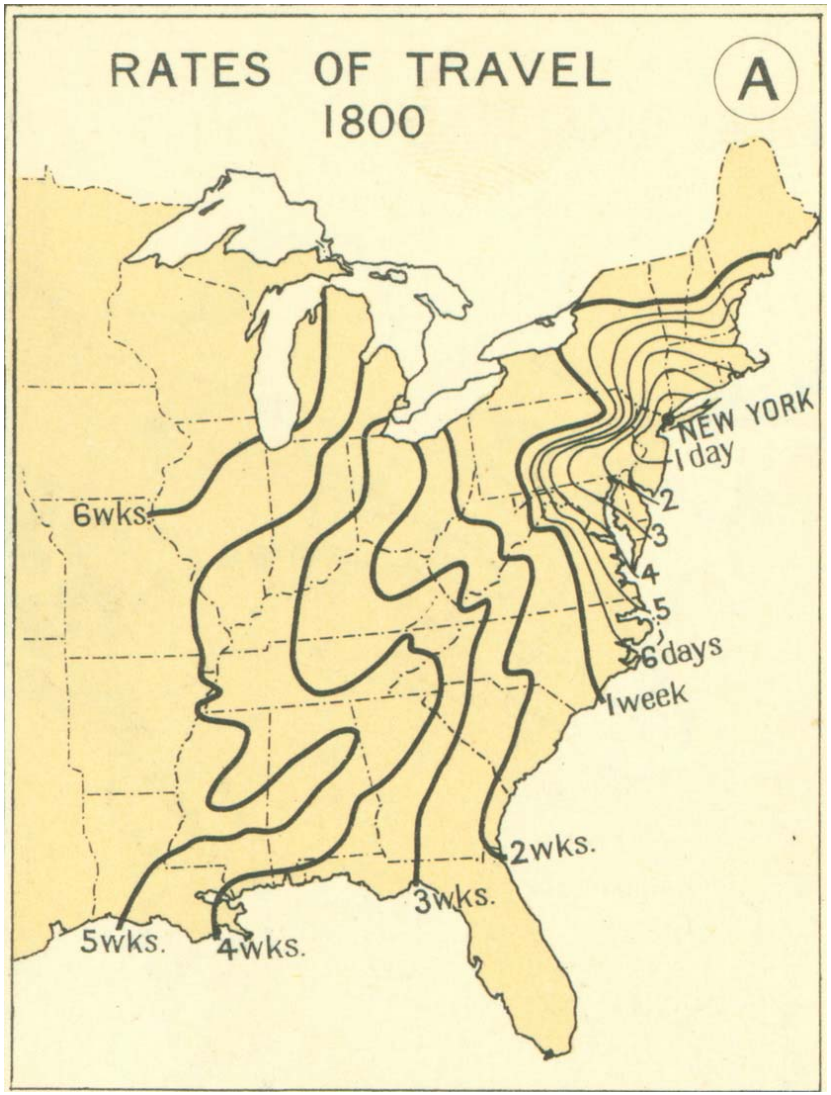
Announcements

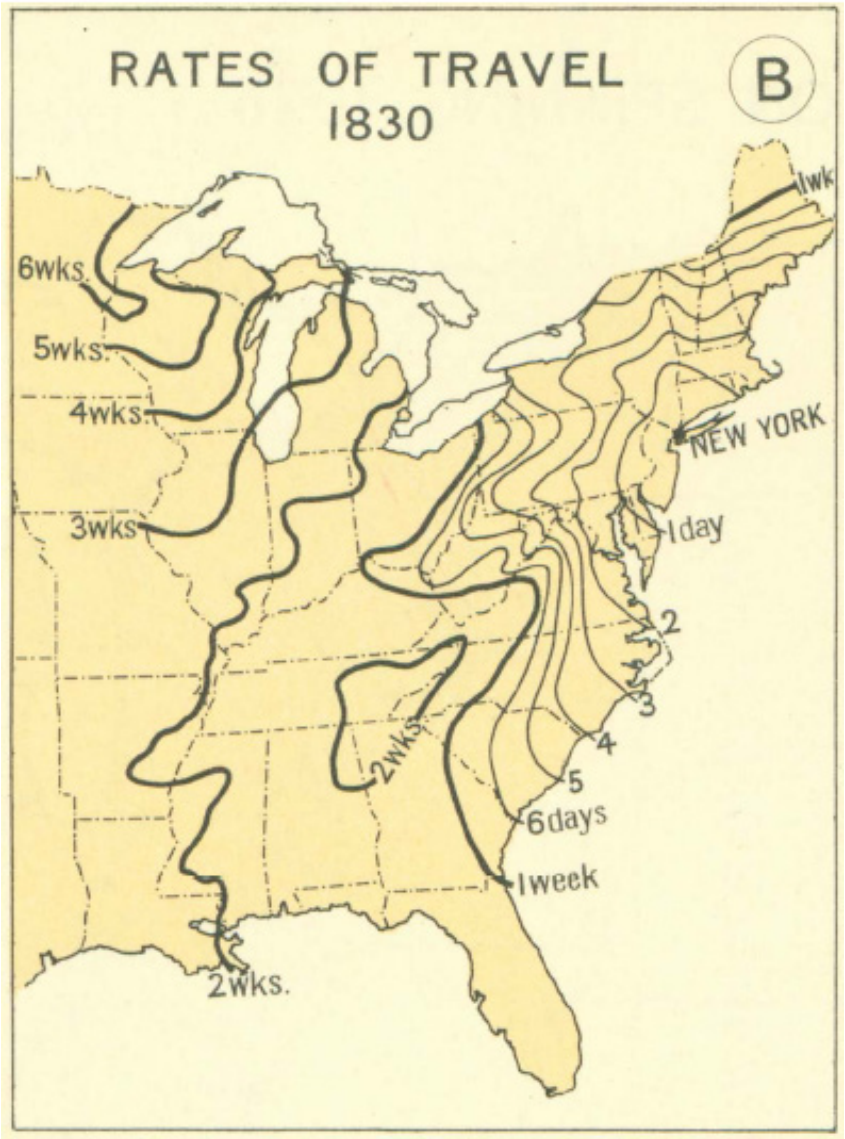
- I have to cancel next Thursday's class (3/22/2012) because of a rescheduled seminar
- Midterm 2 is coming up in a couple of weeks (3/29/2012)
- Don't forget to work on your research paper (literature review is due 4/11/2012)

The Evolution of Travel Times



From "Atlas of the Historical Geography of the United States" by Charles Paulin, 1932

The Evolution of Travel Times



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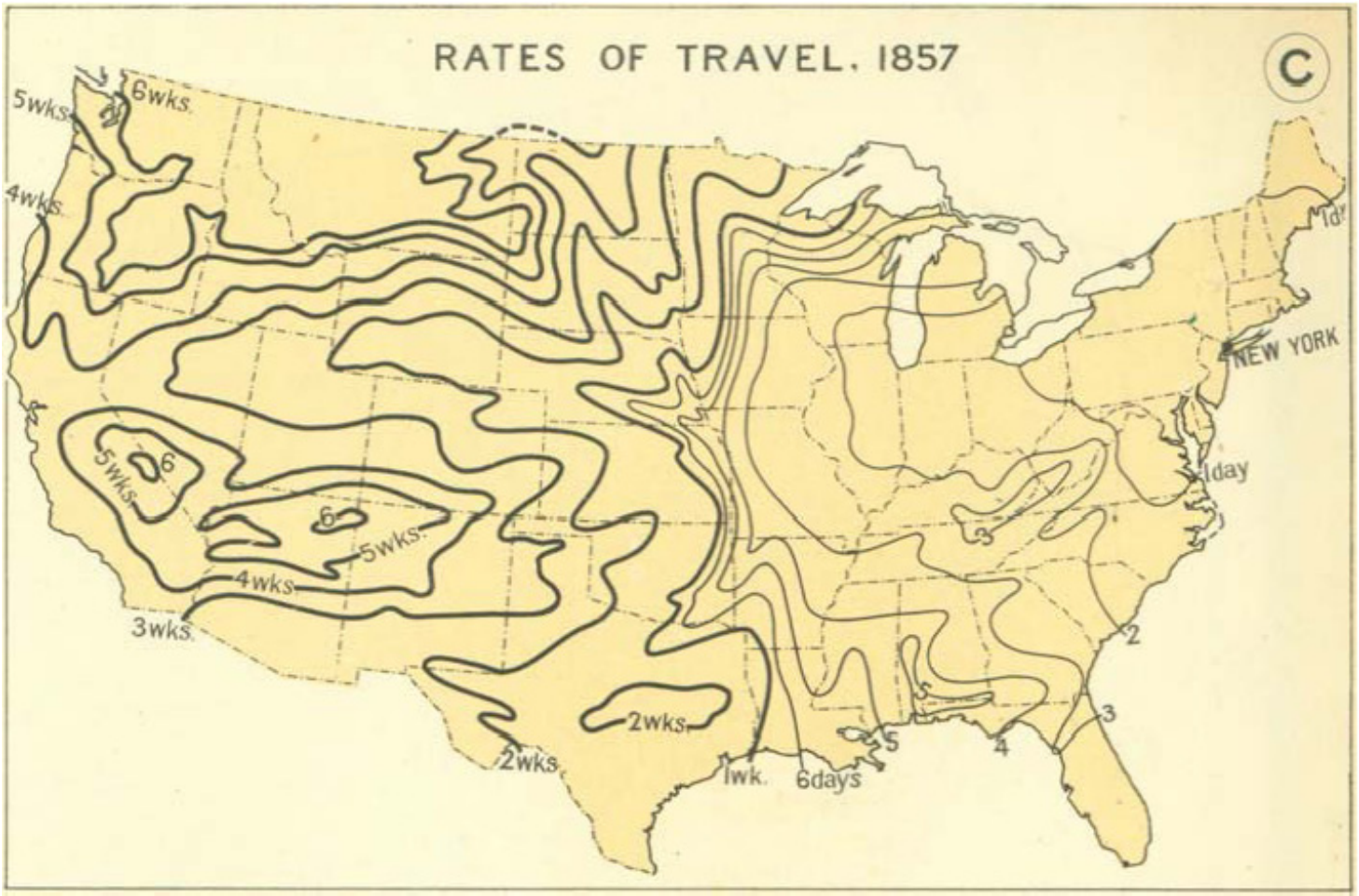

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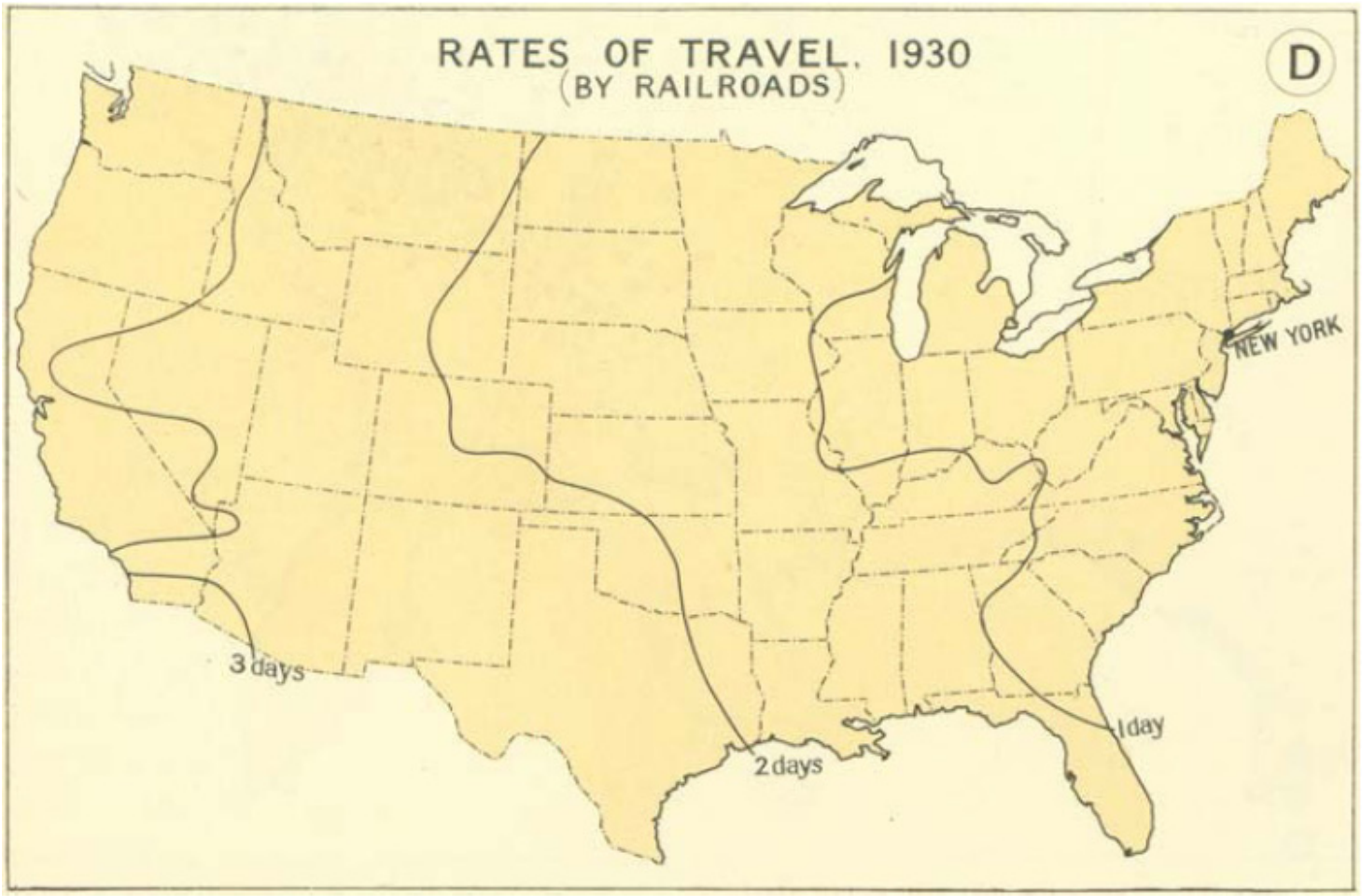


From "Atlas of the Historical Geography of the United States" by Charles Paulin, 1932

A Timeline of Road Construction

- 1792-1845: Turnpike Era
- 1847-1853: Plank Road Boom
- 1850-1902: Toll Roads in the West
- 1880-1916: Good Roads Movement
- 1956- : Interstate Highway System

A Timeline of Road Construction

The Call

SAN FRANCISCO BICYCLE RIDERS AS DISCIPLES OF PROGRESS.

Enthusiastic Outpouring of Devotees of the Wheel Who Are Determined on Improving the City's Thoroughfares—Fully One Hundred Thousand Spectators Viewed the Parade.

Problems with Turnpikes

- Turnpikes faced some controversy
- People feared owners abusing monopoly power and objected to paying for something that used to be free
- To keep the public happy, legislators wrote restrictions into turnpike charters
- Examples of these restrictions:
  - Toll gates could be spaced no closer than a specified minimum distance
  - Exemptions from toll payment for particular people
  - Toll and penalty increases required petitioning the legislature
- Even with better roads, land transport was still costly compared to water transport

The End of Toll Roads

- Despite the regulations, many private toll roads were chartered and in use throughout the 19th century
- They were often more successful than government efforts to expand roads
- In the late 1800s, sentiment turned against toll roads
- State and federal governments developed anti-toll road policies
- The network of private toll roads had disappeared by 1920

The End of Tollroads

The Extent of Private Toll Roads

Toll Road Movements	Incorporations	% Successful in Building Road	Roads Built and Operated	Average Road Length	Toll Road Miles Operated
Turnpikes Incorporated from 1792 to 1845	1562	55	859	18	15000
Plank Roads Incorporated from 1845 to 1860	1388	65	902	10	9000
Toll Roads in the West Incorporated from 1850 to 1902	1127	40	450	15	7000
Other	1000	50	500	16	8000
Total	5000-5600	48-60	2500-3200	12-16 miles	30000-52000

Roads - Not Much of a Revolution

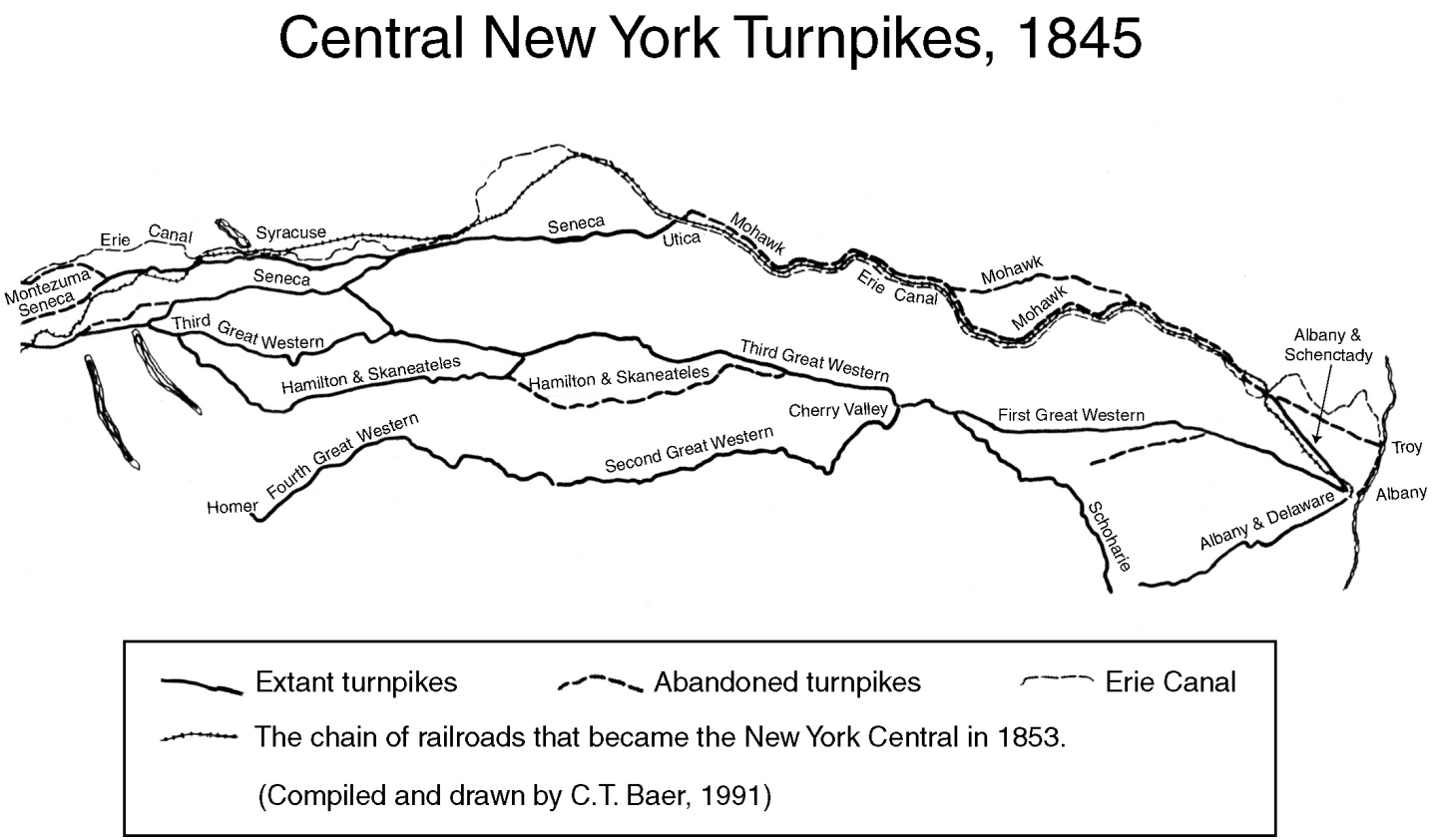
- Large investments were made in turnpikes, mainly in the mid-Atlantic states and New England
- While not all that profitable for the investors, the roads did cut travel costs in half
- Turnpikes were typically private endeavors with a slight public twist to them
- Governments were typically unable to finance and maintain roads or were very inefficient at it
- Road transportation still remained costly: it was slow and took up manpower and animal power for an extended period of time
- Roads weren't going to be the transportation revolution the economy was looking for

Transportation in the Early Nineteenth Century

Transportation Costs, 1815

Mode of Transportation	Cost per Ton-Mile
Road	$0.30
River, Upstream	$0.06
River, Downstream	$0.01
Ocean	<$0.01

Map of Central New York Turnpikes, 1845



The Construction of Canals

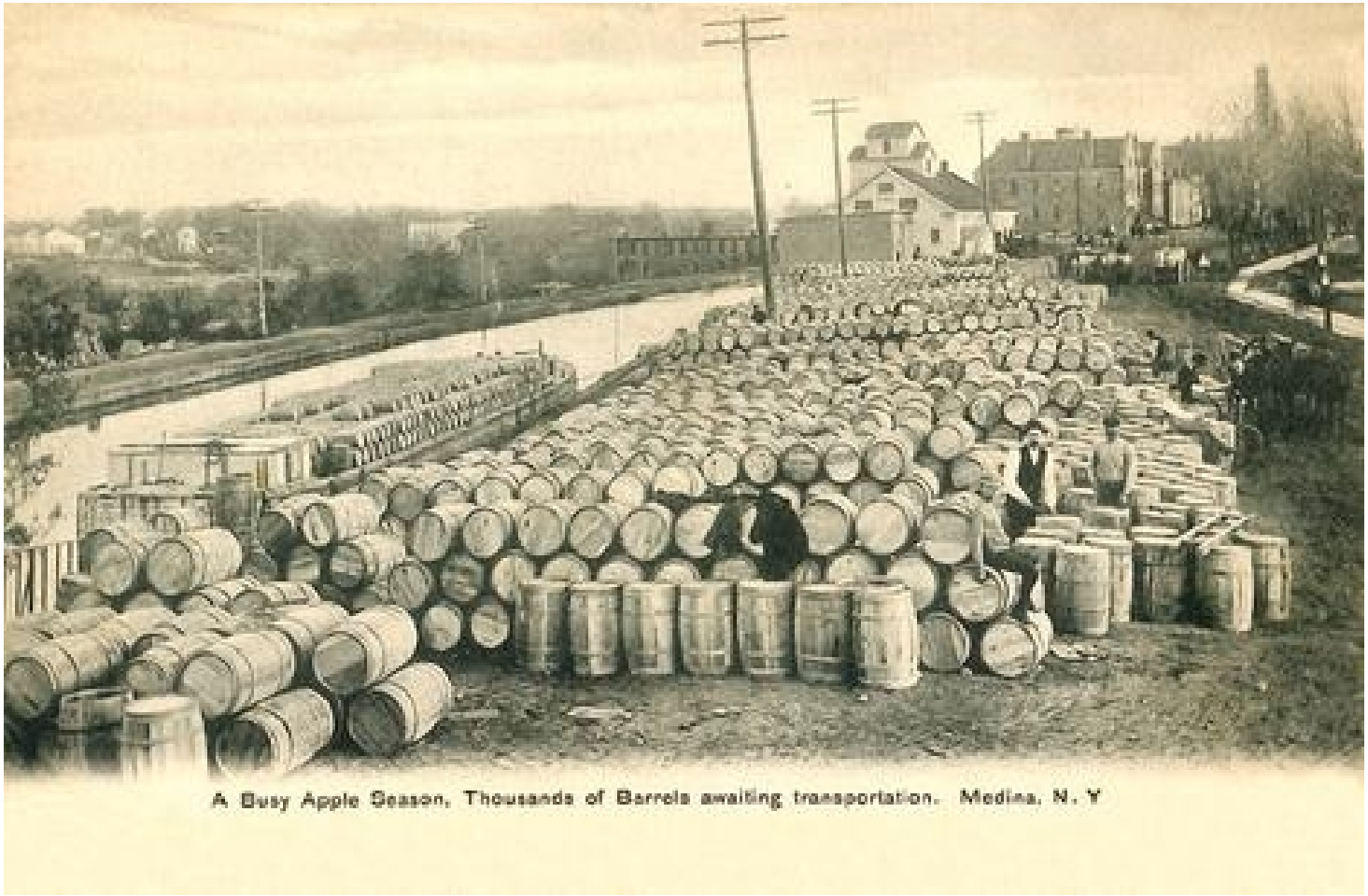
- Canals solved many of the problems with roads
- They could be built to cover similar stretches of land but benefited from using boats rather than wagons
- Canal technology was well developed:
  - Canals have been around since 4000 B.C.
  - By 609, China had completed the Grand Canal, over 1,000 miles of water transport
  - Were being built extensively in England in the 1700s as a result of the Industrial Revolution
- So canals seemed like a pretty good solution to transportation issues

Problems with Canal Construction

- Canals seem like a great idea, but their construction presents a few issues
- Roads were being built 10 or 15 miles at a time, this doesn't work for canals
- To be useful, canals had to be big projects; big projects cost a lot of money and raise big route planning issues
- This moved them into the realm of a very large public works project
- Once that happens, issues of politics, bureaucracy, waste and corruption arise

Case Study: The Erie Canal

The Erie Canal



Why focus on the Erie Canal?

- Engerman and Sokoloff (2004) on the governance of the building of the Erie Canal
- They want to study how much corruption there was in the antebellum economy
- Concerned with the issue of whether low corruption, secure property rights are a precondition for growth and whether corruption increases or decreases as an economy grows
- The Erie Canal was one of the biggest public works projects before the Civil War
- It had major effects on the shape of the economy and transportation networks
- It can be fairly easily compared to modern public works projects

History of the Erie Canal

- Politics were central to canal creation:
  - Canals were typically funded and operated by the government
  - Being on the canal path led to big economic gains
  - If financed through taxes, burden is shared by entire state
- Politics is evident in route choice: went to Erie rather than Ontario, making it much longer than necessary
- Why? Kept trade from getting diverted to Canada, would increase land values in western NY

History of the Erie Canal - The Politics of the Canal

- Mid-Hudson valley farmers opposed the project
- Strong opposition from people in New York City
- Canal was only approved by a narrow margin
- Getting the necessary votes required logrolling
- Unlike bank charters, it didn't seem that votes were obtained through bribes

History of the Erie Canal - The Politics of the Canal

- Ultimately, the legislation to build the canal gets passed
- It is to be funded entirely by the state (federal funding fell through)
- Money for construction would be borrowed on the credit of the state
- It would be paid off through a Canal Fund
- Money for the Canal Fund would come from canal tolls, a tax on salt, duties on auctioned goods, taxes on steamboat passengers and a real estate tax on land within 25 miles of the canal

History of the Erie Canal - The Construction of the Canal

- Where concerns of corruption and fraud arose were in the construction of the canal
- Construction was contracted out to private firms and individuals
- In modern times, this means big contracts potentially going to friends and family
- Things were different then: contracts were split up into small chunks and the quality of work was easily observed and compared to well-known standards
- Small contracts meant small gains from corrupt practices
- Overall result: canal gets constructed at a cost 46 percent higher than estimated costs

Erie Canal Cost Overruns in Context

Actual Expenditures to Projected Costs on Major Public Works

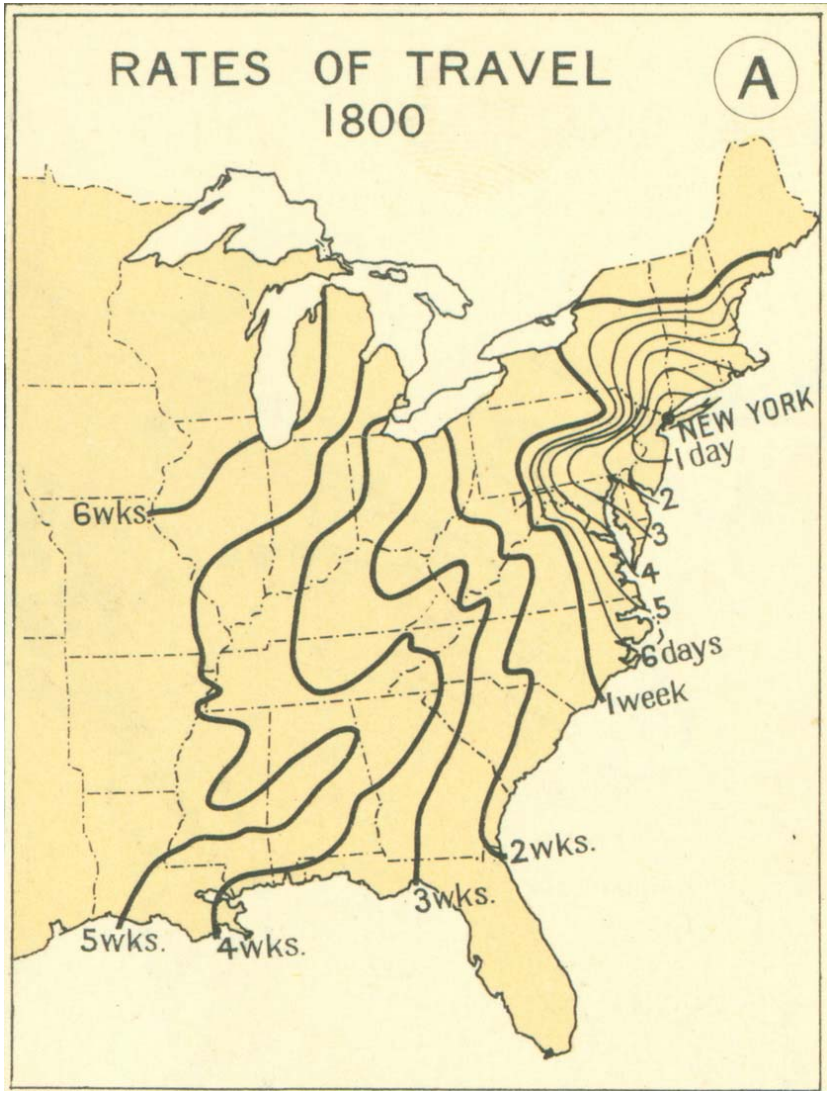
Years	Public Works	Projected Cost (current US $ millions)	Actual Expenditures (current US $ million)	Ratio of Actual to Projected Costs
1817-1825	Erie Canal	5.75	8.4	1.46
1835-1862	Enlargment of Erie Canal	12.42	30	2.42
1883-1926	Mississippi River Levee Line	11.45	229	20
1902-1913	Panama Canal	145	298	2.06
1931-1936	Hoover Dam	48.89	54.7	1.12
1952-1953	Interstate Highways	25	477.5	19.1
1966-1975	Louisiana Superdome	35	163	4.66
1971-1975	Renovation of Yankee Stadium	24	100	4.17
1991-2004	The Big Dig	2800	14600	5.21

The Results of the Erie Canal

- The Erie Canal was a huge success
- It easily paid for itself and the social gains were huge
- It altered the status of New York City and the counties along the canal
- It led to additional canal construction (both from competitors and because of promises made during voting)
- These additional canals typically didn't see the success of the Erie but many still had reasonably high social returns

Map of Canals in the United States, 1825

The Effect of Canals on Travel Times



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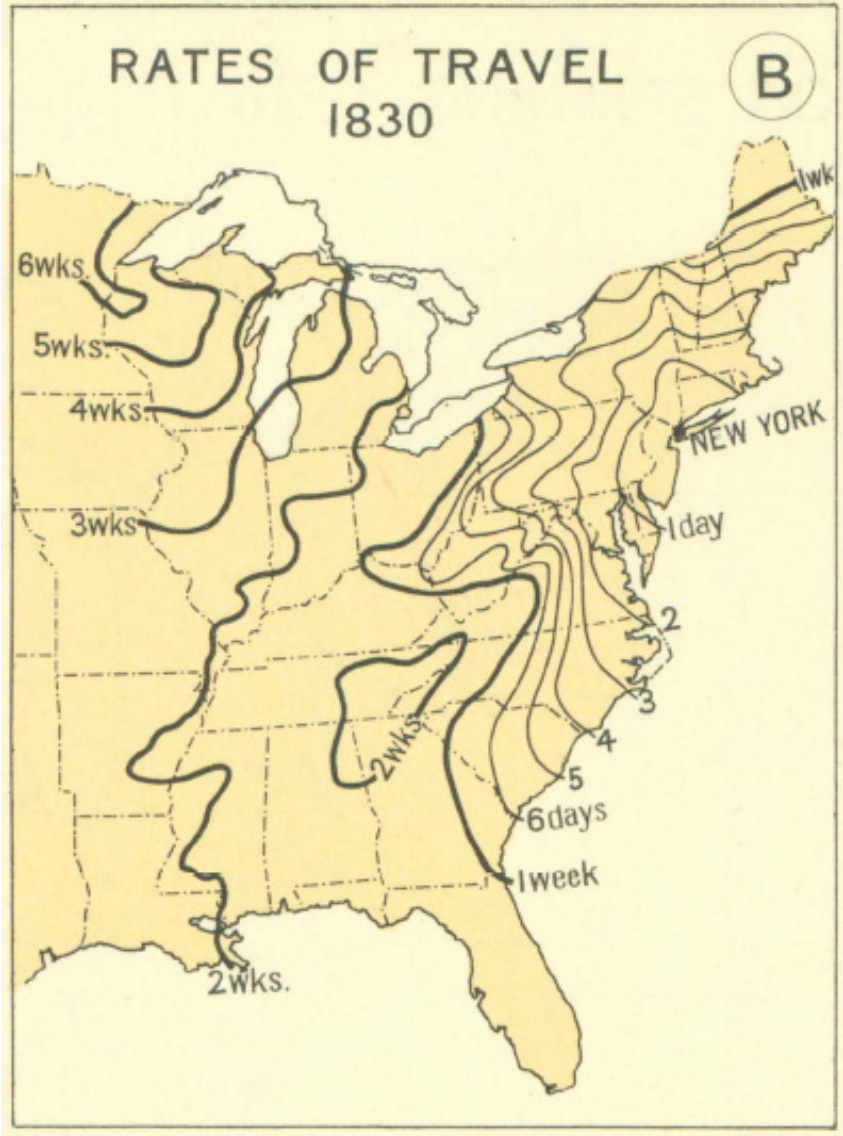
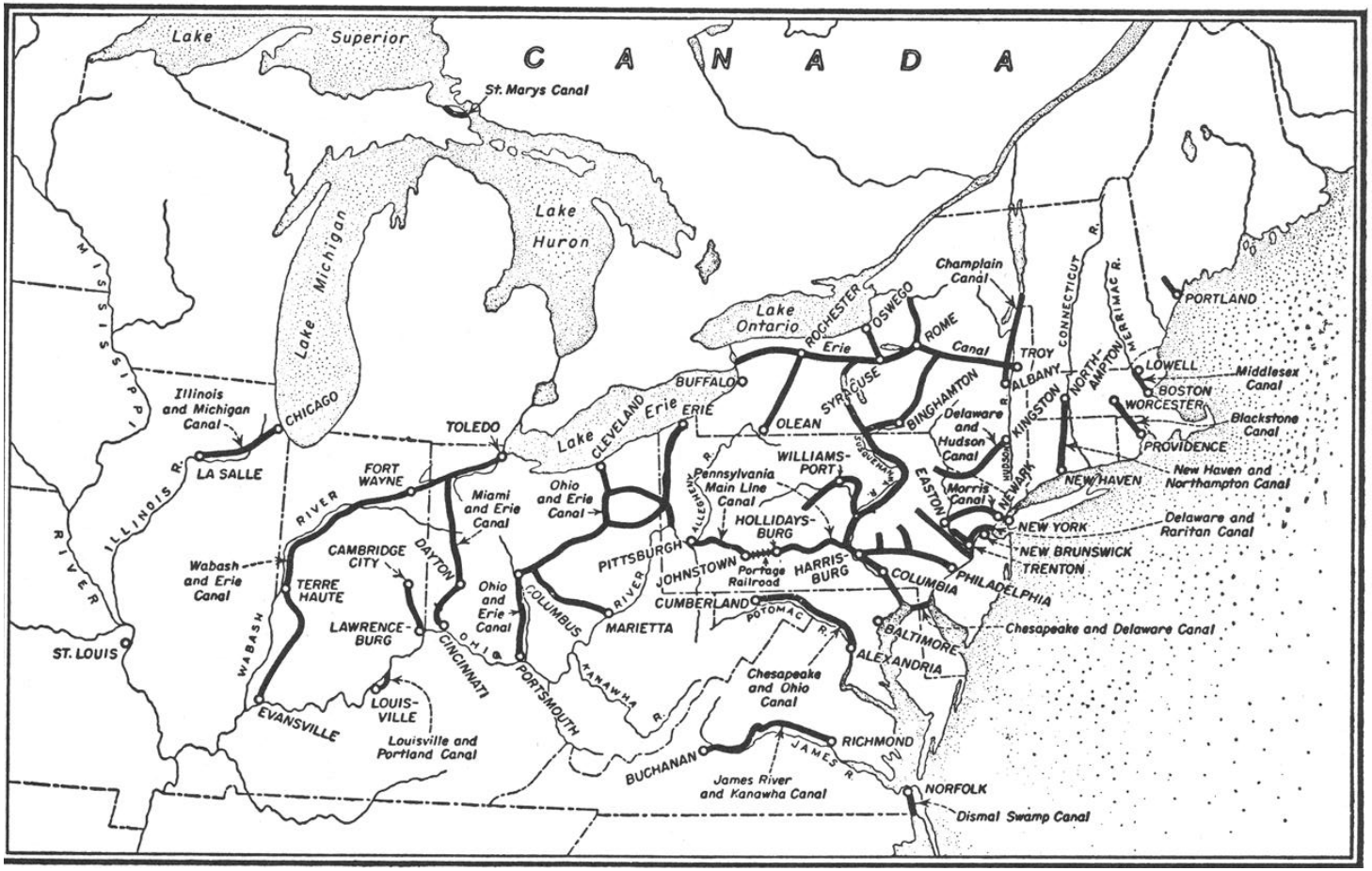


A Brief Summary of the Canal Era

- Canal building occurred in three major waves:
  - 1815-1834 - construction of the New York and Pennsylvania systems
  - 1834-1844 - construction in the Midwest
  - 1844-1860 - feeder lines into existing network
- Commercially, the results were quite different for each phase:
  - 1815-1834 - large private returns and social returns
  - 1834-1844 - generally unprofitable but probably good social returns
  - 1844-1860 - financial disaster for both state governments and private investors

The Canal System by 1860



The Canal System Over Time

Expansion of Canals and Railroads

Year	Canal Mileage	Railroad Mileage
1820	150	0
1830	1277	73
1840	3326	3328
1850	3698	8879
1860	4000+	30636

Lessons in Public Good Provision From the Canal Era

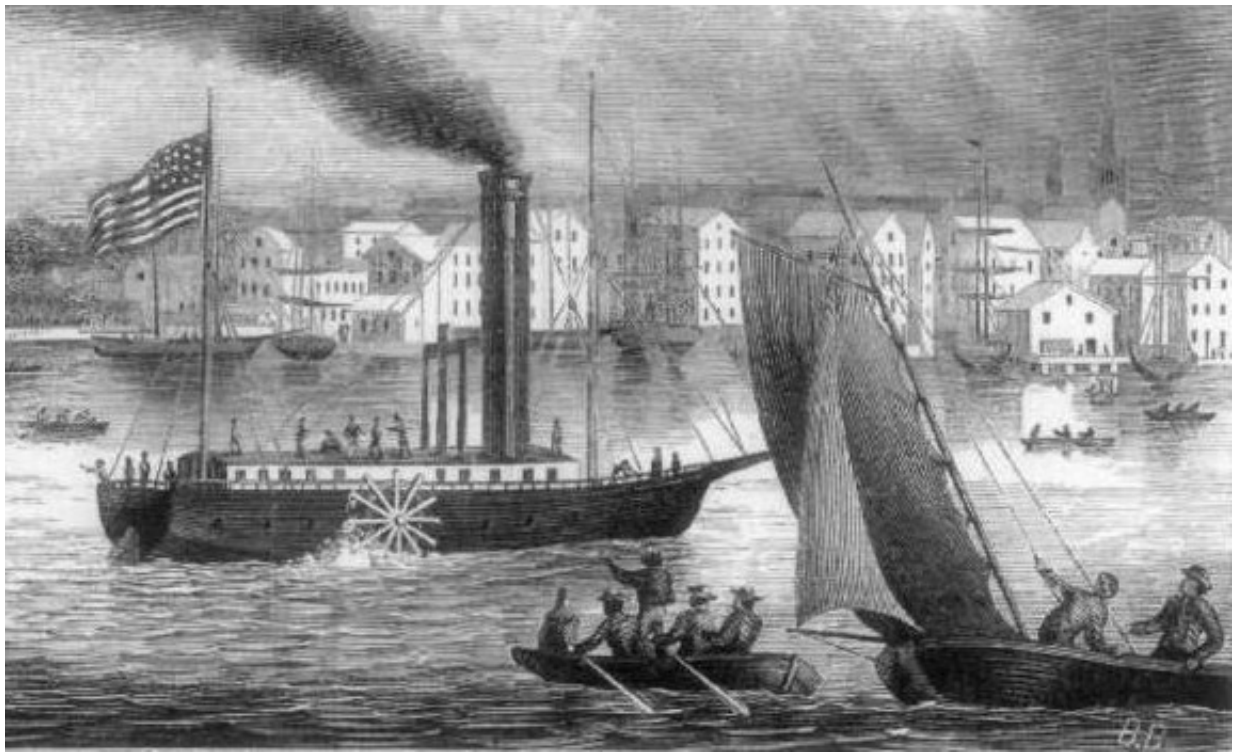
- Canals did fundamentally change the transportation network, linking the Midwest to the East
- Particularly for the early canal projects, there were huge social gains that justified the large public expenditures
- However, public provision of canals didn't stay efficient throughout the whole period
- By the end of the period, public debt was being accumulated for questionable social returns

The Economic Impact of Canals

- Canals cut the cost of shipping from 20 cents per ton-mile in 1810 to as little as 1 cent per ton-mile by the end of the era
- Trade through the North (primarily through the Erie Canal) became almost as large as trade through the Mississippi by 1860
- Even once railroads were built, canals remained in operation (a combination of low operating costs and cheaper shipping of high-bulk commodities)
- The government support of large canal projects led to two important developments for the future economy:
  - Congress began to use land grants to promote canal construction
  - The huge costs led to the growth of bond markets and links to foreign capital markets

Evolutions in River Transport

Evolutions in River Transport



Productivity Gains in Steamboats

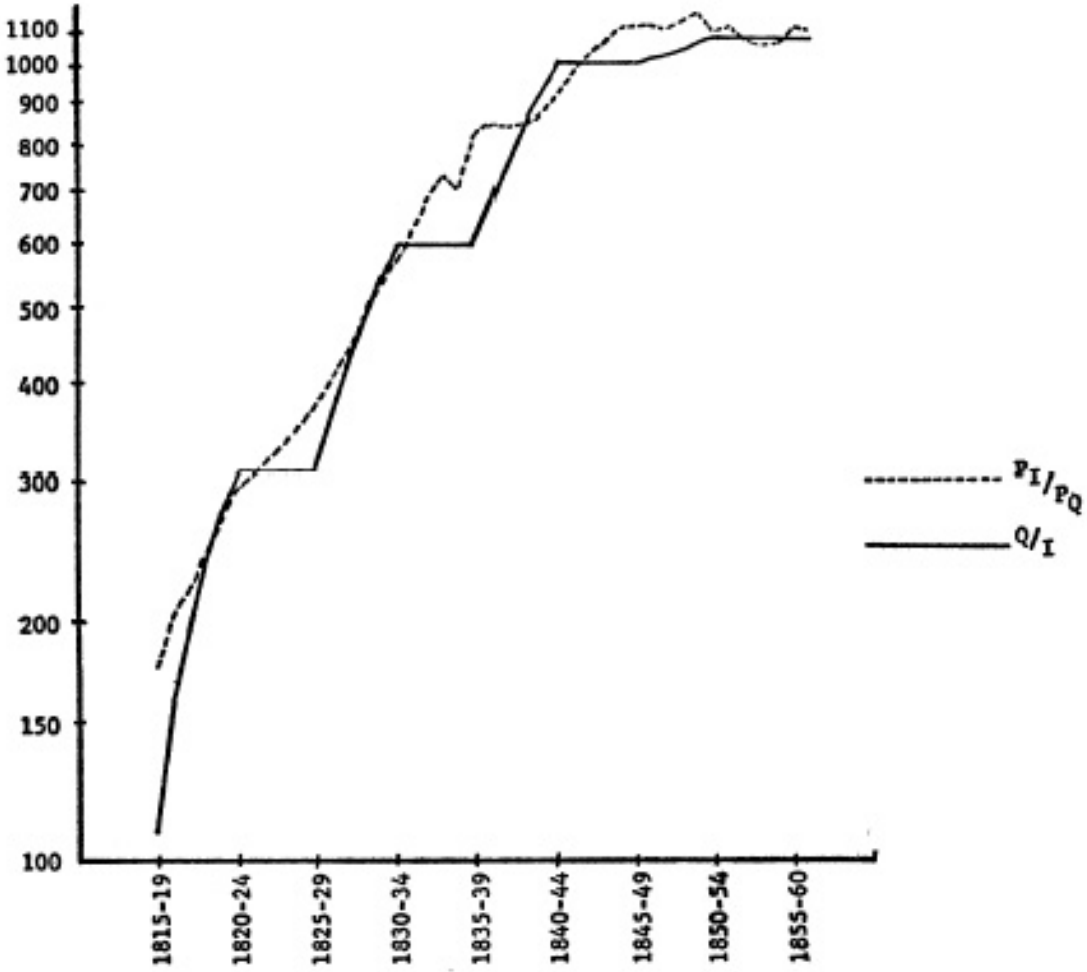


FIGURE 1

FIVE YEAR MOVING AVERAGES OF INDEXES OF STEAMBOAT TOTAL PRODUCTIVITY

Productivity Gains in Steamboats

Inputs of an Average Steamboat on the Louisville-New Orleans Route, 1815-1860

Period	Ship Size (tons)	Ratio of Carrying Capacity to Size	Capital Input per Ton	Labor Input per Ton	Fuel Input per Ton	Insurance per Ton
1815-19	220	0.5	0.17	0.22	1.53	5.09
1820-29	290	0.8	0.11	0.13	1.06	1.26
1830-39	310	1	0.08	0.09	0.77	0.53
1840-49	310	1.6	0.07	0.07	0.55	0.21
1850-60	360	1.75	0.07	0.07	0.58	0.2

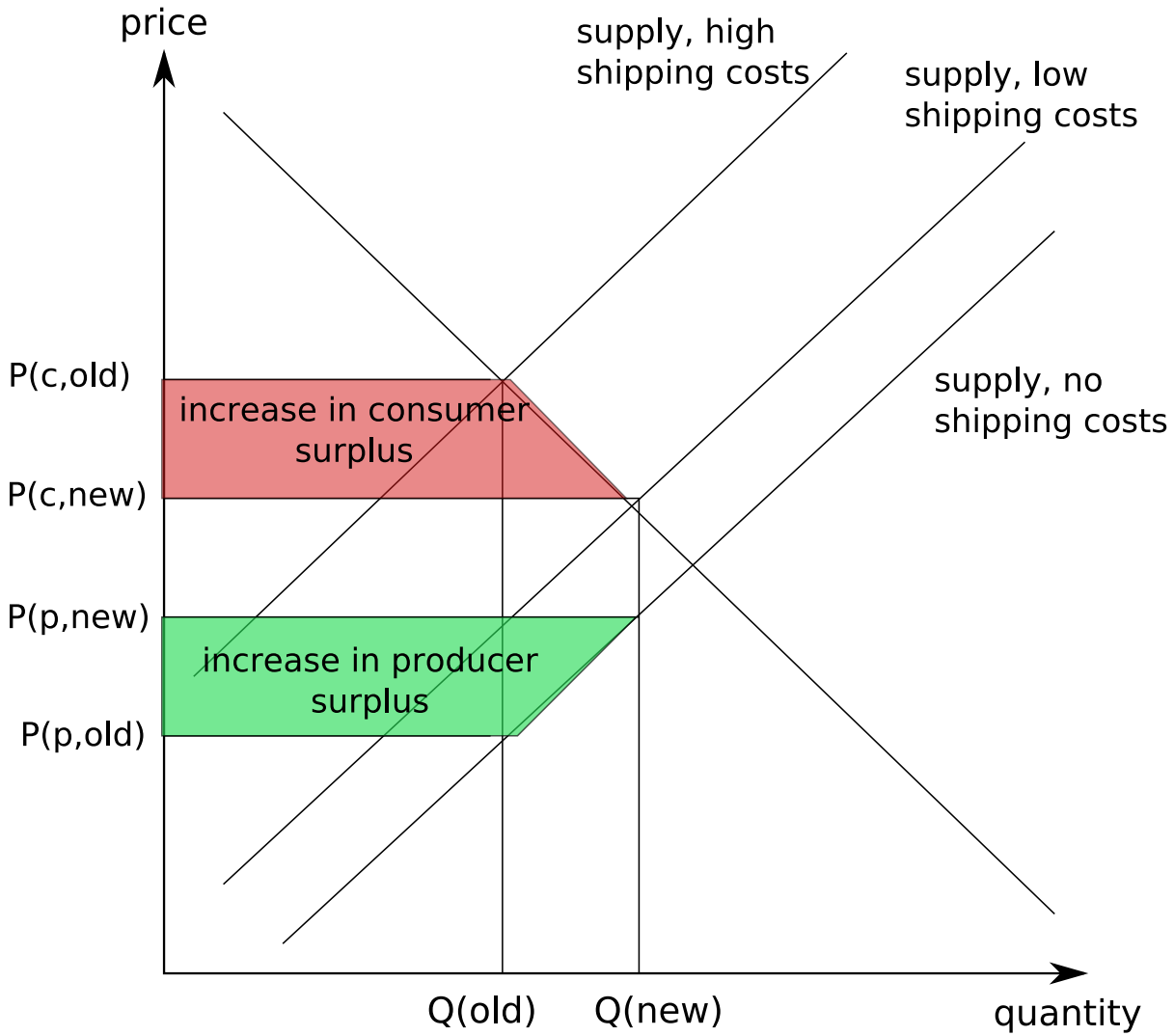
The Role of the Government in River Transport

- River travel presented a slight wrinkle for the government's role in transportation improvements
- Constitutionality of federal involvement in internal improvements was hotly debated
- Beyond constitutionality, opposition and support for federal involvement differed greatly across the country
- River transport was unique in that navigable rivers were under federal control (they were the interstate federal highways of the day)
- It was up to the federal government to improve rivers (states couldn't collect taxes on river transport) but the government was often hindered by an anti-big government sentiment

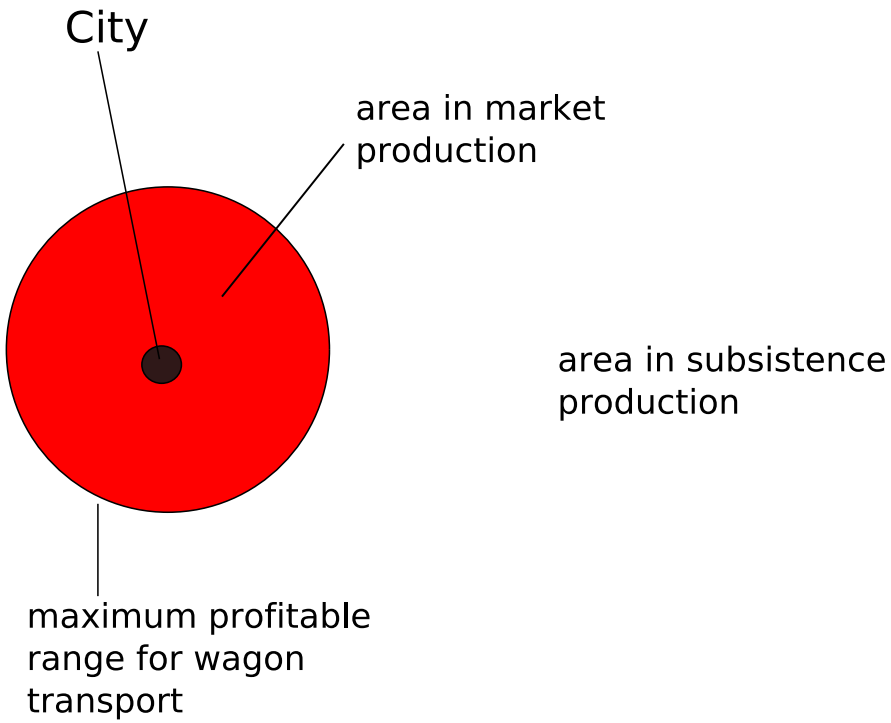
Who Benefited From Transportation Improvements?

- We've seen that many of the transportation improvements led to major reductions in shipping costs but didn't necessarily lead to big profits for investors
- If transportation improvements were so important but profits weren't huge, where were these big social returns going?
- They were going to a few different groups:
  - **Investors**: some investors did see decent returns
  - **Producers**: expanded access to markets meant greater demand, better transportation meant higher net prices received
  - **Consumers**: expanded access to markets meant greater supply, better transportation meant lower net priced paid
  - **Landowners**: land linked to transportation network increased in value

Gains in Surplus From Lower Shipping Costs



Market Size and Land Values



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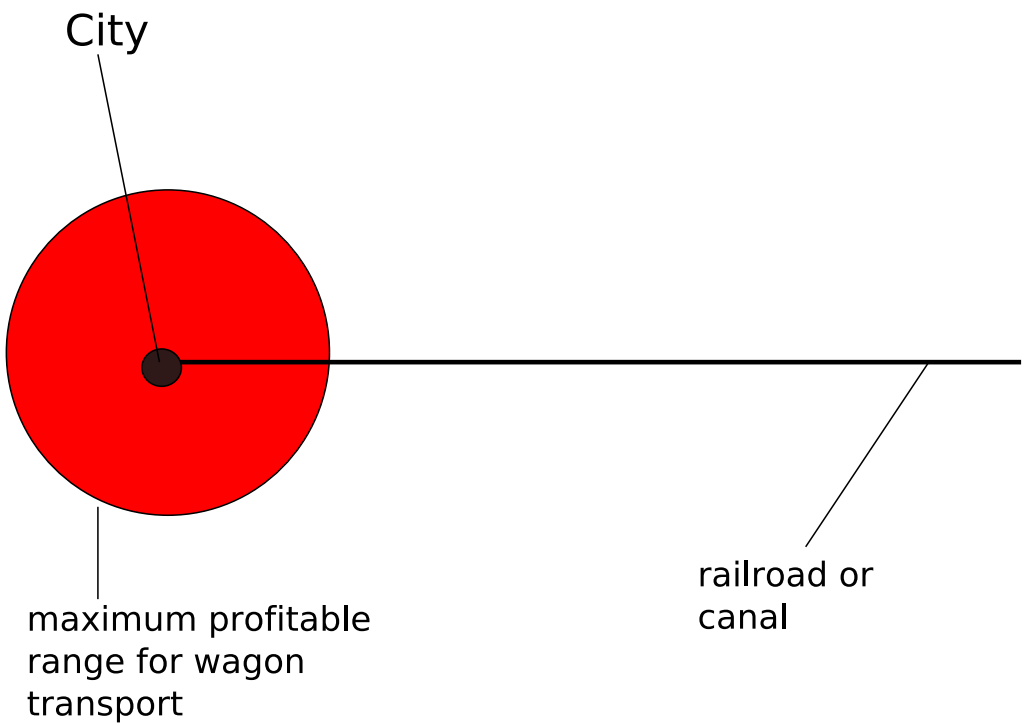

Market Size and Land Values