Economics C23-1
Lecture 8

I. The Rise of Industry

A. Early National Period

B. Turn of the Century (1800): Textiles

1. early developments
2. spinning
3. weaving
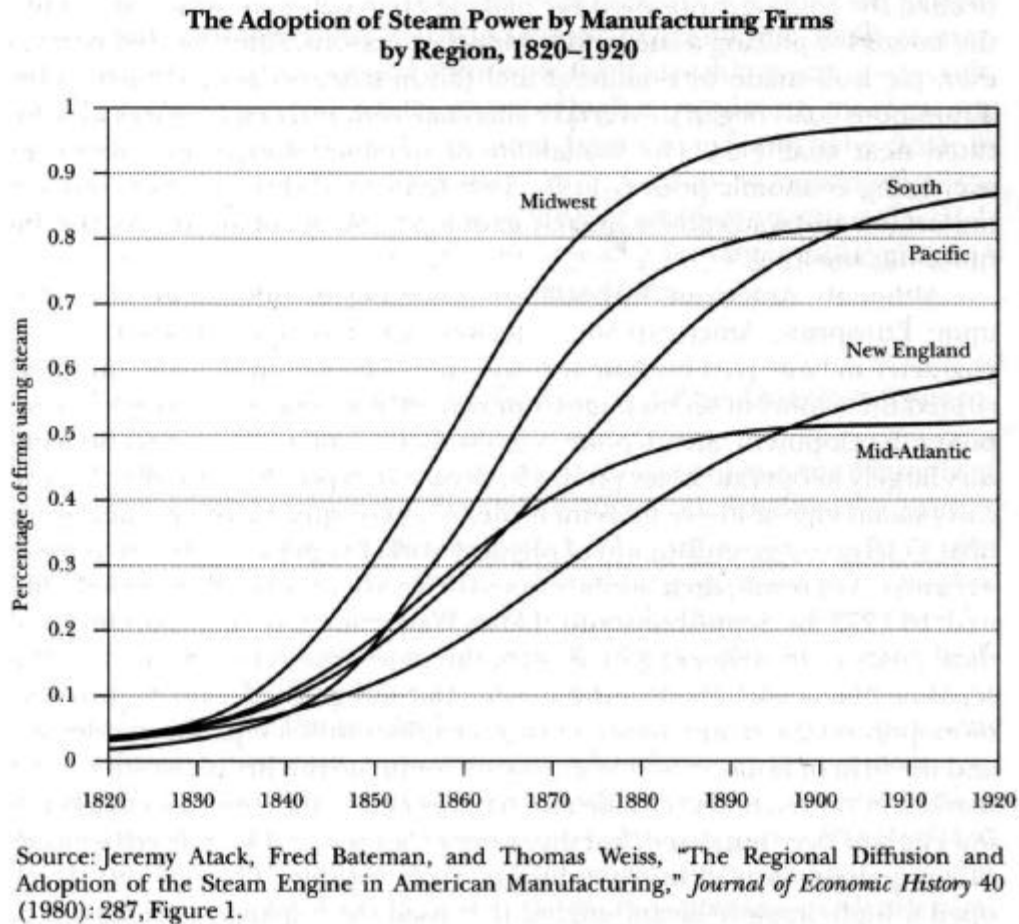4. labor productivity
5. growth in industry output

TABLE 7.1

Sources of Labor Productivity Growth in Cotton Textiles

Source of Productivity Change	1833–39		1855–59	
	Average Annual Growth (%)	Portion of Total Productivity Increase (%)	Average Annual Growth (%)	Portion of Total Productivity Increase (%)
Increased capital per unit of labor	0.74	11	0.43	13
Increased raw materials per unit of labor	3.33	50	1.60	50
Improvements in labor force quality	0.33	5	0.33	10
Improvements in machinery technology	0.25	4	0.30	9
Learning-by-doing	2.02	30	0.54	17
TOTAL	6.67	100	3.20	100

Source: Paul A. David, "Learning by Doing and Tariff Protection: A Reconsideration of the Case of the Ante-Bellum United States Cotton Textile Industry," *Journal of Economic History* 30 (1970): 521-601. Reprinted by permission of Cambridge University Press.

C. Iron

D. Sources of power

The Adoption of Steam Power by Manufacturing Firms by Region, 1820–1920

[Figure: line graph. X-axis: years 1820 to 1920. Y-axis: Percentage of firms using steam, 0 to 1. Curves labeled Midwest, South, Pacific, New England, Mid-Atlantic.]

Source: Jeremy Atack, Fred Bateman, and Thomas Weiss, "The Regional Diffusion and Adoption of the Steam Engine in American Manufacturing," *Journal of Economic History* 40 (1980): 287, Figure 1.

E. Why earliest industry in the Northeast?

The "Relative Productivity Hypothesis of Industrialization"

F. More Efficiency or Scale Economies?

Efficiency Gains and Scale Economies
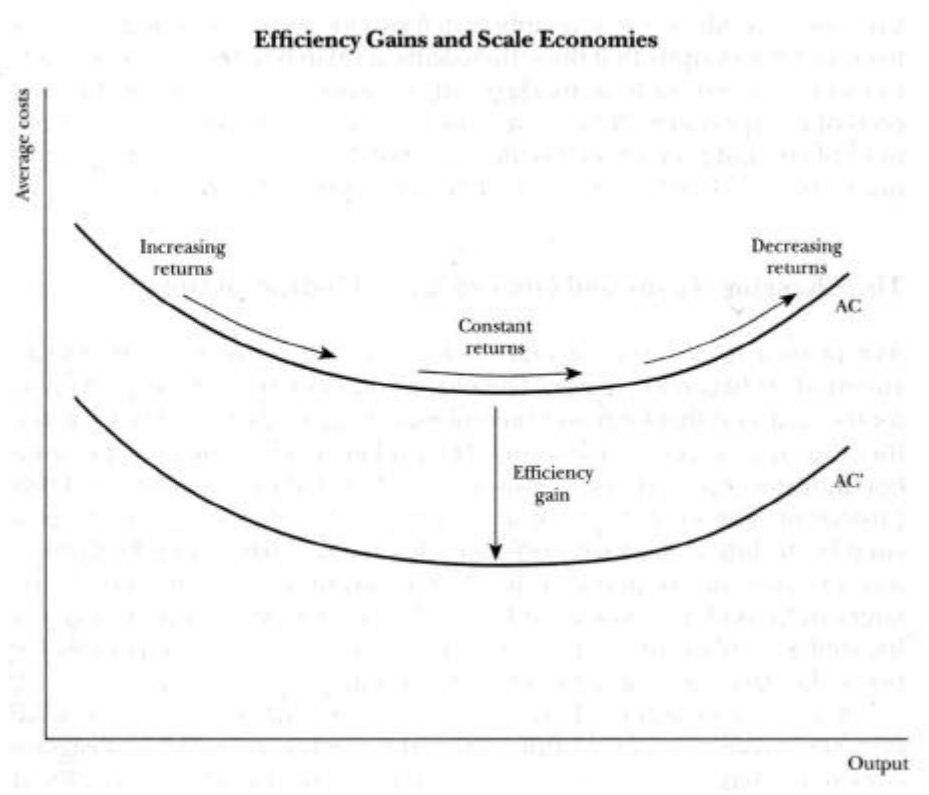
Percentage of Industry Value Added Originating from Different Production Methods in Selected Industries, 1850 and 1870

Industry	Artisan Shops		Other Nonmechanized		Mills		Factories	
	1850	1870	1850	1870	1850	1870	1850	1870
Boots and shoes	39	33	61	45	0	4	0	19
Brewing	41	21	24	0	35	49	0	30
Clothing	13	16	87	66	0	0	0	18
Cotton goods	0	0	4	3	16	1	79	96
Flour milling	7	5	0	0	91	95	2	0
Furniture	50	18	20	14	10	26	19	41
Iron	0	0	33	1	22	10	44	89
Leather	54	20	16	7	26	29	4	43
Liquor	9	4	18	4	73	82	0	10
Lumber milling	3	1	1	2	88	63	8	34
Meat-packing	34	31	29	0	11	69	25	0
Saddlery	62	71	38	28	0	1	0	0
Sheet metal	89	41	6	33	5	2	0	24
Tobacco	24	30	76	68	0	2	0	0
Wagon and carriages	32	33	63	47	3	3	3	18
Woolen goods	0	4	1	12	39	7	60	77

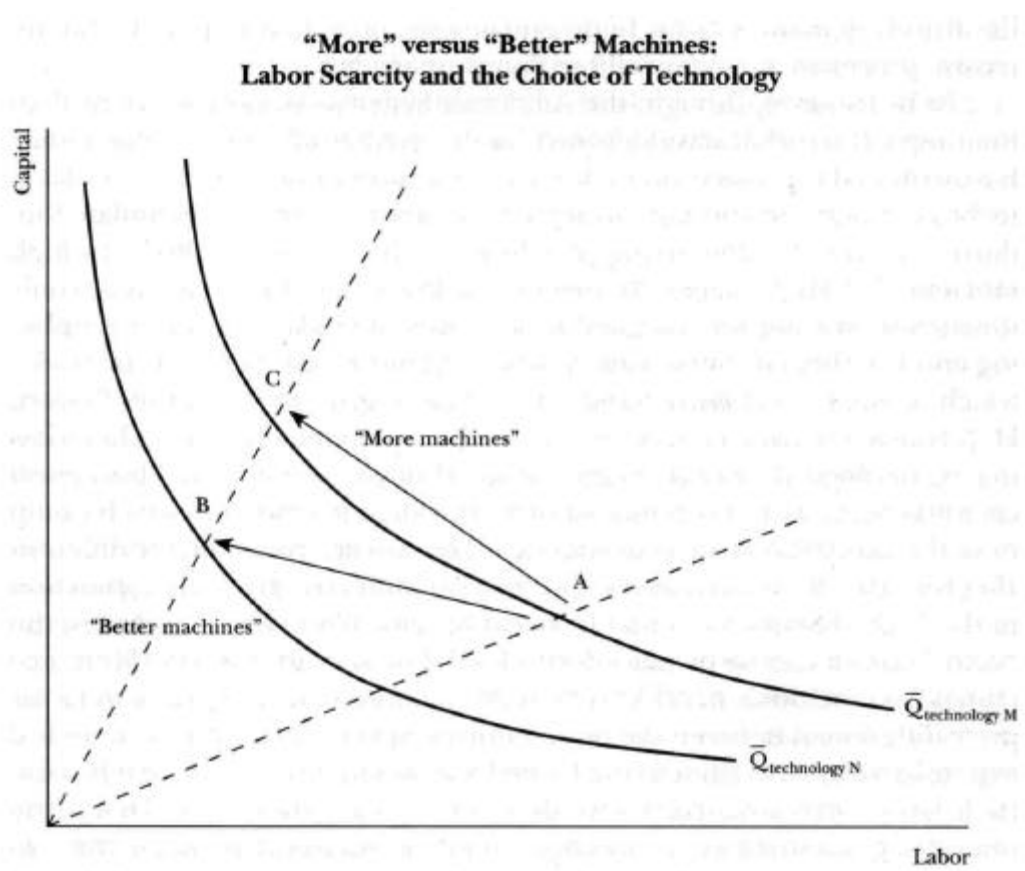Artisan shops = 1–6 employees; no power
Other nonmechanized = over 6 employees; no power
Mills = 1–25 employees; steam or waterpower
Factories = over 25 employees; steam or waterpower

Source: Adapted from Jeremy Atack, "Economies of Scale and Efficiency Gains in the Rise of the Factory in America, 1820–1900," in *Quantity and Quiddity: Essays in U.S. Economic History* (Middletown, Conn.: Wesleyan University Press, 1987): 296, Table 9.2.

G. Choice of Technology: The American System

"More" versus "Better" Machines:
Labor Scarcity and the Choice of Technology

Capital (vertical axis)

C — "More machines"

B — "Better machines"

A

$\bar{Q}_{\text{technology M}}$

$\bar{Q}_{\text{technology N}}$

Labor (horizontal axis)

Is in just "interchangeability"?
Is it cheap land & scarce labor?
Could be just more machines with the same technology
Could be better machines
But wages *and* interest rates were high

The role of land in the paradox

H. Regional Patterns & Harberger Triangles

Manufacturing in the United States, by Region, 1850–1860

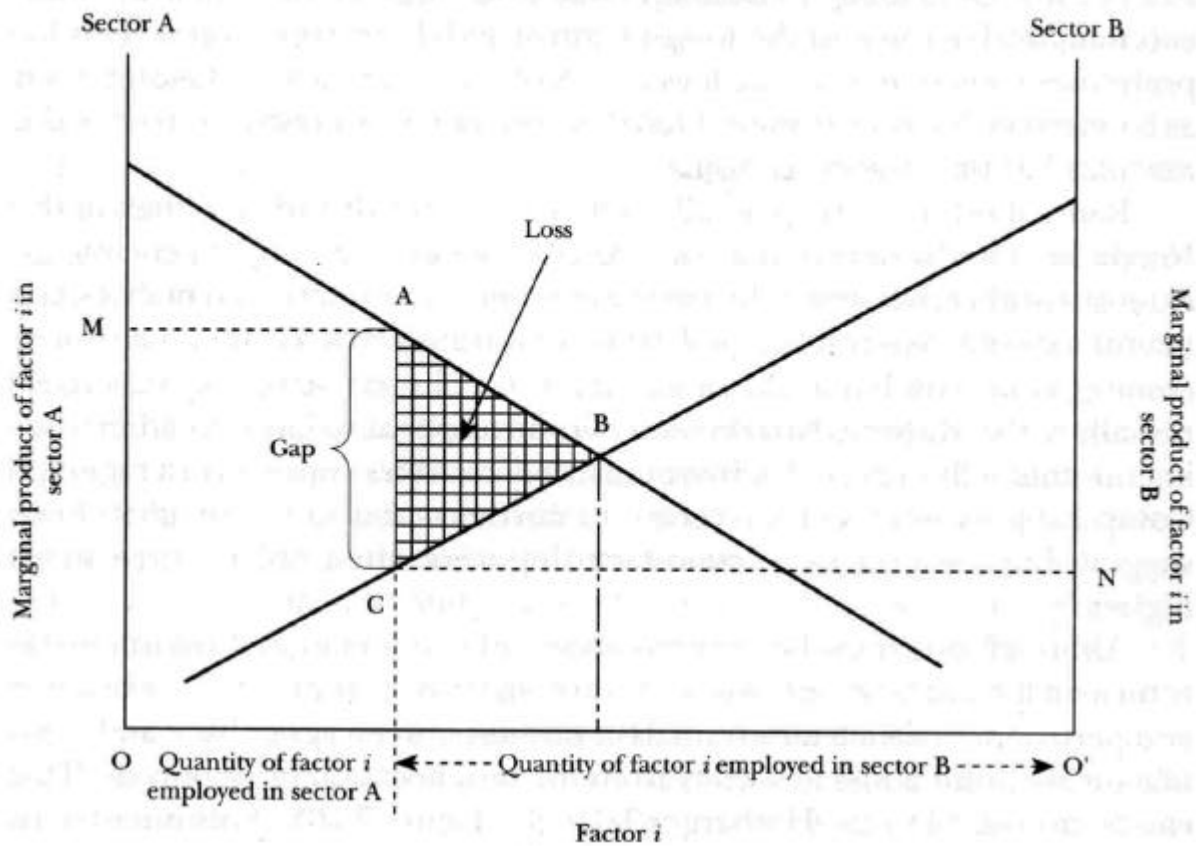| Region	Number of Firms	Capital ($ millions)	Employees (thousands)	Output ($ millions)	Capital per Firm ($)	Number of Employees per Firm	Output per Firm ($)	Output per Employee ($/person)	Output per Capita ($/person)
1850									
New England	22,487	166	313	283	7,364	14	12,594	904	104
Middle Atlantic	54,024	236	421	473	4,363	8	8,757	1,124	71
Midwest	24,921	63	111	146	2,536	4	5,877	1,315	27
South	20,505	67	110	101	3,273	5	4,921	918	12
1860									
New England	20,671	257	392	469	12,456	19	22,669	1,196	149
Middle Atlantic	53,287	435	546	802	8,164	10	15,059	1,469	96
Midwest	33,350	174	189	347	5,216	6	10,395	1,836	38
South	24,081	116	132	193	4,827	6	8,034	1,462	19
Percentage Change 1850–60									
New England	−8	54	25	65	69	35	80	32	43
Middle Atlantic	−1	84	29	69	87	25	71	30	35
Midwest	33	176	70	137	105	50	76	39	40
South	17	73	20	91	47	20	63	59	58

Source: Fred Bateman and Thomas Weiss, *Deplorable Scarcity: The Failure of Industrialization in the Slave Economy* (Chapel Hill: University of North Carolina Press, 1981): 17, Table 1.2.)

Manufacturing Rates of Return, by Region
1850 and 1860

Region	Rate of Return for All Firms		Rate of Return for "Large" Firms	
	1850	1860	1850	1860
Northeast	14.7	18.6	12.0	18.4
Midwest	23.8	20.9	24.2	14.4
South	19.8	25.1	16.8	21.1
United States	18.4	20.2	15.8	17.9

Source: Computed from the Bateman-Weiss samples from the manuscript censuses of manufacturers for 1850 and 1860. "Large" firms were defined as firms with $5,000 or more capital invested.

Factor Price Equalization and Sectoral Factor Allocations:
The Harberger Triangle

Sector A

Sector B

Loss

A

M

B

Marginal product of factor i in sector A

Marginal product of factor i in sector B

Gap

N

C

O   Quantity of factor i
employed in sector A

Quantity of factor i employed in sector B

O'

Factor i

II. Inter-Regional Trade Patterns

A. The old story (North)

B. Some revisions