Europe Gets Ahead

Jesús Fernández-Villaverde

University of Pennsylvania

February 28, 2010
A Big Question and a Small Question

- Big question: why Europe first?

- Small question: why, within Europe, Great Britain first?
Figure 5: Welfare Ratios
Figure 4. Welfare Ratios in Europe and Beijing
Figure 6: Welfare ratios in Asia
First noted by De Vries (1994).

Increase in hours worked since the end of the middle ages: longer days, less holidays.

Particularly important in reformation countries.

Actually, increases in the hours of work seem a constant: Neolithic revolution.
In short, at the very deepest levels of material life, there is at work a complex order, to which the assumptions, tendencies and unconscious pressures of economies, societies and civilizations all contribute.” Fernand Braudel, *Les Structures du quotidien: le possible et l’impossible.*

- Fork became popular in 14th century Italy. By 1600, commonly used for eating by merchant and upper classes. Extended later across Europe.
- Chairs also became popular in 16th century. Before that, reserved for upper classes (we still call it "chair" in a professor).
- Brandy and other distilled liquors: 16th-17th centuries.
- Fashion.
- Multiplication of merchant ships by five....
The Glorious Revolution of 1688, I

- Overthrow of James II by William III.
- Invited by a substantial fraction of the English elite:

**Letter of the Immortal Seven**

We have great reason to believe, we shall be every day in a worse condition than we are, and less able to defend ourselves, and therefore we do earnestly wish we might be so happy as to find a remedy before it be too late for us to contribute to our own deliverance...the people are so generally dissatisfied with the present conduct of the government, in relation to their religion, liberties and properties (all which have been greatly invaded), and they are in such expectation of their prospects being daily worse, that your Highness may be assured, there are nineteen parts of twenty of the people throughout the kingdom, who are desirous of a change; and who, we believe, would willingly contribute to it, if they had such a protection to countenance their rising, as would secure them from being destroyed.
The Glorious Revolution of 1688, II

- Army financed by Amsterdam.
- Crosses the Channel in October-November of 1688. Quickly defeats James.
- William III and Mary II officially replaced him on February 13, 1689.
- William is a weak ruler:
  1. War with France.
  2. Foreigner.
Institutional Changes I

- Bill of Rights of 1689:
  1. That the pretended power of suspending the laws or the execution of laws by regal authority without consent of Parliament is illegal;
  2. That levying money for or to the use of the Crown by pretence of prerogative, without grant of Parliament, for longer time, or in other manner than the same is or shall be granted, is illegal;
  3. That it is the right of the subjects to petition the king, and all commitments and prosecutions for such petitioning are illegal;
  4. That the raising or keeping a standing army within the kingdom in time of peace, unless it be with consent of Parliament, is against law;
  5. That election of members of Parliament ought to be free;
  6. That the freedom of speech and debates or proceedings in Parliament ought not to be impeached or questioned in any court or place out of Parliament;
  7. And that for redress of all grievances, and for the amending, strengthening and preserving of the laws, Parliaments ought to be held frequently.
Institutional Changes II

- Act of Union 1707 between England and Scotland.
- Inclosures Acts.
- In general, inclusive set of institutions.
The Modern Agriculture

- Norfolk four-course system:
  1. Wheat.
  2. Turnip.
  3. Barley with clover and ryegrass undersown.
  4. Clover and ryegrass were grazed or cut for feed.

- Developed first in Flanders. Introduced in England in 1730 by Charles Townshend.

- Eliminates fallow, incentivates enclosing.
Technological Innovation I

- 1688-1815 is a period of fast technological innovation.

- Reasons?
  1. Higher rate of return.
  2. Patent system.
  3. Enlightenment.

- Traditional account: textiles and steam engine. Today, we have a much wider view.
Technological Innovation II

1. Lights.
2. Ceramic.
3. Textiles.
5. Cement and concrete.
6. Canned food.
7. Longitude.
The Canonical Example: the Steam Engine


2. India, Ottoman empire, China.


5. Watt’s engine: 1775.
Historians of Science versus Economists

- Many historians of science focus on the autonomous role of science in developing inventions and progress (the “Newton paradigm”).

- However, economists emphasize the role of profit.

- Classical study of Schmokler (*Invention and Economic Growth*, 1963): innovation is determined by the size of the market.

- Examples:
  1. Horseshoe, many innovations in the late 19th century and early 20th century, stop afterwards.
  3. Drugs for Malaria versus drugs for male impotence.
What is an idea?

What are the basic characteristics of an idea?

1. Ideas are *nonrivalrous* goods.

2. Ideas are, at least partially, *excludable*. 
Different Types of Goods

1. Rivalrous goods that are excludable: almost all private consumption goods, such as food, apparel, consumer durables fall into this group.

2. Rivalrous goods that have a low degree of excludability: tragedy of the commons.

3. Nonrivalrous goods that are excludable: most of what we call ideas falls under this point.

4. Nonrivalrous and nonexcludable goods: these goods are often called public goods.
### Examples of Different Goods

<table>
<thead>
<tr>
<th>Rivalrous goods</th>
<th>Nonrivalrous goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawyer services</td>
<td>Encoded satellite TV transmission</td>
</tr>
<tr>
<td>CD player</td>
<td>Computer code for a software application</td>
</tr>
<tr>
<td>Floppy disk</td>
<td>Operations manual for Wal-Mart stores</td>
</tr>
<tr>
<td>Fish in the sea</td>
<td>National defense</td>
</tr>
<tr>
<td>Sterile insects for pest control</td>
<td>Basic R&amp;D</td>
</tr>
<tr>
<td></td>
<td>Calculus</td>
</tr>
</tbody>
</table>
Nonrivalrousness and Excludability of Ideas

- **Nonrivalrousness:** implies that cost of providing the good to one more consumer, the *marginal cost* of this good, is constant at zero. Production process for ideas is usually characterized by substantial fixed costs and low marginal costs. Think about software.

- **Excludability:** required so that firm can recover fixed costs of development. Existence of intellectual property rights like patent or copyright laws are crucial for the private development of new ideas.
Average versus Marginal Costs

![Graph showing the relationship between average and marginal costs](image)
Intellectual Property Rights and the Industrial Revolution

- Ideas engine of growth.
- Intellectual property rights needed for development of ideas.
- Sustained growth recent phenomenon.
- Coincides with establishment of intellectual property rights.
Data on Ideas

- Measure technological progress directly through ideas.
- Measure ideas via measuring patents.
- Measure ideas indirectly by measuring resources devoted to development of ideas.
Important Facts from Data

- Number of patents issued has increased: in 1880 roughly 13,000 patents issued in the US, in 1999 150,000.

- More and more patents issued in the US are issued to foreigners. The number of patents issued to US firms or individuals constant at 40,000 per year between 1915 and 1991.

- Number of researchers engaged in research and development (R&D) in the US increased from 200,000 in 1950 to 1,000,000 in 1990.

- Fraction of the labor force in R&D increased from 0.25% in 1950 to 0.75% in 1990.
Is the Level of R&D Optimal?

- Sources of inefficiency:
  1. Monopoly power of intermediate good producers.
  2. Externalities in research.

- Possible remedies.

- Implications for Antitrust policy.
Is the Level of R&D Optimal?

- Will we have innovation in the absence of a patents system?
- Boldrin and Levine (2003) have argued that we would.
- Why? Time between new invention and other competitors can produce the same good.
- Evidence from the market of generics versus brand drugs.
Schumpeterian Growth

- There is an alternative view of growth: Schumpeterian models of creative destruction.

- Loosely based on the insights of Joseph Schumpeter.

- New products replace old products: Ipod replaced CDs, CDs replaced LPs, LPs replaced Wax cylinders.


- An interesting aspect of these models is that they generate growth cycles.

- We will skip them because they require some more advanced math.
Share of the national income appropriated as taxation (%)
Sources of taxation (1660-1810) in £10,000 (LN scale)

- Excises and stamps on domestic taxation
- Custom duties on import
- Direct taxes
Spread to Europe

- Belgium, early 19th century.

- France, Germany.

- Only later in 19th century to south and east Europe.


- U.S. is a somehow different case.
Figure 2A: French Revolutionary Armies as Treatment, European Sample
Figure 2B: Napoleonic Armies as Treatment, European Sample

- Urbanization rate vs. year
- Black line: Treatment
- Dotted line: Control

Data Source: [Details provided in the text]