Recapping the Malthusian World

The Malthusian Trap

Recapping the Malthusian World

- Population growth or decline tended to bring societies back to subsistence income
- The short run gains of technological change may have been higher incomes
- However, the only long run consquences were larger populations and greater population density
- There were some important ways in which the world wasn't stagnant
- Think about human capital, personal and property security, legal institutions, financial markets, accumulated scientific knowledge, etc.

From the Malthusian Trap to Modern Growth

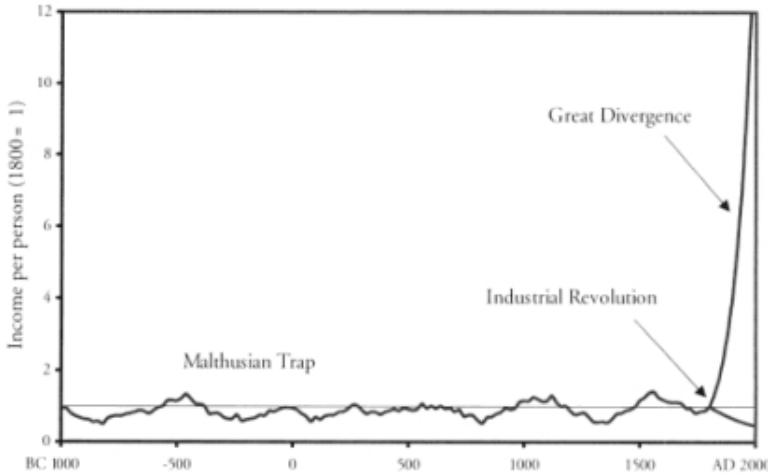
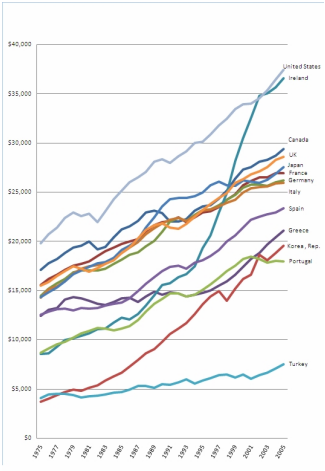
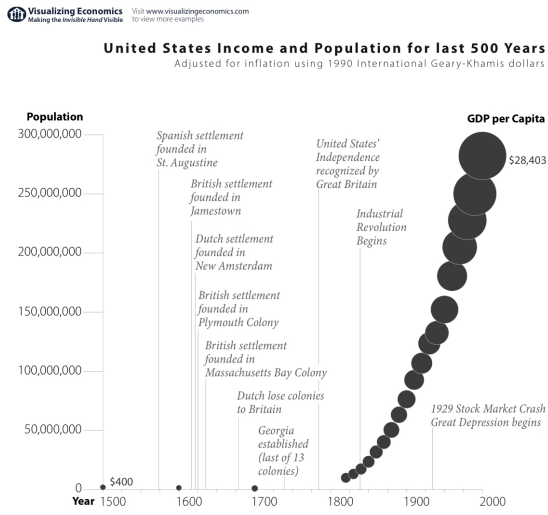


Figure 1.1 World economic history in one picture. Incomes rose sharply in many countries after 1800 but declined in others.

From the Malthusian Trap to Modern Growth



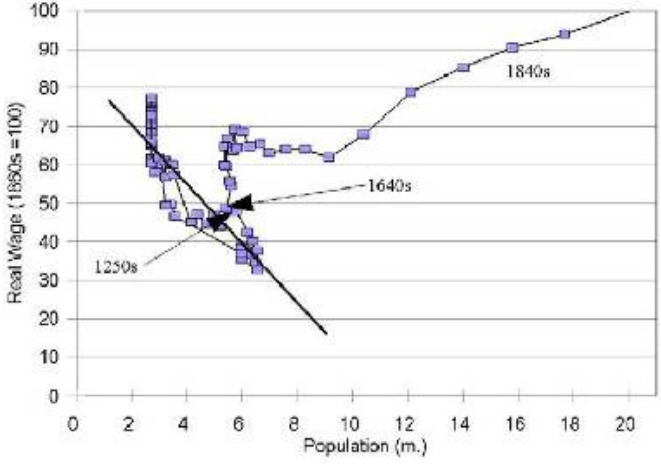
From the Malthusian Trap to Modern Growth



Source: Angus Maddison, University of Groningen

From the Malthusian Trap to Modern Growth

Figure 1: Real Wages Versus Population, England, 1250-1869



Modern Contributions to Growth

Economic Growth, 1950-1980

Country	Share of Total Growth Explained by Factor (in %)		
	k	z	A
Britain	37.44	-0.80	63.41
Germany	30.11	-0.76	70.57
USA	33.72	-3.28	69.79
Japan	25.86	-0.82	74.96
Kenya	25.00	-26.21	101.52
India	51.49	-8.06	56.72
USSR	47.18	-1.91	54.60
USSR (1976-82)	126.92	-3.46	-23.85

Note: Contributions are calculated using the .25, .70 and .05 as the shares of capital, labor and resources in income respectively.

Decomposing Growth by Industry

Total Factor Productivity Growth for the US, 1974-1999

	1974-1990	1991-1995	1996-1999
TFP growth rate	0.33	0.48	1.16
Growth in TFP by sector:			
Computer sector	11.2	11.3	16.6
Semiconductor sector	30.7	22.3	45
Other nonfarm business	0.13	0.2	0.51
Output shares:			
Computer sector	1.1	1.4	1.6
Semiconductor sector	0.3	0.5	0.9
Other nonfarm business	98.9	98.8	98.7
Contribution from each sector:			
Computer sector	0.12	0.16	0.26
Semiconductor sector	0.08	0.12	0.39
Other nonfarm business	0.13	0.2	0.5

Data are from Oliner and Sichel, 2000.

Contributions to British Growth During the Industrial Revolution

CONTRIBUTIONS TO NATIONAL PRODUCTIVITY GROWTH, 1780–1860
(percentage per annum)

Sector	McCloskey	Crafts	Harley
Cotton	0.18	0.18	0.13
Worsteds	0.06	0.06	0.05
Woolens	0.03	0.03	0.02
Iron	0.02	0.02	0.02
Canals and railroads	0.09	0.09	0.09
Shipping	0.14	0.14	0.03
Sum of modernized	0.52	0.52	0.34
Agriculture	0.12	0.12	0.19
All others	0.55	0.07	0.02
Total	1.19	0.71	0.55

Sources: McCloskey, "Industrial Revolution," p. 114; Crafts, *British Economic Growth*, p. 86; and Harley, "Reassessing the Industrial Revolution," p. 200.

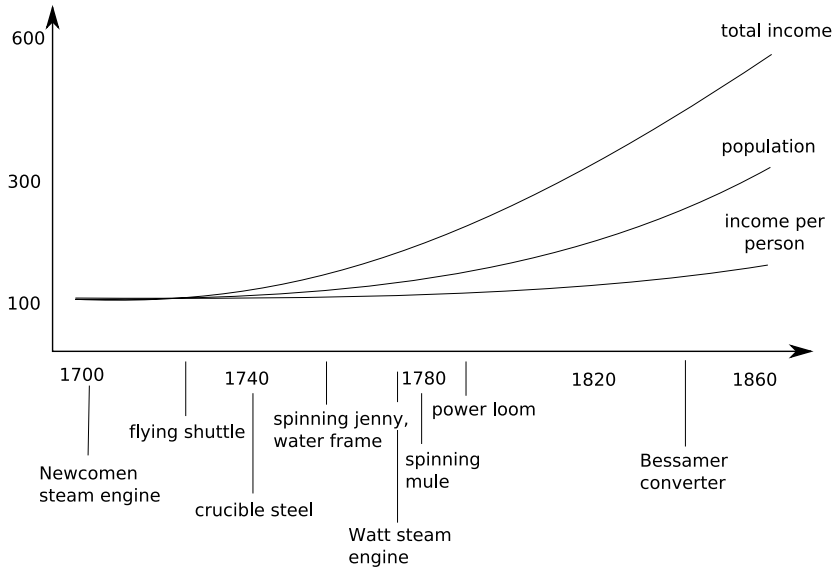
Technological Change and the Industrial Revolution

- So one of the key things distinguishing the modern world from the preindustrial world is steady growth in technology/efficiency
- This suggests that one important feature of the Industrial Revolution may be technological change itself and the characteristics of society that promote innovation
- We'll first trace the history of technological change during the Industrial Revolution
- Then we will consider the forces that may have made sustained technological change possible

A Framework for Describing Technological Change

- We can think about technological change falling into to broad categories: microinventions and macroinventions
- *Microinventions* - small, incremental improvements to known technologies
- *Macroinventions* - shifts to entirely new ways of thinking about carrying out production
- The productivity gains of microinventions will be positive but small and potentially diminishing with each successive invention
- After a new macroinvention, microinventive activity takes place to refine the new methods of production
- One possible way to think of the Industrial Revolution is a cluster of macroinventions that led to an acceleration of microinventions

Major Innovations of the Industrial Revolution



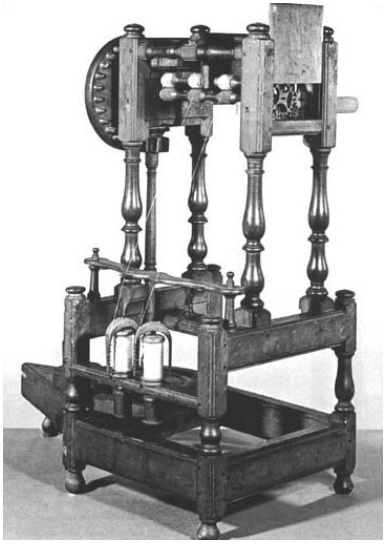
Flying Shuttle - John Kay, 1733

The Flying Shuttle

Spinning Jenny - James Hargreaves, 1764

The Spinning Jenny

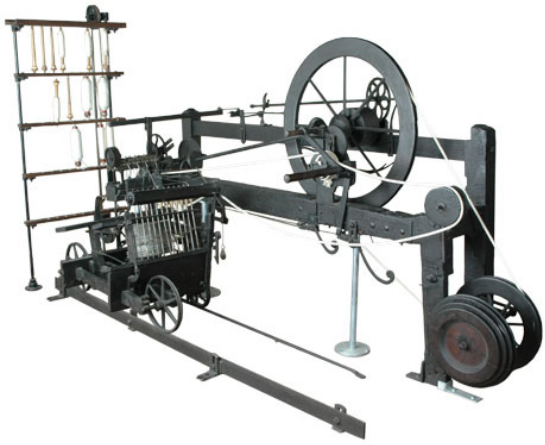
Water Frame - Richard Arkwright, 1762



Arkwright's Water Frame

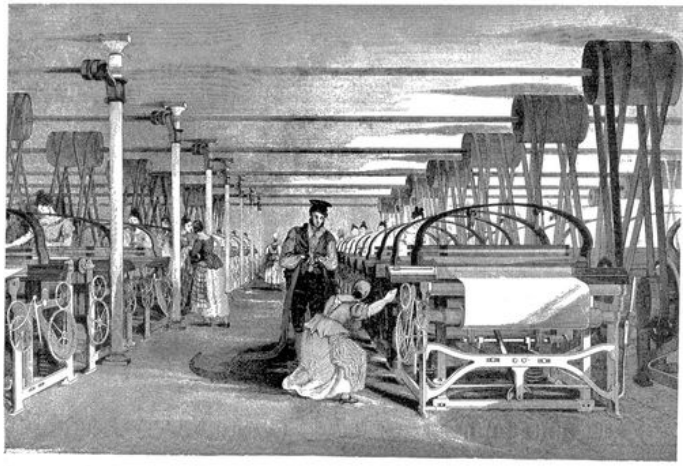
Arkwright's Cromford Mill, 1771

Spinning Mule - Samuel Crompton, 1779



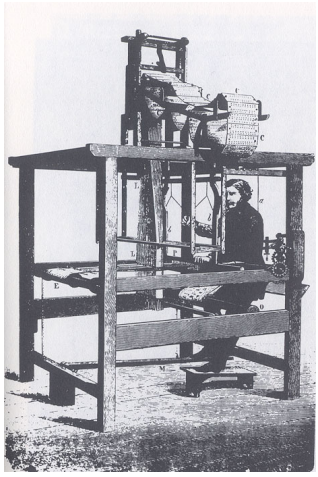
The Mule Jenny

Power Loom - Edmund Cartwright, 1784



The Power Loom

Jacquard Loom - Joseph Jacquard, 1801

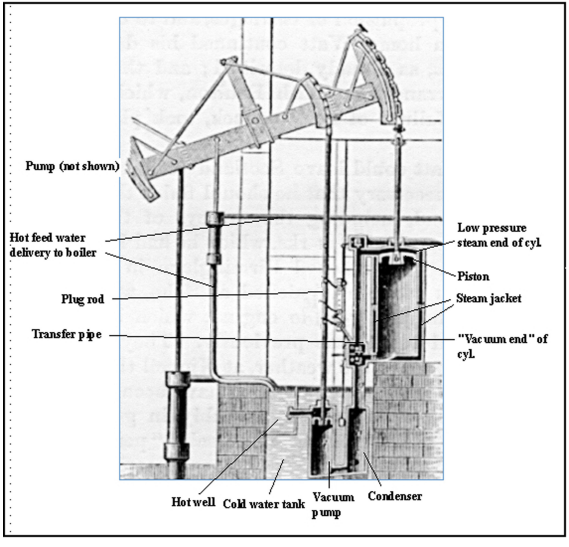


The Jacquard Loom

Newcomen Steam Engine - Thomas Newcomen, 1712

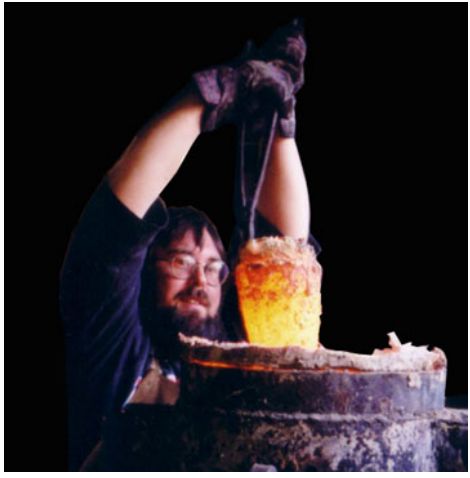
Not the Newcomen Steam Engine

Watt Steam Engine - James Watt, 1775



High Pressure Steam Engine - Richard Trevithick, 1800

Crucible Steel - Benjamin Huntsman, 1740's



Steelmaking

Bessemer Converter - Henry Bessemer, 1855

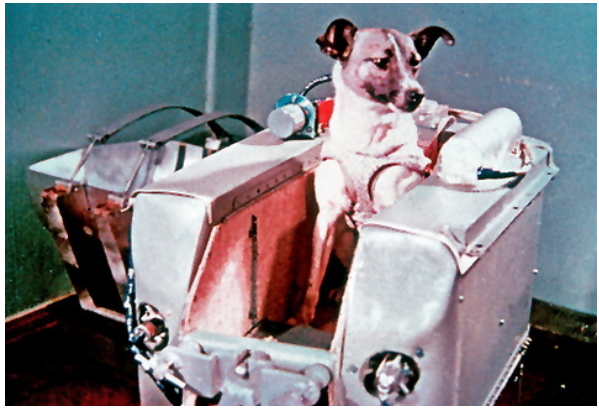
Major Innovations of the Industrial Revolution

These and other innovations during the Industrial Revolution fundamentally changed the way production took place:

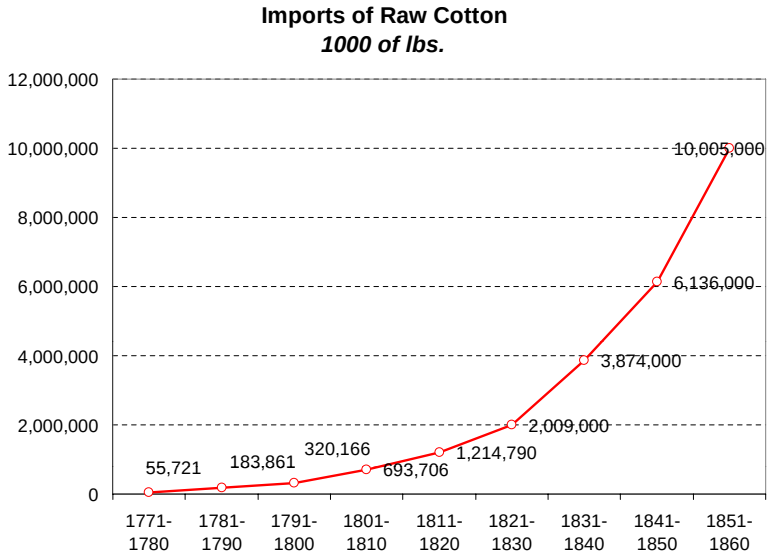
- The mechanization of tasks
- The switch from organic to inorganic/mineral energy
- The coupling of thermal and kinetic energy
- The organization of work
- Advances in metallurgy

Macro-inventions Don't Necessarily Mean Growth

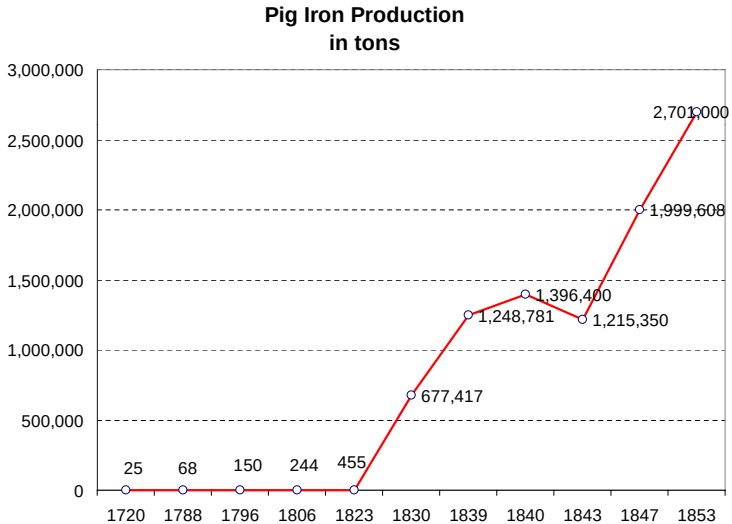
Macro-inventions Don't Necessarily Mean Growth



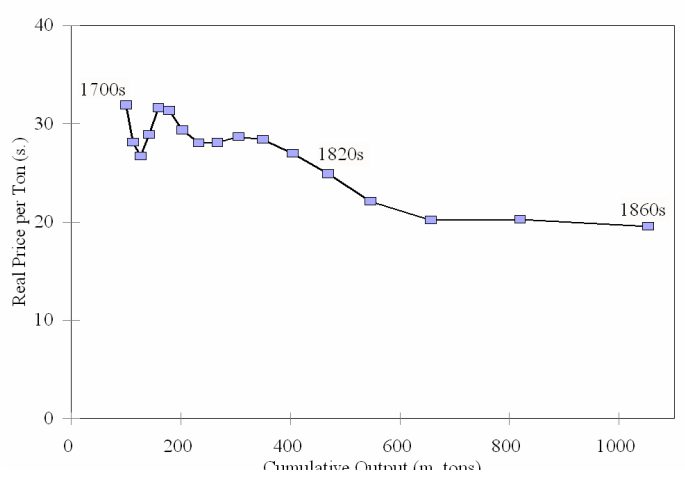
Growth of the British Textile Industry



Growth of the British Iron Industry



Growth of British Coal Output



Growth of Steam Power

TABLE 2
STATIONARY STEAM ENGINES IN THE BRITISH ECONOMY, 1760–1870

A Sources of Power, 1760–1870 (horsepower)

	1760	1800	1830	1870
Steam	5,000	35,000	165,000	2,060,000
Water	70,000	120,000	165,000	230,000
Wind	10,000	15,000	20,000	10,000
Total	85,000	170,000	350,000	2,300,000

B Uses of Steam Power (percentage)

	1800	1870
Coal Mining	37.8	18.0
Other Mining	10.9	3.6
Cotton Textiles	12.6	18.0
Other Textiles	8.8	10.5
Metal Manufactures	12.0	14.7
Rest of Economy	17.9	35.2

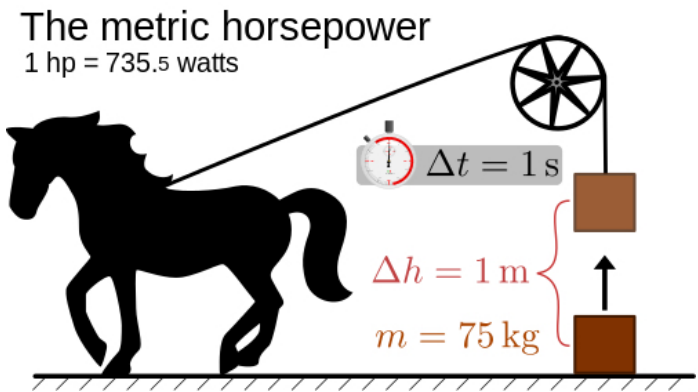
Sources: Sources of power from Kanefsky, "Diffusion," p. 338. Uses of steam power: 1800: Kanefsky and Robey, "Steam Engines," p. 181; 1870: Kanefsky, "Diffusion," pp. 302, 334.

Growth of Steam Power

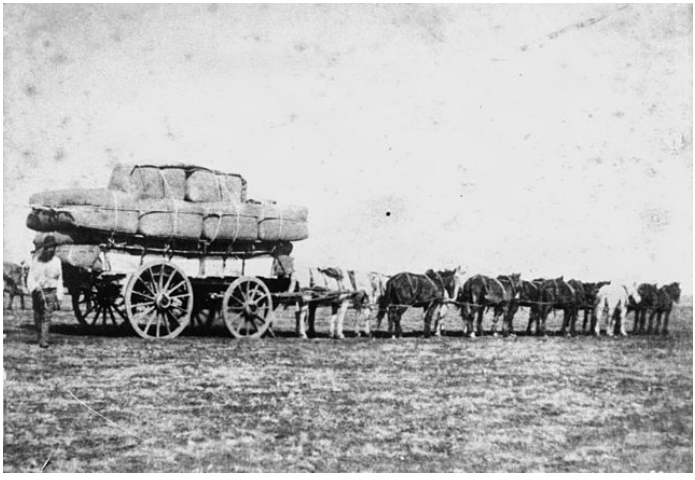
TABLE 4
STEAM'S CONTRIBUTION TO BRITISH LABOR PRODUCTIVITY GROWTH, 1760–1860
(percentage per year)

	1760–1800	1800–1830	1830–1860
Rates of Growth			
Steam HP per worker	4.3	3.9	5.3
Railway capital per worker			16.2
Contributions			
Steam capital deepening	0.004	0.02	0.04
Railway capital deepening			0.15
Total capital deepening	0.004	0.02	0.19
Rates of growth			
TFP in steam power	2.8	0.06	2.4
Railways TFP			3.5
Contributions			
Steam power TFP	0.005	0.001	0.05
Railways TFP			0.05
Total TFP	0.005	0.00	0.10
Total steam	0.01	0.02	0.29
Memorandum items (% GDP)			
Steam engine income share	0.1	0.4	0.8
Railway capital income share			0.9
Steam engine social saving	0.2	0.02	1.4
Railway output share			1.4

Horsepower Aside



Horsepower Aside

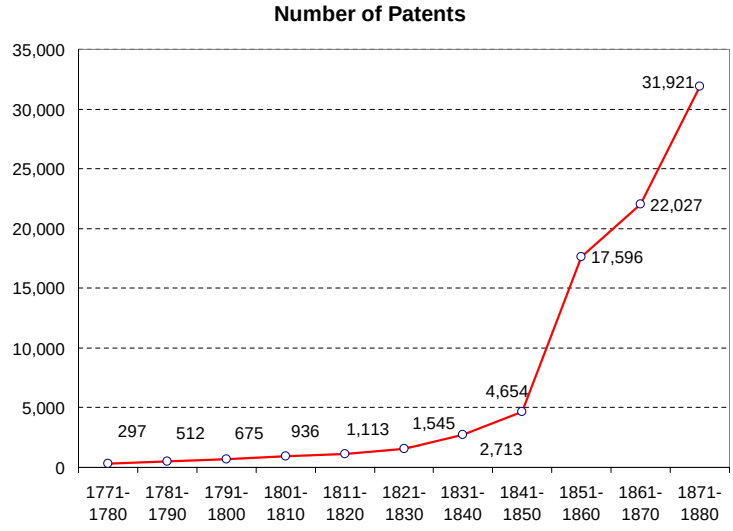


team of horses, 12 horsepower

Horsepower Aside

Pennsylvania Railroad's Q2, 7,987 horsepower

Growth in British Innovation



Growth in British Innovation

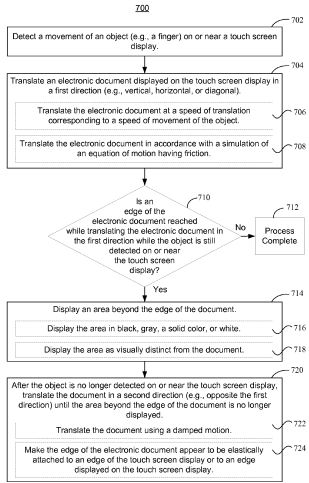


Figure 7

Two Views of the Industrial Revolution

- Traditional view: Industrial Revolution was a broad change across many industries, innovation all over the place. 'Britain as workshop of the world'

  A wave of gadgets swept over England. – T.S. Ashton

- Crafts and Harley view: Industrial Revolution was actually confined to a couple industries (specifically, cotton and iron). Nothing special was going on elsewhere. 'Britain as cotton factory of the world'
- Enter Peter Temin

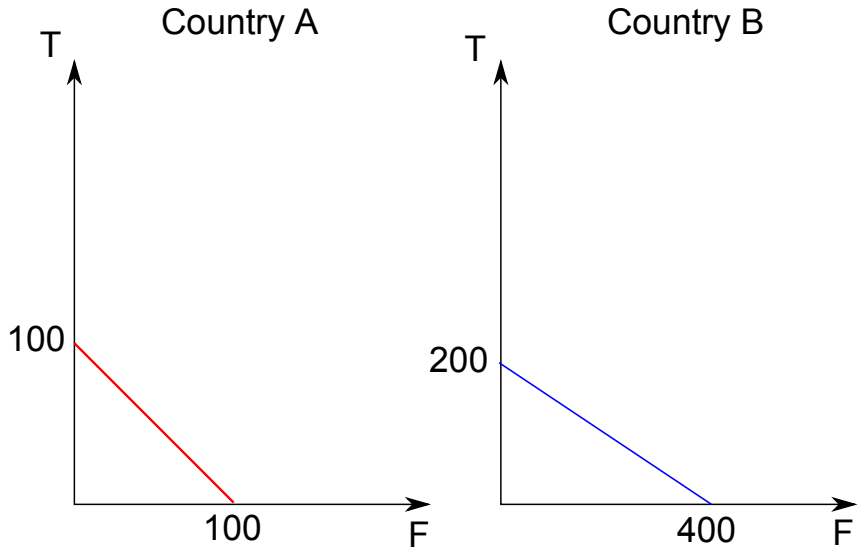
Two Views of the Industrial Revolution

- Temin decides to test the two views by focusing on international trade
- He argues that if technological change was focused on just iron and textiles, we would observe different trade patterns than if technological change was more widespread
- It is basically a story about how comparative advantage works when you have many goods and technological change that may affect some or all of those goods
- Let's walk throught the argument by first doing a quick review of how comparative advantage works

Two Views of the Industrial Revolution

- Suppose we have two countries A and B that can each produce two goods, food (F) and textiles (T)
- Because of differences in resources, wages, worker quality, etc. the countries production capabilities may differ
- Let's say country A has 100 workers and each worker can produce either one unit of food or one unit of textiles
- Country B also has 100 workers but they are better, each worker can produce either four units of food or two units of textiles
- Let's look at this graphically

Two Views of the Industrial Revolution



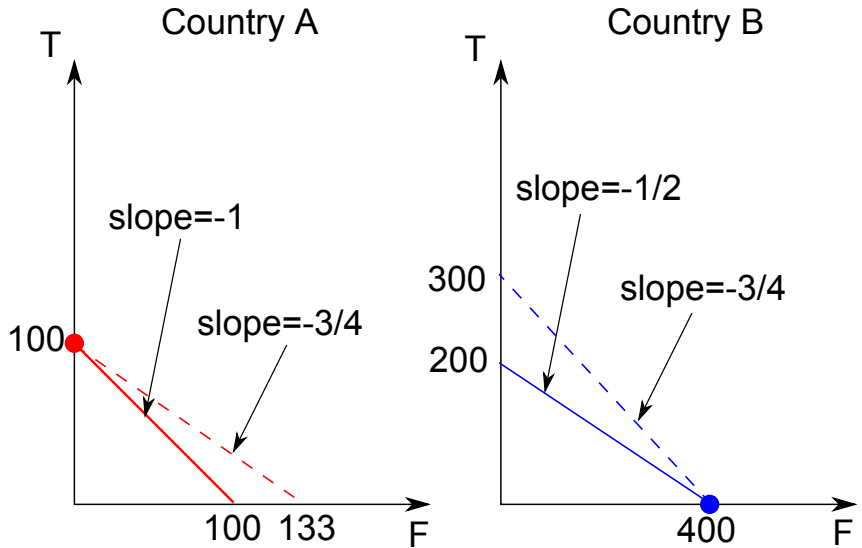
Two Views of the Industrial Revolution

- Both of these countries can benefit from trade
- Notice that for every extra unit of food country A wants, it has to give up one unit of textiles
- For every extra unit of food country B wants, it has to give up half of a unit of textiles
- What if country B offers to give country A one unit of food in exchange for 0.75 units of textiles?

Two Views of the Industrial Revolution

- The proposed trade: A gives B one unit of food in exchange for 0.75 units of textiles
- It's a good deal for country A (that unit of food would cost them one unit of textiles to produce themselves)
- It's a good deal for country B (they gave up 0.5 units of textiles to produce the food but got back 0.75 units of textiles)
- It allows both countries to consume more than they could without trade, so they will start specializing and trading

Two Views of the Industrial Revolution



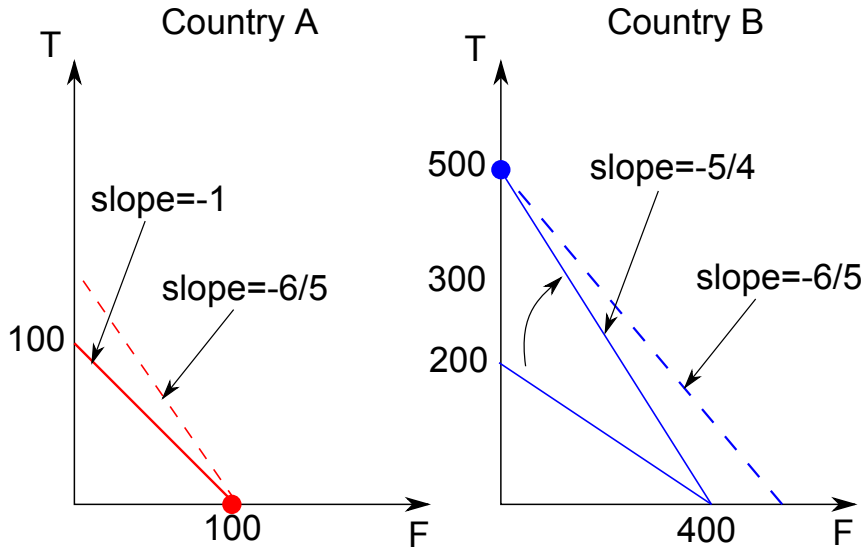
Two Views of the Industrial Revolution

- So it makes sense for the countries to specialize
- Country A has a comparative advantage in producing textiles, they will use all of their workers to produce textiles and trade with country B for whatever food they need
- Country B has a comparative advantage in producing food, they will produce food to trade for country A's textiles (and maybe produce some textiles themselves if A can't produce enough)
- Notice that even though country B can produce more textiles with a worker than country A can, it still makes sense for B to trade for textiles
- Now what happens if country B invents new textile technology?

Two Views of the Industrial Revolution

- Let's say that country B invents new weaving and spinning technology that let's them make five units of textiles with each worker
- This flips the comparative advantages
- Now country B has the comparative advantage in textiles ($\frac{5}{4}$ units of textiles for each unit of food compared to country A's one unit of textiles for each unit of food)
- So country B specializes in textiles and A switches to specializing in food (and they'll settle on a new price that's advantageous to both, say 1 F: $\frac{6}{5}$ T)
- If we were to look at trade data, we would see country B switch from being an importer of textiles to being an exporter of textiles

Two Views of the Industrial Revolution



Two Views of the Industrial Revolution

- Back to Temin's argument
- If technological change was confined to iron and textiles, England would exploit its new comparative advantage in those industries by producing lots of iron and cloth to export in exchange for everything else
- We would therefore see a rise in exports of iron and textiles and a drop in exports (or rise in imports) of other manufactured goods

Two Views of the Industrial Revolution

- However, if other manufacturing sectors also experienced technological change, Britain would also expand those industries and export those goods
- So looking at the range of what is exported versus the range of what was imported tells us about the range of industries in which Britain experienced significant technological change
- To the data...

British Manufacturing Exports

TABLE 2
SHARES OF TOTAL AND MANUFACTURING EXPORTS
(percentage)

Sector	1794–1796	1814–1816	1834–1836	1854–1856
Manufacturing/total	86	82	91	81
Cotton/manufacturing	18	49	53	42
Woolens/manufacturing	27	21	17	15
Iron/manufacturing	11	2	2	7
Other/manufacturing	44	28	28	36

Source: Davis, *Industrial Revolution*, pp. 95–101.

A Final Word on Growth During the Industrial Revolution

Accounting for Britain's Economic Growth

	Output growth	Contributions from Capital stock growth	Labor force growth	TFP
Crafts				
1760-80	0.6	0.25	0.35	0.00
1780-1831	1.7	0.60	0.80	0.30
1831-73	2.4	0.90	0.75	0.75
Feinstein				
1761-1800	1.1	0.50	0.40	0.20
1801-1830	2.7	0.70	0.70	1.30
1831-1860	2.5	1.00	0.70	0.80

A Final Word on Growth During the Industrial Revolution

Accounting for Britain's Economic Growth

	Output growth	Contributions from Capital stock growth	Human capital stock growth	TFP
Greasley & Oxley				
1760-80	0.6	0.30	0.20	0.10
1780-1831	1.7	0.60	1.10	0.00
1831-73	2.4	0.90	1.70	-0.20

The Industrious Revolution

- The Industrial Revolution wasn't all just changes in technology
- There were fundamental changes in the way people worked
- There were changes to the nature of paid work, unpaid work, the division of time and relationships within the household
- Not only did what workers produced change, what they bought also changed
- First, let's think about how much people worked

Work Hours Across Societies

Annual Work Hours Over 800 Years

Period	Type of worker	Annual hours
13th century	Adult male peasant, UK	1620 hours
14th century	Casual laborer, UK	1440 hours
Middle Ages	English worker	2309 hours
1400-1600	Farmer-miner, adult male, UK	1980 hours
1840	Average worker, UK	3105-3588 hours
1850	Average worker, U.S.	3150-3650 hours
1987	Average worker, U.S.	1949 hours
1988	Manufacturing workers, UK	1855 hours
2000	Average worker, Germany	1362 hours

The Middle Ages observation corresponds England in the 1400s.

Changing the Way We Work

- Before industrialization there were irregular work hours and significant household production
- By 1700, mills started imposing stricter regulation of work hours, machines added even more structure to the work day as the Industrial Revolution progressed
- Forces creating time-discipline: division of labor, supervision of labor, fines, bells, clocks, money incentives, preaching, schooling, suppression of fairs and sports
- There is a general retraining of workers to adhere to a rigid work day

Changing the Way We Work

The weavers, 't is common with them to be drunk on Monday, have their head-ache on Tuesday, and their tools out of order on Wednesday. As for the shoemakers, they'll rather be hanged than not remember St. Crispin on Monday...and it commonly holds as long as they have a penny of money or pennyworth of credit.

–John Houghton, Collection of letters, 1681

Changing the Way We Work

Every one but an idiot knows that the lower classes must be kept poor or they will never be industrious; I do not mean, that the poor of England are to be kept like the poor of France, but, the state of the country considered, they must (like all mankind) be in poverty or they will not work.

–Bernard Mandeville, Fable of the Bees, 1714

Changing the Way We Work

William Temple, an advocate of workhouses for poor children, 1770:

> *There is considerable use in their being, somehow or other, constantly employed at least twelve hours a day, whether they earn their living or not; for by these means, we hope that the rising generation will be so habituated to constant employment that it would at length prove agreeable and entertaining to them...*

Changing the Way We Work

The poor know little of the motives which stimulate the higher ranks to action - pride, honor and ambition. In general, it is only hunger which can spur and goad them onto labor.

– Joseph Townsend, 1786

Changing the Way We Work

Instead of being as before, idle, careless, indolent, envious, dissatisfied and disaffected, the fruits of their former depraved, helpless and wretched condition, they become careful and thrifty both of their money and time, and soon begin to imbibe fresh notions respecting themselves and others and are happily found to be better fathers, better husbands and more respected members of the community...

–1802 description of Cornish miners

Changing the Way We Work

Richard Wakefield, on the irrationality of parents, 1802:

> *Parents in general from whom to take for time the idle, mischievous, least useful and most burdensome part of their family to bring them up without any care or expense to themselves in habits of industry and decency is a very great relief; are very much adverse to sending their children to the houses of industry; from what cause, it is difficult to tell.*

How Do We Learn About Time Use?

Modern time use data:

- Electronic pagers - write down what you're doing when your paged
- Time use diaries - keep a journal of everything you did
- Random hour recall - asked to recall everything you did in one randomly chosen hour of a previous day

How Do We Learn About Time Use?

Activities started at midnight by college students

Activity	Frequency	Percent
Sleeping	5	27.78
Washing, dressing and grooming oneself	1	5.56
Comparison shopping	1	5.56
Relaxing, thinking	2	11.11
Television and movies (not religious)	1	5.56
Listening to/playing music (not radio)	1	5.56
Computer use for leisure (exc. Games)	1	5.56
Travel related to purchasing food (not	2	11.11
Travel related to socializing and commu	1	5.56
Trvl related to attending or hosting so	1	5.56
Travel related to relaxing and leisure	1	5.56
Traveling, n.e.c.	1	5.56
Total	18	100

How Do We Learn About Time Use?

Activities happening at midnight for college students

Activity	Frequency	Percent
Sleeping	26	22.03
Rsrch/HW for class for degree, cert, or	13	11.02
Work, main job	9	7.63
Television and movies (not religious)	7	5.93
Washing, dressing and grooming oneself	6	5.08
Interior cleaning	6	5.08
Food and drink preparation	4	3.39
Attending religious services	4	3.39
Taking class for degree, certification,	3	2.54
Eating and drinking	3	2.54
Relaxing, thinking	3	2.54
Travel related to purchasing food (not	3	2.54
Travel related to relaxing and leisure	3	2.54
Sleeplessness	2	1.69
Playing games	2	1.69
Computer use for leisure (exc. Games)	2	1.69
Reading for personal interest	2	1.69
Insufficient detail in verbatim	2	1.69
Personal/Private activities	1	0.85
Total (including responses not listed above)	118	100

How Do We Learn About Time Use?

What's available in the 1700's?

- No 18th century pagers
- No sociologists to gather time use diaries
- We do have some diaries (for an extreme case, see Samuel Pepys)
- We also have the Old Bailey

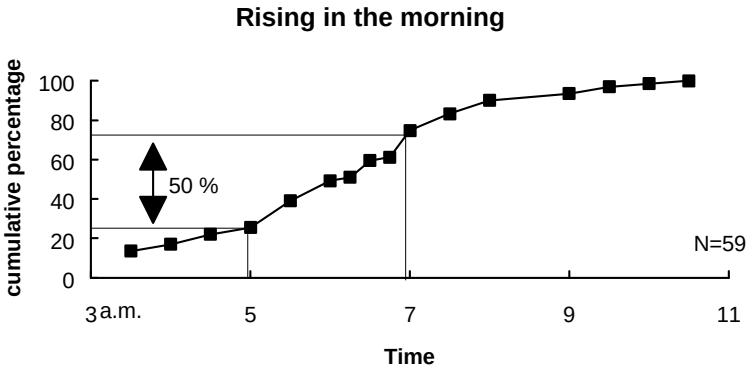
Two Legerdemain Ladies of profound experience in the mysteries of Shoplifting; one of them having been whipt at the Carts tail but the very last Sessions, were convicted for stealing two pieces of Callicoe, under pretence of buying o kerum . The Goods were taken before they got out of sight in one of their aprons, who alleadged a very civil excuse, assuring the Court that she was drunk with Brandy, and knew not what she did; but that Plea was overrul'd, and both of them found guilty.

Thomas Wale. I am a Carpenter: I was at work at a building in Queen Anne's-street, near Marybone; I locked up my tools in my chest, on the 20th of January at night, being a Saturday night in that house, and on Monday the 22d when I went to work in the morning, I found my chest had be brook open...

Q. What time did you go there in the morning?

Wale. About six o'clock.

Rising Times

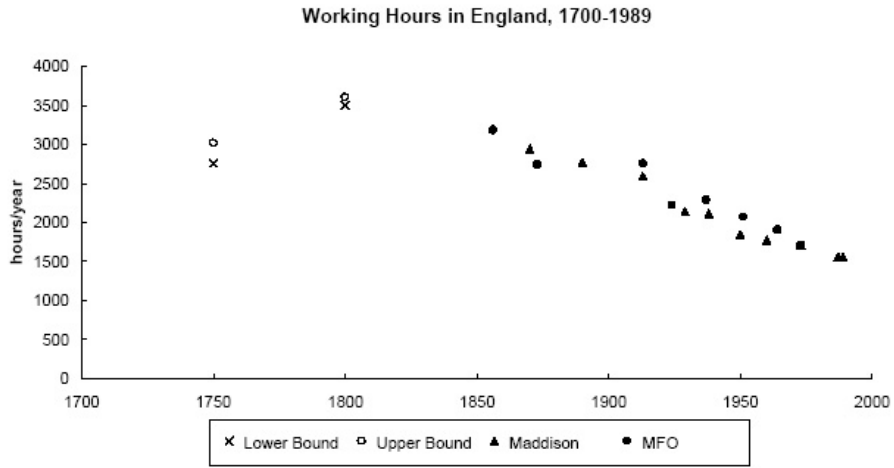


Work Hours during the Industrial Revolution

Table 4: Working hours/year, 1760 and 1800

	1760	*1800*	*Δ*
Lower Bound	2,288	3,366	1,078
Upper Bound	2,631	3,538	907

Work Hours, 1700-1989



Modern Work Hours

Work hours per week in the United States, 2003

	Males		Females	
Time use category	High school grad or less	College educated	High school grad or less	College educated
Total market work	37.5	43.4	22.8	29.8
Total non-market work	13.7	13.9	24.1	21.4
Leisure	114.0	107.2	116.5	112.0
Annual hours of market work	1952.1	2256.3	1186.1	1550.6
Annual hours of total work	2661.9	2979.6	2438.8	2661.4

The Industrious Revolution

The Industrious Revolution

Basic model of the household as an economic unit (pioneered by Becker):

- Households combine store bought goods with their own labor to create consumption goods
- Time is divided between labor supplied to the market (for wages), labor used in household production (for example, cooking), and time spent for leisure
- Household utility comes from leisure and the final consumption goods (purchased goods + home labor)

The Industrious Revolution

So what parameters are changing over time in this model?

- The range of goods available for purchase is expanding
- Formal labor sector opportunities for women and children are rising
- Marginal utility of money income is rising

What would economists then predict about the allocation of household time?

The Industrious Revolution

Let's think of a very, very simple version:

- You like eating pizza but there is no pizza parlor in town
- You can make a decent pizza but it takes a lot of time (kneading the dough, slicing toppings, baking, dishes, etc.)
- So a pizza requires you to work at your job to earn enough to buy the ingredients and then use your time to make the pizza
- Now a pizza parlor opens up selling pizzas and hiring drivers to deliver that pizza

How does this affect your work, consumption and time allocation decisions?

Jan de Vries - The Industrious Revolution

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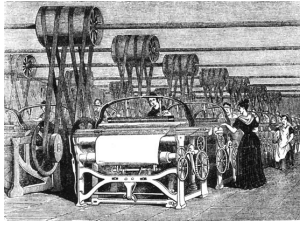


The Industrious Revolution

With this framework in mind, we can think of the Industrious revolution as two major transformations occurring between the mid-17th century and the early 19th century:

- Reduction in leisure time as the marginal utility of money income rose
- Reallocation of labor from goods and services for direct consumption to marketed goods

This does more than just increase working hours, it fundamentally changes family and economic relationships.

Effects of the Industrious Revolution

- Greater labor force participation of household members
- Shift from self-sufficiency to market-oriented production
- Greater importance of economic alliances with outsiders
- Females become automous earners

Female Labor Force Participation

Female Labor Force Participation, Britain, 1851

Occupational Category	Males (thousands)	Females (thousands)	Percent Female
Domestic Services	193	1135	85.5
Commercial	91	0	0
Transportation & Communications	433	13	2.9
Agriculture	1788	229	11.4
Metal Manufactures	536	36	6.3
Bricks, Cement, Pottery, Glass	75	15	16.7
Chemicals	42	4	8.7
Leather & Skins	55	5	8.3
Paper & Printing	62	16	20.5
Textiles	661	635	49
Clothing	418	491	54
Food, Drink, Lodging	348	53	13.2
Total Occupied	6545	2832	30.2
Total Unoccupied	1060	5294	83.3

The Industrious Revolution

- This notion of the Industrious Revolution requires a more nuanced view of growth during the Industrial Revolution
- Growth in productivity wasn't just better machines and smarter workers, it was also getting more people to work and each worker to worker longer
- Think about how this relates to our growth accounting
- The Industrious Revolution also highlights the role of demand-side changes - industrialization wasn't simply a supply-side event

Was the Industrious Revolution a Permanent Shift?

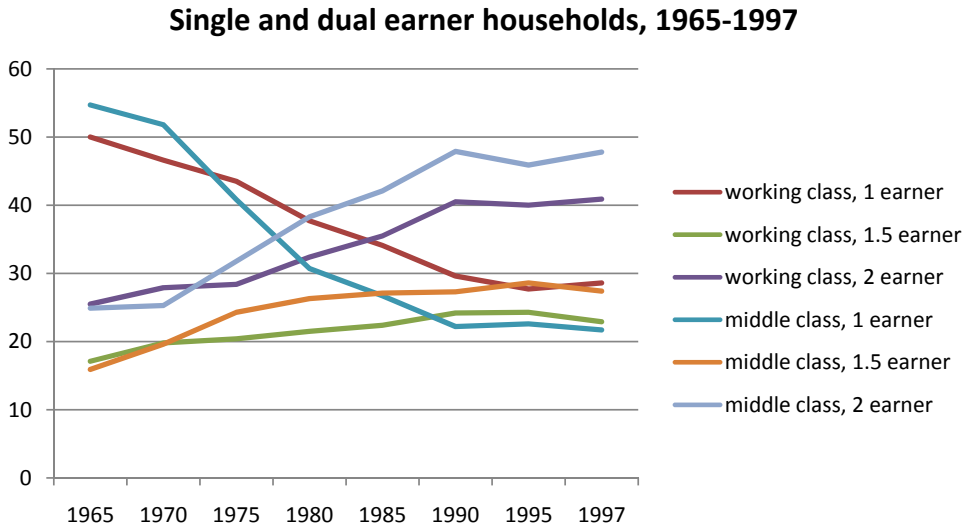
So was the Industrious Revolution a permanent shift?

- Not necessarily
- Later in the 19th century, households reverted back to breadwinner-homemaker structure
- Wages and industry were still going up, so why didn't this just further Industrious Revolution trends?

Was the Industrious Revolution a Permanent Shift?

- New set of consumption goods emerged that required household time (think hygiene, nutrition, health and education of children, demand for enjoying the comforts of home)
- No real market good substitutes for these things (did increase demand for complementary goods: plumbing, furniture, etc.)
- As male wages rose, women and children withdrew from the labor force
- May be going through another change in the latter half of the 20th century, back toward two-earner households and greater reliance on market goods than household time-intensive goods

Back to dual-earner households



Back to dual-earner households

Back to dual-earner households

Back to dual-earner households

Announcements

- We're starting in on the Industrial Revolution today
- Required readings for the section:
  - Mokyr (2008), "The Contribution of Economic History to the Study of Innovation and Technical Change", *Handbook of the Economics of Innovation*
  - De Vries (1994), "The Industrial Revolution and the Industrious Revolution", *Journal of Economic History*
- Grades and feedback are up on Blackboard for the first homework assignment (grades are out of 20)
- Get started on the second assignment, due February 22nd at 5pm (I'm expecting you to use a different variable than either one you used on the first assignment)

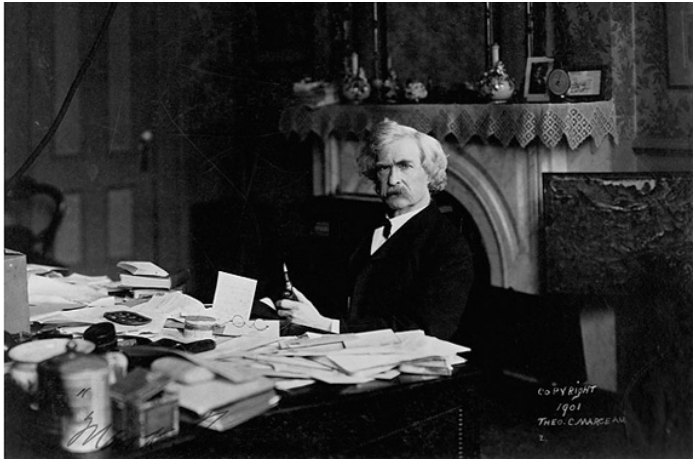
Announcements

- We're going to continue cranking through the Industrial Revolution
- Required readings for the section:
  - Mokyr (2008), "The Contribution of Economic History to the Study of Innovation and Technical Change", *Handbook of the Economics of Innovation*
  - De Vries (1994), "The Industrial Revolution and the Industrious Revolution", *Journal of Economic History*
- Make certain you're working on the second assignment, due February 22nd at 5pm (I'm expecting you to use a different variable than either one you used on the first assignment)

Announcements

- The midterm is two weeks away
- While we'll get to new readings before then, the set of readings covered on the midterm will be the readings from the preindustrial economy lectures and the Industrial Revolution readings
- 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
- Important update: 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

Announcements



Don't be Mark Twain.

Announcements

- This week is all about the Industrious Revolution and the Demographic Transition
- Then we'll start in on explanations for the Industrial Revolution
- Required readings:
  - De Vries (1994), "The Industrial Revolution and the Industrious Revolution", *Journal of Economic History* (this week)
  - 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)
- Make certain you're wrapping up the second assignment, due February 22nd at 5pm (I'm expecting you to use a different variable than either one you used on the first assignment)

Announcements

- The midterm is on February 29th in class
- While we'll get to new readings before then, the set of readings covered on the midterm will be the readings from the preindustrial economy lectures and the Industrial Revolution readings
- The exam will cover lecture material up to and including the 2/22 lecture
- 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
- 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