A Native American overlooks the newly completed transcontinental railroad

Transport

Capitalism, Markets, and Innovation

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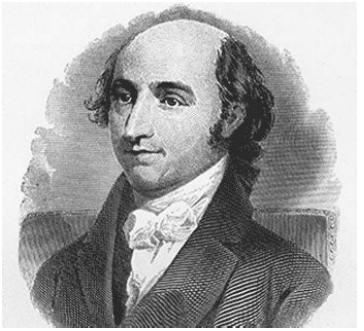
Key questions

1. What was the impact of lower transport costs and new transport technologies on the American economy?

2. How did funding the transport sector help develop US financial markets?

Albert Gallatin



The Gallatin plan

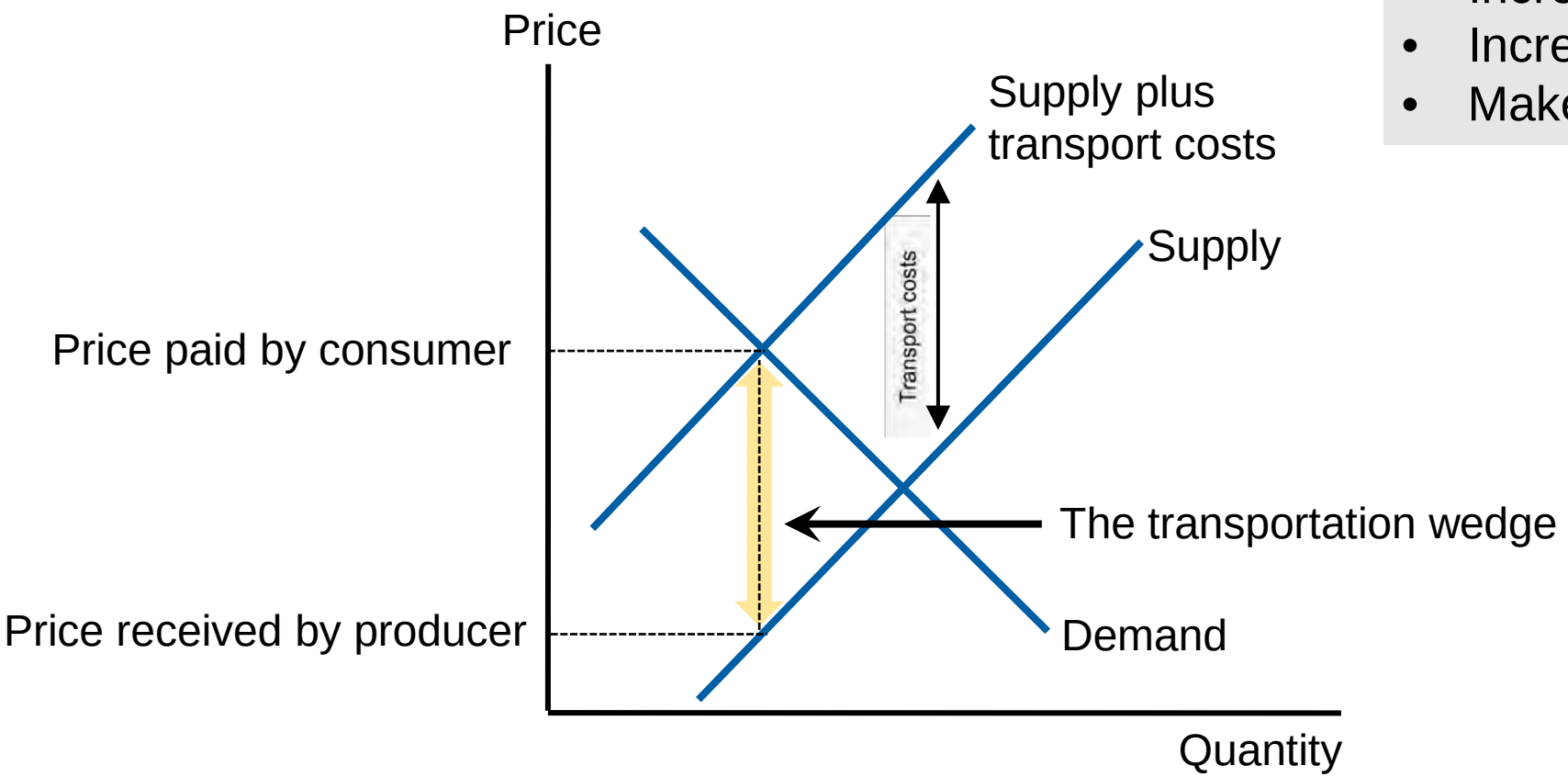
- **Albert Gallatin (1761-1849),** "America's Swiss Founding Father", was the 4th Secretary of the Treasury from 1801-1814.
  - ✓ Arranged the financing for Louisiana purchase (1803).
  - ✓ Founded New York University.
- In 1808, he wrote the "Report on Roads, Canals, Harbors and Rivers", one of the great planning documents in American history.
  - ✓ Proposed a transportation network—canals and roads—financed by the Federal government.
  - ✓ Many of his proposals were completed (but by state governments and the private sector).
- The Gallatin River in Montana (a blue-ribbon trout stream) is named after him.

Transport cost economics

Lower transport costs:

- Reduce prices consumers pay and increase prices producers receive.
- Increase the size of existing markets.
  - ✓This is important for manufacturing, which relies on economies of scale.
  - ✓Larger markets increase the incentive for innovation.
- Create new markets and allow trade in a wide variety of goods.
- Allow industries to specialize by location (e.g. semiconductors in Silicon Valley).

The transportation “wedge”



Transport costs:

- Increase the price consumers pay.
- Lower the price producers receive.

A decline in transport costs:

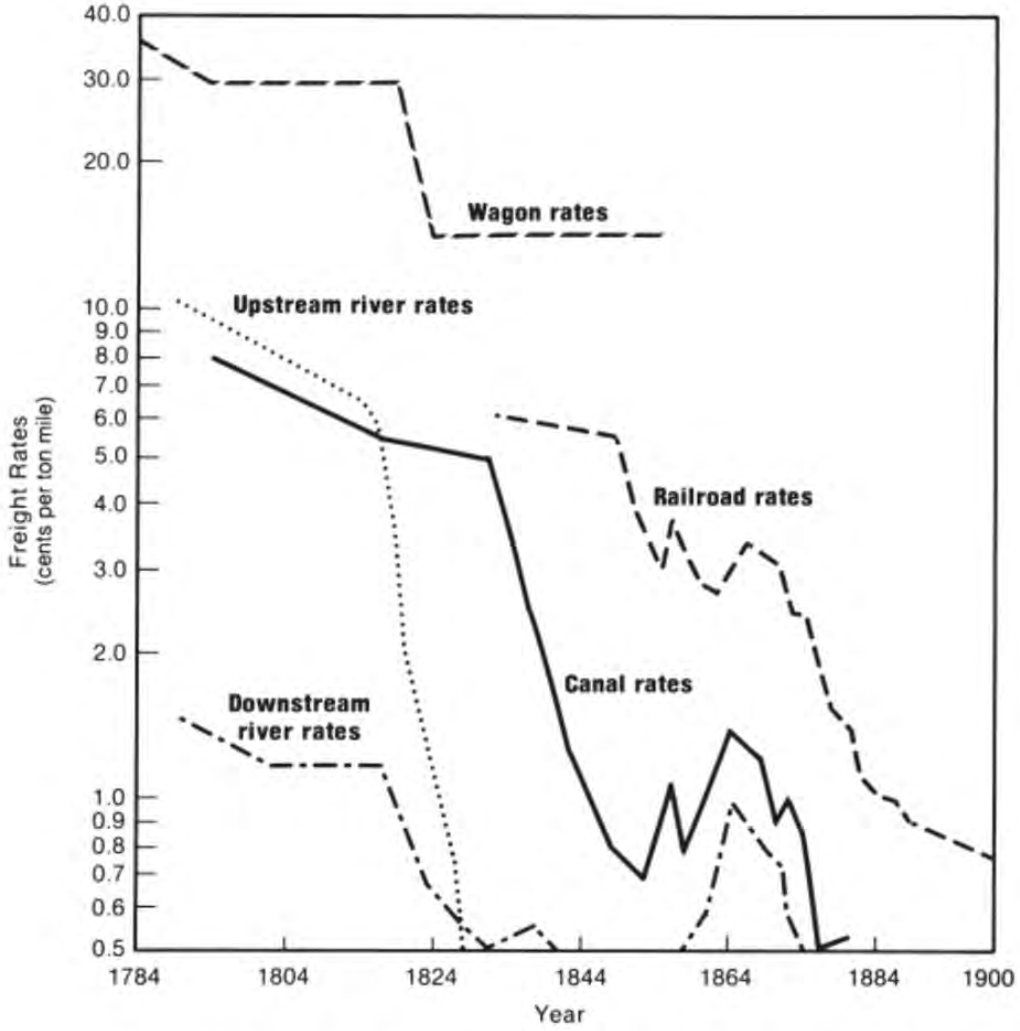
- Increases consumer surplus.
- Increases producer surplus.
- Makes society better off.

The “incidence” of transport costs

Who bears the burden of transport costs? The consumer or the producer or both?

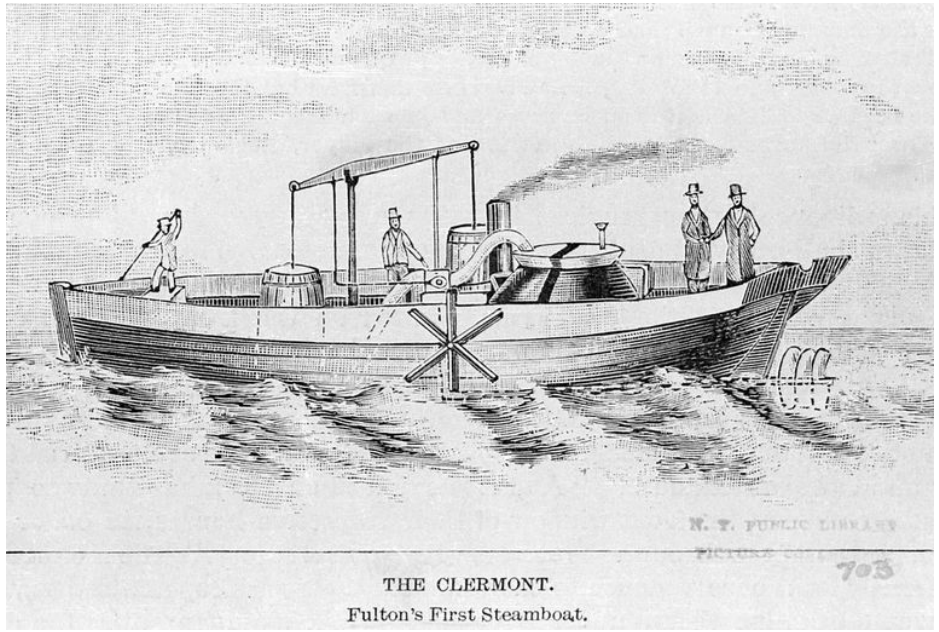
=> Not necessarily who writes the check.

Freight rates, 1784-1900



Freight rates declined dramatically during the nineteenth century.

Fulton's folly



- In 1787, John Fitch invented the first steamboat to navigate an American river.
- But Robert Fulton is often credited as the "father of steam navigation"—his designs were commercially successful.
- In 1807, Robert Fulton's *Clermont* traveled upstream from New York to Albany in 32 hours (sailing ships took 4 days).
- The steamboat *New Orleans* traveled from Pittsburgh to New Orleans in 1811 (the journey took more than two months).
- Robert Fulton died relatively poor in 1815.

Steamboats

- By 1820, steamboats had become the main form of transport on America's rivers and the eastern seaboard.
- They played a crucial role in the economic development of the Mississippi River region.

Drawbacks:

- The average lifespan of a steamboat was only 4-5 years.
- Approximately 4,000 deaths occurred in steamboat disasters between 1810 and 1850.

The Erie Canal

- Canals before the Erie Canal were small and had little impact.
- The Erie Canal was started in 1817 and completed in 1825. It connected the Great Lakes to the Hudson River and the Atlantic Ocean.
- $7 million cost (about $200 million in current dollars) which was financed by bonds issued by the state of New York. It was immediately profitable.

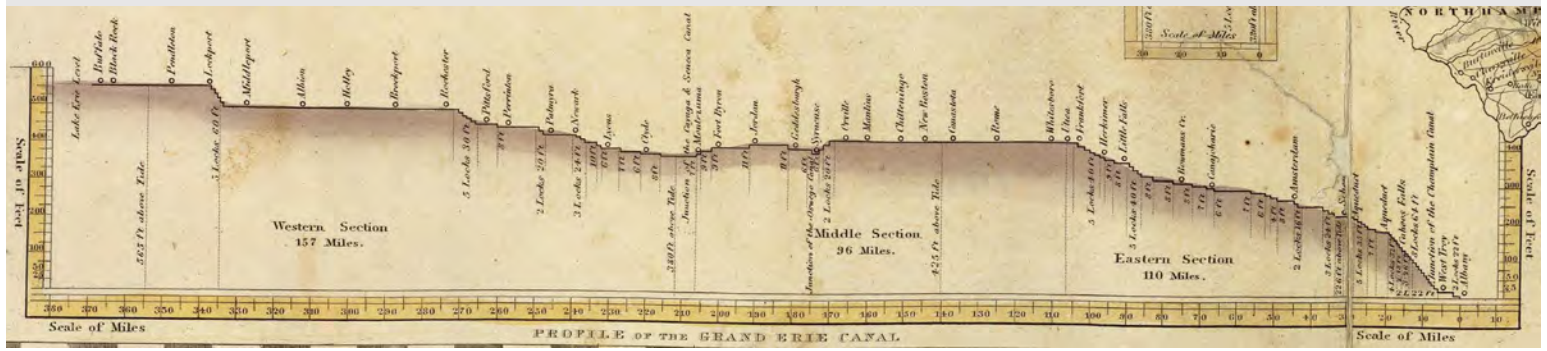
Impact of the Erie Canal

- Lowered shipping costs by as much as 90% (e.g. the cost of shipping a ton of wheat between Buffalo and NYC fell from $100 to $10).
  - ✓Transport time was also reduced by up to one third.
- Accelerated the settlement of the Great Lakes region.
- Greatly increased the amount of manufacturing in upstate New York, and the economic ascendancy of the New York City and the New York port.
- Created demand for investing in transportation bonds issued by other US states (often to European investors).

Other Canals

- Many states built canals, hoping to emulate the success of the Erie Canal.
- Pennsylvania Main Line Canal cost over $12 million and carried less than 10% of the Erie Canal's volume.
- Early canals in Ohio connected to the Great Lakes and the Erie Canal trade. They were profitable, but not as successful as Erie Canal.
- Most later canals were failures.

Profile of the Erie Canal



Major canals of the 1800s

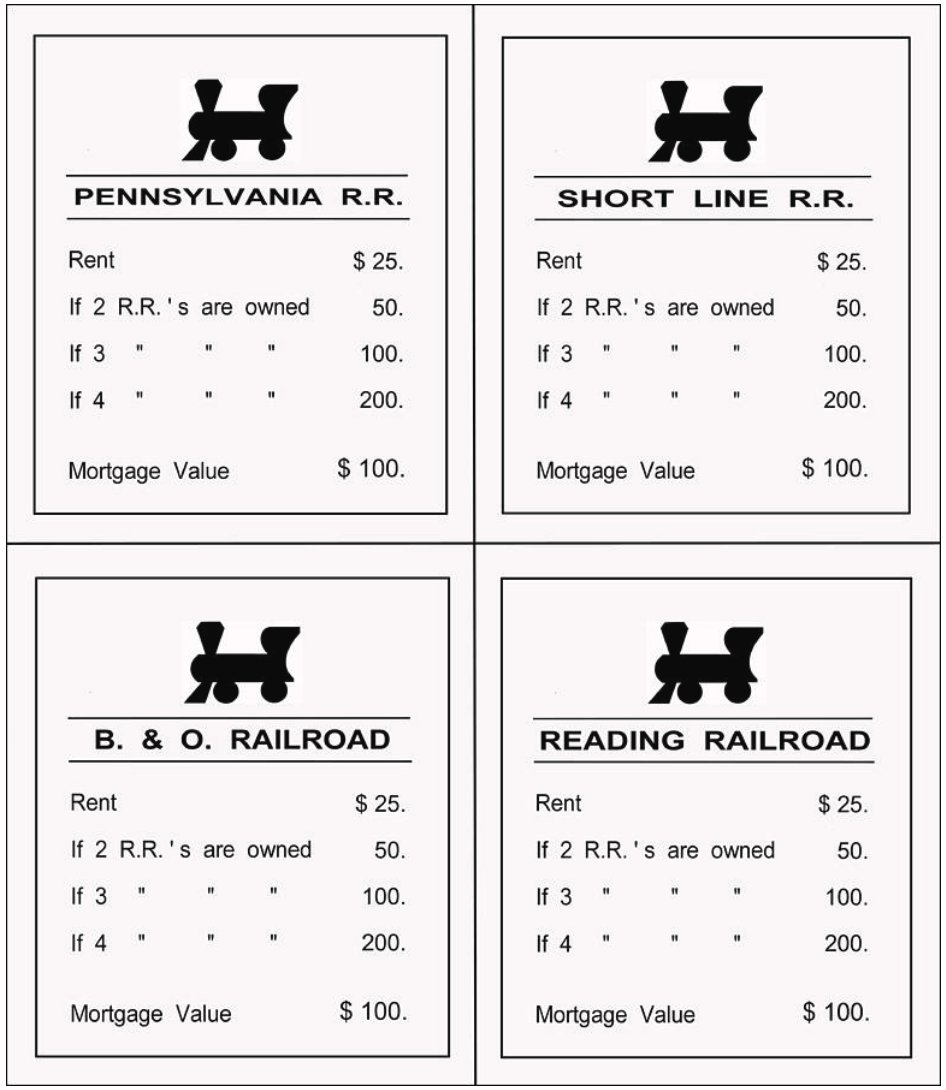
The US state bond crisis of the 1840s

- Canals were primarily financed by state governments, by issuing bonds mostly to European investors.
- In 1836, a monetary tightening by the Bank of England raised interest rates around the world. This was followed by the Panic of 1837 in the US.
- There were widespread defaults by US states in the 1840s.
- 19 out of 26 states had issued bonds. Eight states (Arkansas, Illinois, Indiana, Louisiana, Maryland, Michigan, Mississippi, Pennsylvania), and one territory (Florida) defaulted.
- These bonds were either renegotiated or repudiated.
- This was an early example of an “emerging markets debt crisis”.

The first U.S. railroads

- England's Stockton and Darlington Railway (1825) was the first public railway to use steam locomotives.
- The Baltimore and Ohio Railroad opened in 1830.
- Other early lines included the Mohawk and Hudson (1830), Saratoga (1832), and South Carolina Canal and Rail Road Company (1833).
- By 1840, over 3,000 miles of railroad tracks had been laid in the U.S.
- Advantages of railroads: flexible locations, speed, and year-round service (many canals could not operate in winter).
  - ✓Speed and comfort made railroads better for passenger transport.
  - ✓Initially, people believed that the human body couldn't withstand high speeds: passengers might suffocate or that their bodies would disintegrate.

Monopoly railroads



Baltimore and Ohio Railroad
The first railroad line in the US, it provided transport between the Ohio River and Baltimore.

Reading Railroad
Used to be operated by Philadelphia and Reading Railroad, later Reading Company. It served Pennsylvania, Delaware, New Jersey, and Maryland.

Pennsylvania Railroad
Once the biggest railroad business in the world, it connected New York, Chicago, and Washington, among others.

Short Line Railroad
Probably an abbreviation of Shore Fast Line, which connected Atlantic City and Ocean City, in Jersey.

Water vs. rail

- Railroads did not overtake water transport (rivers, canals, and the eastern seaboard) until after 1860.
- Factors holding back railroads:
  a. They were more expensive for cargo;
  b. States protected their canal networks; and
  c. Different gauges prevented a unified system (had to change trains often).
- Still, there were 30,600 miles of track in the US by 1860—more than Britain, France, and Germany combined.
- This grew to over 350,000 miles by 1910.
  ✓Only 200,000 miles of surfaced road.

The U.S. rail network

Private sector

- Building the railroads was a huge investment for the US.
  - ✓Greater than investment in canals and manufacturing.
  - ✓In 1880-84, railroad investment was about 5% of GDP and 25% of total US fixed investment.
- Most investment was financed through private capital markets.
  - ✓Before 1850s, equity issuance dominated railroad financing.
  - ✓Railroads accounted for 94% of total US stock market capitalization in 1870, and 75% in 1890.
- Railroads ran into trouble in the late 1800s; nearly a third of railway companies went bankrupt.

Public sector

- Government contributed less than 20% of railroad funding.
  - ✓After collapse of canals, states were concerned about risking public funds for infrastructure projects.
  - ✓Most of the government funding was through land grants.

- Land grants became important after Civil War.
  - ✓Four transcontinental railroads given 130 million acres (about 4% of the land mass of the United States).

Costs and benefits of land grants

Benefits

- Promote railroads without large cash outlays.
- Increased land value (land had little value without railroads).
  - ✓ Checkerboard pattern meant government benefited if the land was improved.
- Military and strategic advantages: railroads provided faster transportation for troops and supplies.
- Settlement and economic development: Railroads facilitated the creation of new farms, ranches, mines, and towns along their routes.

Drawbacks

- Loss of public land: the government gave away 130 million acres from the 1850s through the early 1870s.
- The land grant system led to land speculation and instances of corruption

Railroad competition and manipulation

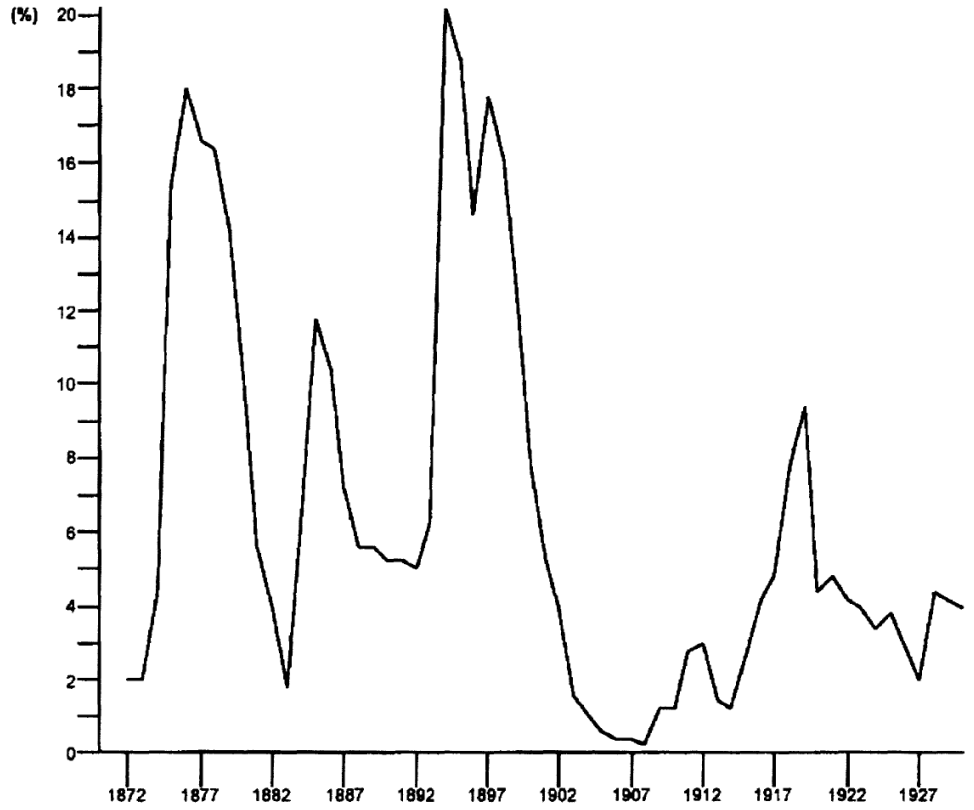
- There were around 1,000 different railroad companies. Price manipulation was prevalent.
  - ✓Price discrimination—charging higher prices to customers who could bear it.
  - ✓Rate fixing—colluding with other railroads to keep prices high.

- Yet, price competition was common because the profit from undercutting competitors was large.

- Jay Gould, a “trader rather than a builder of businesses”, earned a fortune by consolidating the railroads.

Railroad bankruptcies

Figure 2
Percentage of all U.S. Railroad Mileage in Receivership, 1872–1927



Sources: H. H. Swain, "Economic Aspects of Railroad Receiverships" for 1872 to 1897. Later years are from U. S. Commerce Department, Bureau of the Census (1975), pp. 727-733.

Impact of the railroads on the economy

- This is a very hard issue. What would happen without the railways?

- **Robert Fogel:** impact of the railroads was small—they offered limited cost savings over waterways (about 3% of GDP).

- **Leland Jenks:** railways had a transformational impact.
  - ✓Accelerated the industrialization of the US and the development of its financial markets. Railroads were the main buyers of steel, iron, coal, and equipment.
  - ✓Railroads lowered transportation costs and allowed markets to expand and integrate.

Railroads and time zones

- Before 1883, there was no national standard for time.
- Each city or train station kept its own clock, often based on local “solar time”.
- As an initial solution, railroads would often set their own time for use in their timetables; junctions would have several clocks showing the time of each railroad.
- Different time standards used by individual railroads resulted in collisions.
- In 1883, North American railroads adopted a system of four standard time zones proposed by the United States Weather Bureau.
- Standard time zones were officially adopted with the passage of the Standard Time Act in 1918.

Railroads and modern management

- Prior to 1850, US businesses consisted of small firms managed by their owner.
- Railroads were larger and more complicated. The Pennsylvania Railroad had 50,000 employees; a large textile firm might have 1,000.
- Railroads:
  - ✓Employed large numbers of middle managers.
  - ✓Developed the multidivisional corporate structure.
  - ✓Developed many principles of modern accounting (e.g. cost accounting).

The first org chart, from the Erie Railroad in 1855