Sunk Costs, Regulatory Uncertainty and Firm Investment

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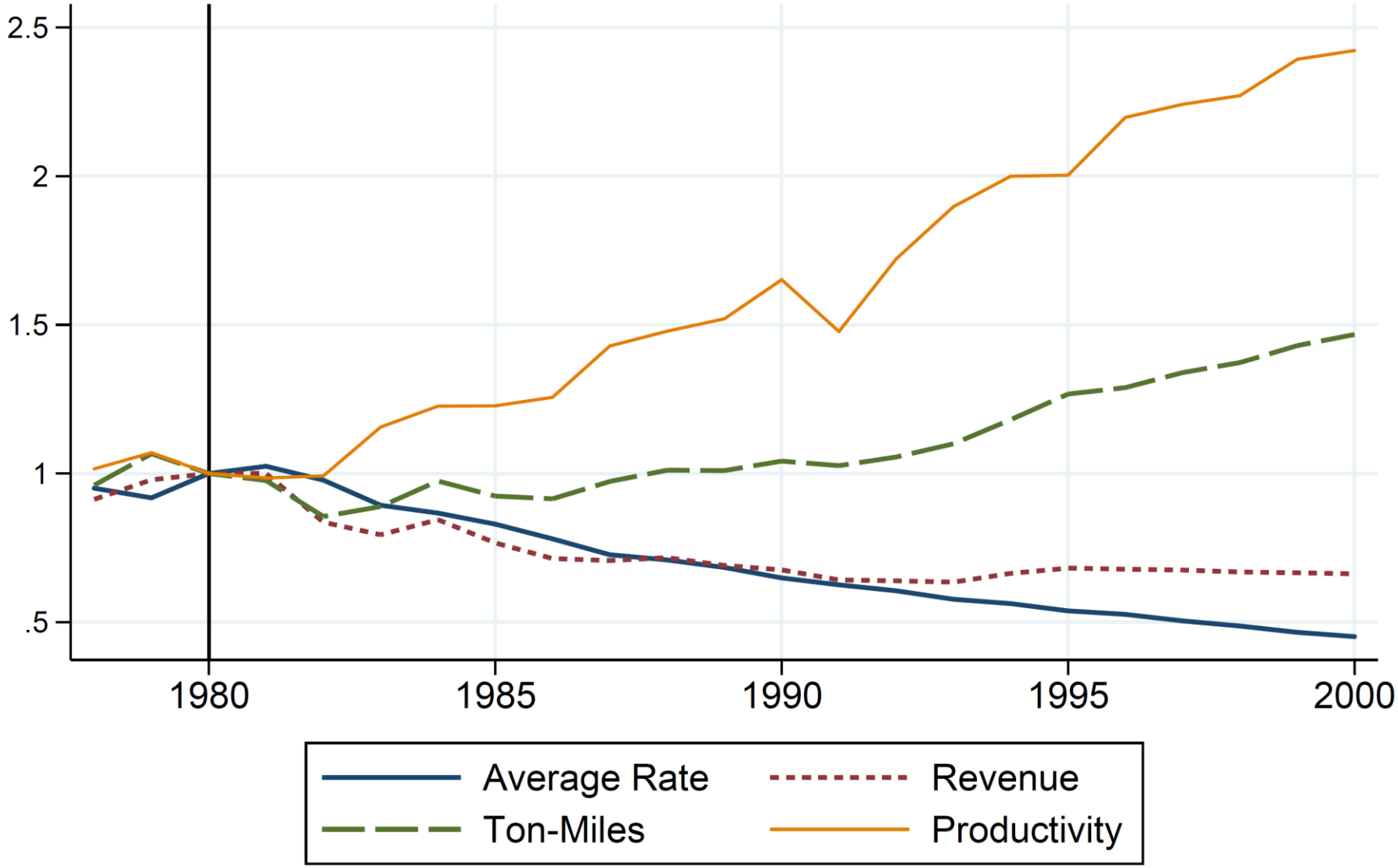
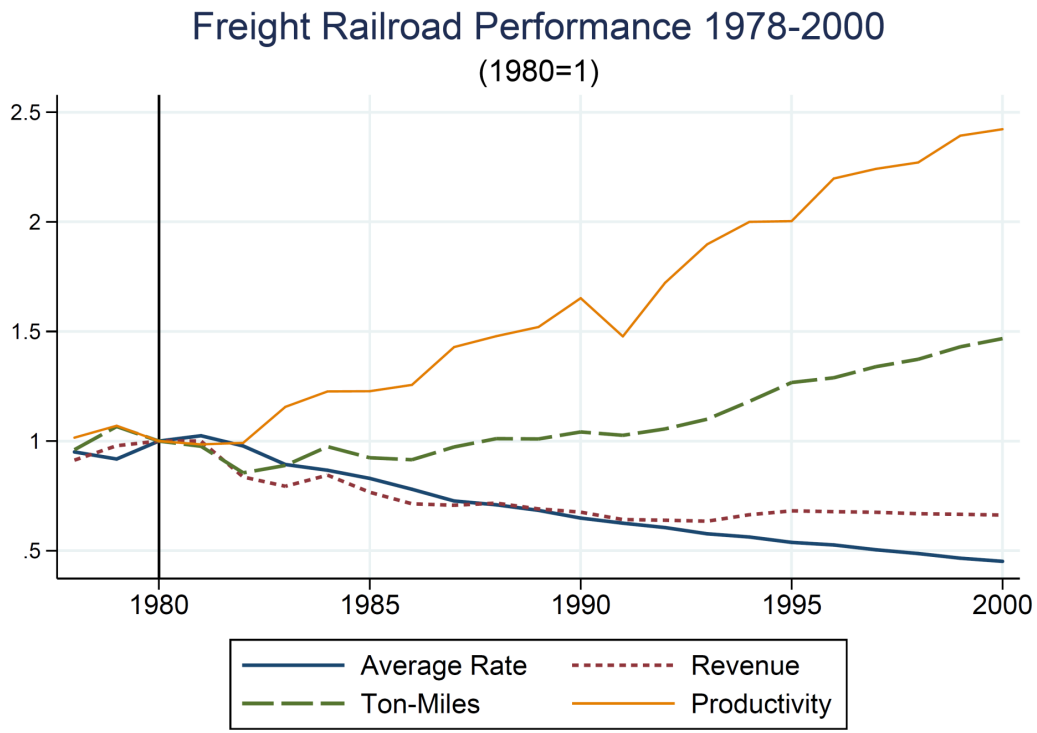
Freight Railroad Performance 1978-2000

(1980=1)



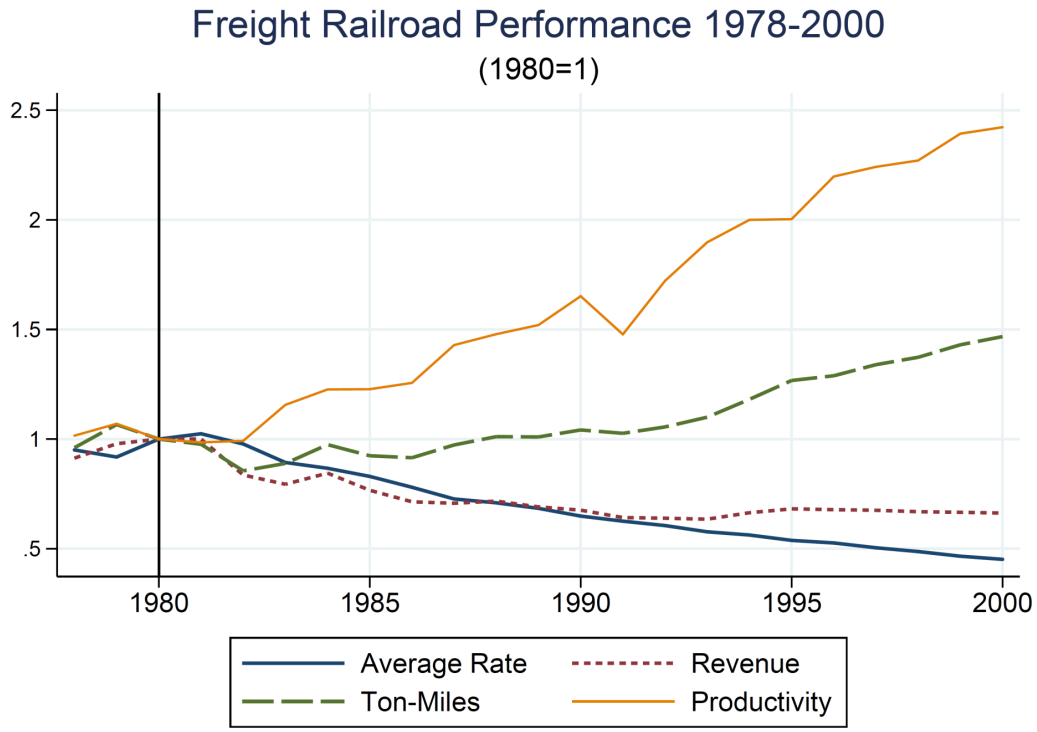
What explains this economic growth?

- “Deregulation” isn’t precise
  - Some but not all industries experience this with deregulation
- Data suggest a cost-based explanation, but qualitative evidence suggest otherwise:
  - "We get costs! We even kind of understood them, but we knew nothing about pricing; that's why we hired the airline guys." [RA 1981]



What explains this economic growth?

- The mechanism is important for economics, and for policy-making:
  - When should we expect deregulation to have these pro-growth effects?
  - Would the rail industry backslide if regulation is reintroduced?
  - Could industrial policy generate growth in nonregulated markets?
- Our ability to answer these questions is regrettably limited.



Solow (1956) model of economic growth

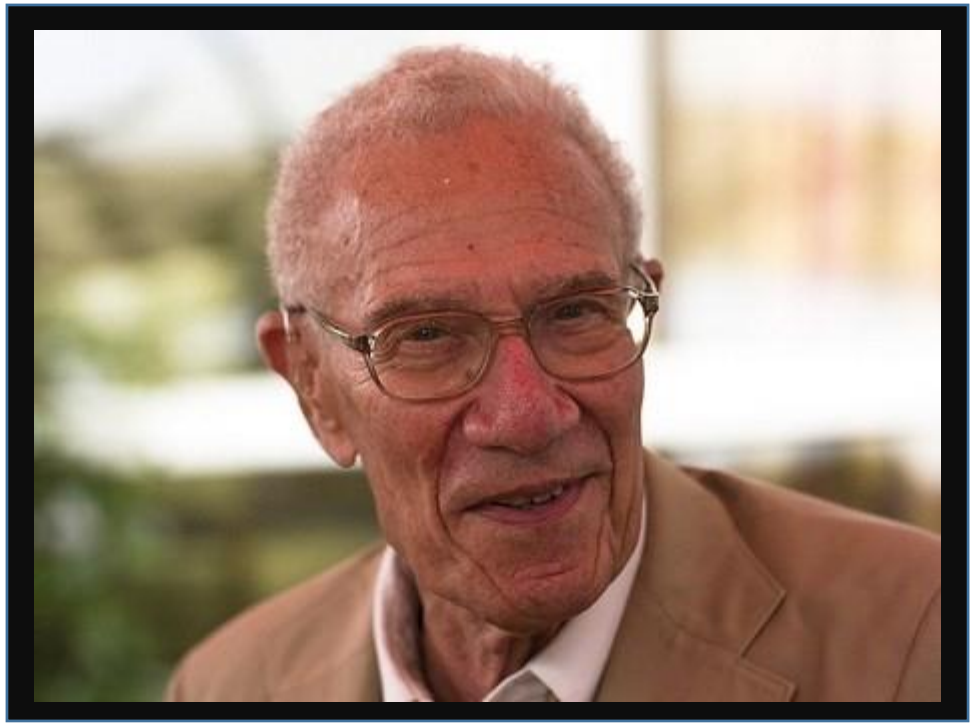
$$Y_t = F(K_t, L_t, A_t)$$

Output

Capital Labor

Solow Residual:
Technology or Knowledge

"Total Factor Productivity"



Robert Solow, Nobel Laureate (1987)

Solow (1956) model of economic growth

$$Y_t = F(K_t, L_t, A_t)$$

Output

Capital Labor

Solow Residual:
Technology or Knowledge

"Total Factor Productivity"

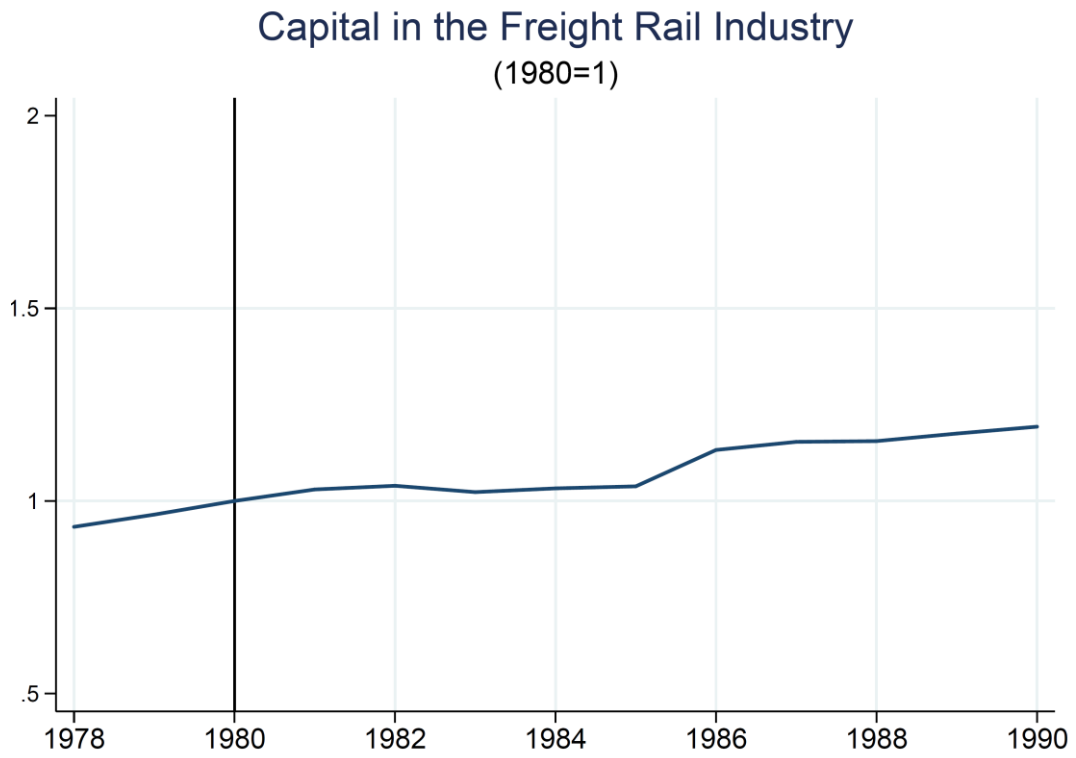
- Steady-state growth depends solely on knowledge growth
- But capital investments can be a source of growth as economy moves toward the steady-state
  - Effects can be large, e.g., postwar growth in western Europe in 1950s, 1960s.
  - Eventually marginal product of capital reaches the rental rate.
- Could capital investment explain the post-Staggers experience?

Can capital investment explain growth?

Table 1: Revenue Productivity 1978-1990

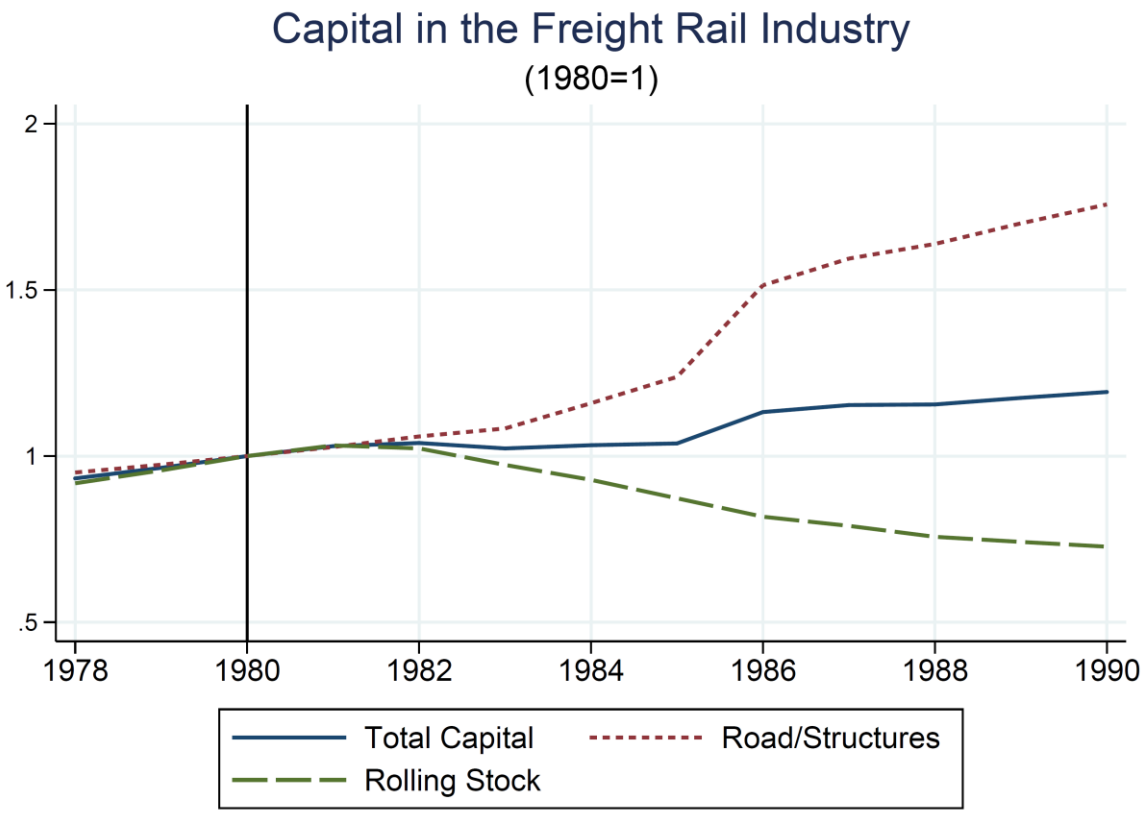
Regressor	Coefficient	St. Error
log(Capital)	0.26	(0.05)
log(Labor)	0.26	(0.06)
log(Fuel)	0.48	(0.06)
log(Demand)	0.32	(0.09)

- Capital is associated with greater output
- But capital growth is too small to matter; accounts for <1% of output growth
- All the action is in the residual: “total factor productivity”



Can capital investment explain growth?

- Staggers affects the *mix* of capital investments
  - Investments in road increase
  - Investments in trains decrease
- Both types of capital are necessary for production
- Main economic distinction:
  - Road is largely *intangible* (sunk)
  - Rolling stock is largely *tangible*



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Hypothesis

- Debt obligations pre-Staggers induced firms to invest more heavily in tangible assets that could be liquidated in the event of bankruptcy.
- This introduced a distortion into the mix of capital assets that reduced productivity (due to underinvestment in intangible assets).
- Staggers granted more control over revenue management and thereby relaxed financial constraints.
- Firms reoptimized CAPEX toward intangible assets and, over time, obtained more productive mixes of capital assets.

Four comments on the hypothesis

1. Possible to formalize–and we have done so in a two-stage model–but the intuition is clear so you are spared the notation and mathematics.
2. Consistent with some stylized facts
   - In 1970s: 10 bankruptcies, rates of return around 2-3% → financial constraints
3. Appealing as a theory because it connects the pricing power obtained from Staggers to the cost reductions achieved in the 1980s
   - Greater revenue reduces financial risk and facilitates a more productive mix of capital.
   - "We get costs! We even kind of understood them, but we knew nothing about pricing; that's why we hired the airline guys." [RA 1981]
4. Provides a novel mechanism linking finance to the real economy
   - Industrial organization literature does not consider debt frictions.
   - Finance literature studies effects of debt frictions on *overall investment:* Fazzari et al (1988); Kaplan and Zingales (1997); Almeida and Capello (2007).

Some “too early” econometrics

Table 2: Revenue Productivity 1978-1990

Regressor	Coefficient	St. Error
log(Road)	0.11	(0.03)
log(Rolling Stock)	0.12	(0.03)
log(Labor)	0.23	(0.06)
log(Fuel)	0.53	(0.05)
log(Demand)	0.29	(0.09)

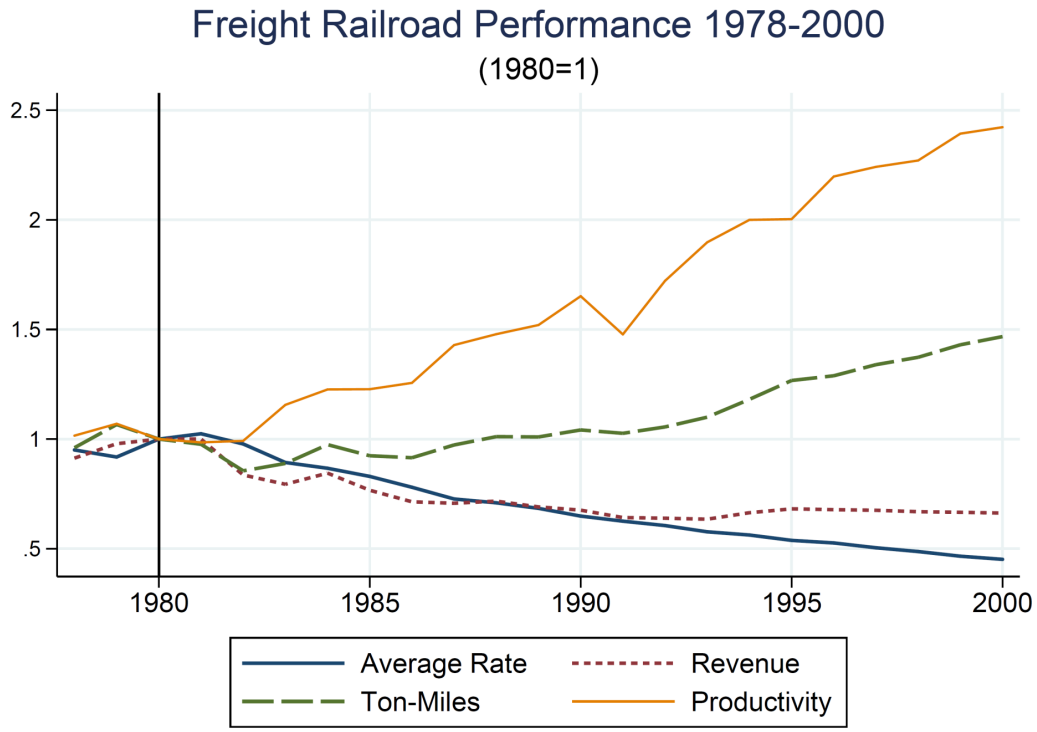
- Coefficients take the correct sign
- But specification is too simple in a theoretical sense
- And data are not adjusted for betterment accounting

On the Construction of an Article

- Adjust capital stock, CAPEX for 1983 betterment accounting change
- Estimate production function ala Gandhi, Rivers & Vuong (2016)
- Answer the research questions:
  - Does the industry move toward a more efficient capital mix in the 1980s?
  - How much of the post-Staggers productivity boost can be attributed to changes in capital allocation?

What explains this economic growth?

- The mechanism is important for economics, and for policy-making:
  - When should we expect deregulation to have these pro-growth effects?
  - Would the rail industry backslide if regulation is reintroduced?
  - Could industrial policy generate growth in nonregulated markets?
- Our ability to answer these questions is regrettably limited (for now).



Thank you.

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