The Industrial Revolution

1750-1850
From Cottage Industry to Factory System
The Cottage Industry
(a.k.a. “putting out system”)

**Pros**
- Avoided guilds
- Helped farmers supplement income
- Created entrepreneurs
- Created new consumer goods
- Work could be done at home

**Cons**
- Inefficient
  - Workers spread out in many places
  - Labor wasn’t coordinated and organized
  - Lack of capital
Why Britain?

- Abundance of Water
  - Canals, Rivers, proximity to the ocean
- Natural Resources
  - Coal, iron
- Stable, Laissez-faire government
  - Central bank
- Abundance of food
  - Left money for consumer goods
    - Fueled innovation and entrepreneurship
- Abundant labor force
- Not decimated by Napoleonic wars
British Trade, 1700-1800

The graph shows the growth in British trade measured in millions of pounds from 1700 to 1800. The trade shows an overall trend of increase with fluctuations. The data peaks notably in the late 1700s.
The Textile Industry

- Cotton output increased 800% between 1780 and 1800
- By 1830, 50% of British exports were cotton fabrics
- Led the way in innovation and industrialization
The Spinning Wheel
The Hand Loom

Diagram showing the parts of a hand loom:
- Head roller
- Heddles
- Head tree
- Beater
- Beater handtree
- Weft
- Shuttle
- Cloth roller
- Cross beam
- Front post
- Treadles
- Crosspiece
- Take-up motion handle
- Breast beam
- Ratchet
- Ratchet wheel
- Warp roller
- Warp
- Back beam
- Upright

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New Technology

(pre-steam engine)
John Kay’s “Flying Shuttle” (1733)
James Hargreaves’s Spinning Jenny (1765)
Richard Arkwright’s Water Frame (1769)
The First Factories (1770s-80s)
Samuel Crompton’s “Spinning Mule” (1779)
Newcomen’s Steam Engine (1705)
James Watt’s Steam Engine
(1770s)
Edmund Cartwright’s Power Loom (1785)
Jacquard’s Loom

FIG 8.1 The Jacquard action
bobbin girl,
circa 1830
mine children, circa 1820
trap boy, circa 1820
“hurrying” coal, *circa* 1820
girls carrying coal, circa 1820
The Iron Industry

• Coal replaces charcoal
  – More efficient to run steam engines

• Coke
  – Biproduct of coal
  – “Pig Iron”
Henry Cort’s Puddling Furnace (1780s)
Ironbridge in the 18th Century
Coalbrookdale by Night by Loutherbourg
Manchester
One of the First Industrialized Cities

• Population
  – 1750: 18,000
  – 1850: 300,000

• Life Span, 1843
  – Laborer: 17 (38)
  – Trader: 20 (41)
  – Gentry: 38 (52)
Railroads

- George Stephenson
  - Liverpool to Manchester railway

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“The Rocket”
The Cumulative Effect of Industrialization

- Factories required steam engines and machines
- Steam engines and machines need iron
- Iron needs coal
- Coal need to be mined
- All of this needs to be transported by train
- Trains require coal and iron….
By 1850...

- Britain produced
  - 2/3 of the world’s coal
  - 1/2 of the world’s iron
  - 1/2 of the world’s cloth
- Per capita income doubled from 1800
- GNP tripled from 1800
The Great Exposition (1851)
The Crystal Palace
GRAND ENTRANCE TO THE GREAT EXHIBITION OF ALL NATIONS.
Industrialization on the Continent

• Lagging Behind Britain
  – Devastated by the Napoleonic wars
  – British empire provided huge markets
  – No government encouragement

• After 1815
  – “Borrowed” British technology
  – Government aid
    • Protective tariffs
    • Paid for infrastructure (railroads)
Economic Nationalism

• The Zollverein (1834)
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*Figures represent millions US $*