = \frac{\dot{L}^*}{L^*} = \frac{1 - \alpha BAL}{\alpha A} = \frac{1 - \alpha}{\alpha} BL \]
Time Series Evidence

- A first look at the data.

- Regression:

\[
\begin{align*}
    n_t &= -0.0026 + 0.524 L_t \\
        &\quad (0.0355) \quad (0.0258) \\
    R^2 &= 0.92, \ D.W = 1.10
\end{align*}
\]

- Robust to different data sets and specifications.
Cross-Section Evidence

- World population was separated from 10,000 BC to circa 1500 AD

- Population and Population Density circa 1500:

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<th></th>
<th>Land Area</th>
<th>Population</th>
<th>Pop/km²</th>
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<tr>
<td>“Old World”</td>
<td>83.98</td>
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<td>Americas</td>
<td>38.43</td>
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<td>0.0012-0.005</td>
<td>0.018-0.074</td>
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<td>Flinders Islands</td>
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- England vs. Europe and Japan vs. Asia.