

# Does Foreign Competition Spur Productivity? Evidence From Post WWII U.S. Cement Manufacturing

by

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Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Census Bureau.

# Does Competition Spur Productivity?

## And, if so, how?

- Old and important questions

## Related questions

- Do lower tariffs spur productivity? And, if so, how?

# Ask These Questions in U.S. Cement Industry

- Industry faced a surge in competition in mid 1980s
  - Not from lower tariffs, but new transport technology, ....
  - Importers offer cement at substantial discounts to domestic
  - Imports go from very little to 25-30% of production

## We find that competition spurred productivity

- TFP falling in 2 decades prior to import surge (10%)
- TFP surges after imports, 35% in next decade

# What were sources of 1980s productivity gain?

- Major source was changes in management practices
  - Over 1960s, 1970s, firms signed contracts with union that put strong restrictions on mgmt
  - In 1980s, many of these restrictions lifted
- Selection (closing low-productivity plants) not a big factor

# Imports “Forced” Efficient Production

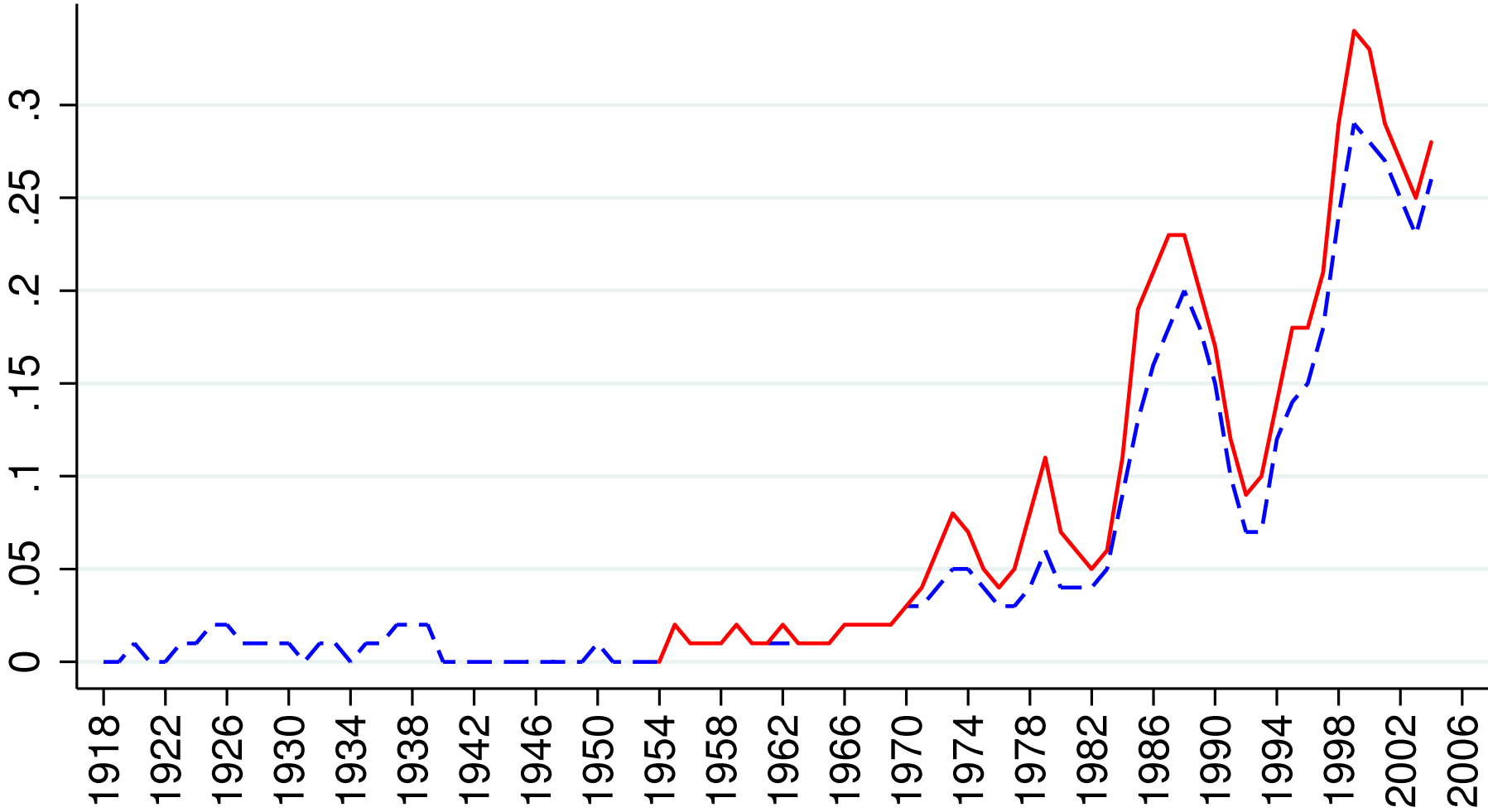
- Imports forced investment in new management practices
- Will present theory later

# Outline

- Show surge in competition, productivity
- History of union, evolution of contracts
- $\Delta s$  in contracts closely related to  $\Delta s$  in productivity
- Other sources of productivity growth (selection)
- Regional competition and productivity
- Related literature

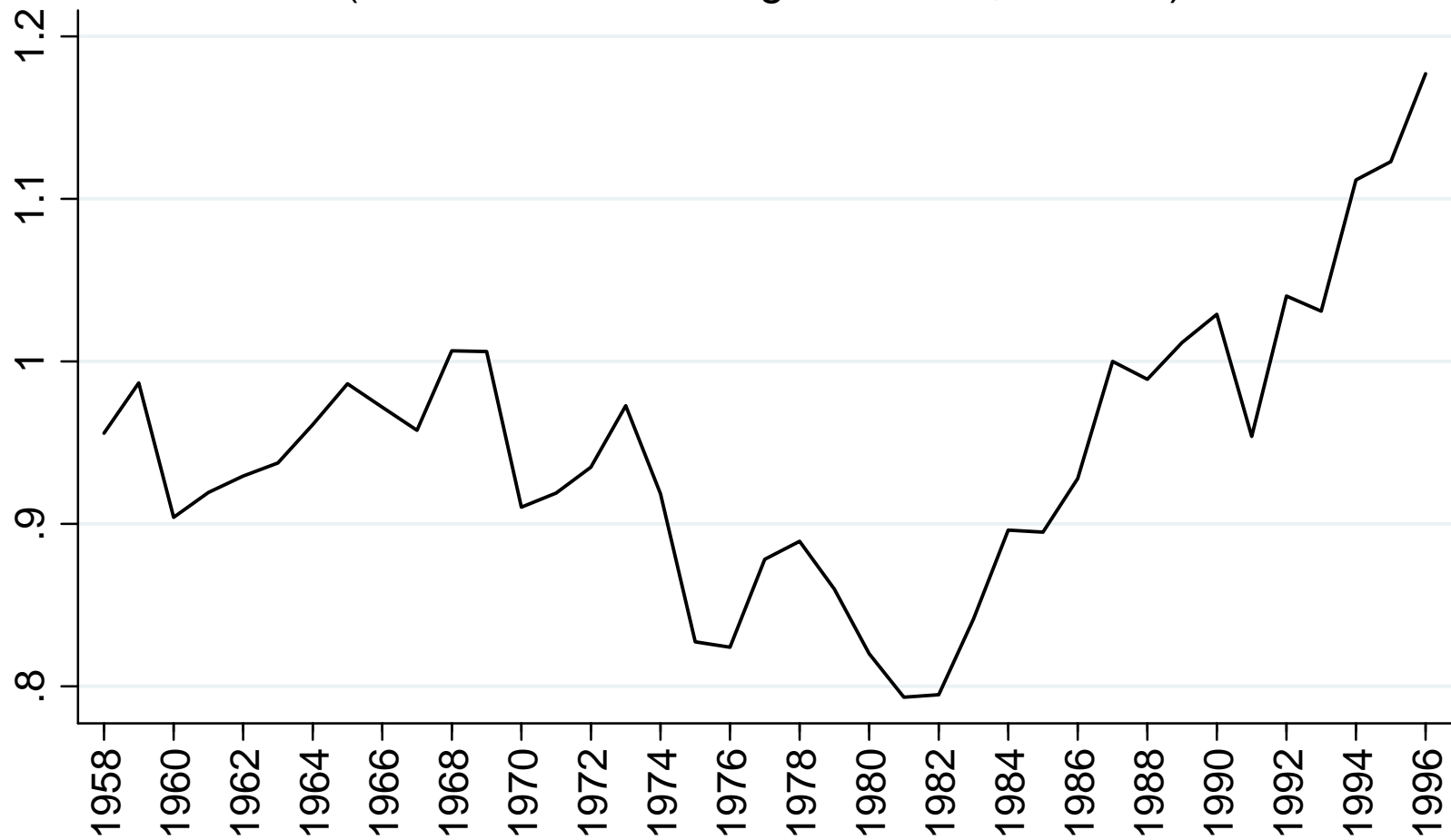


Figure 1.  
U.S. Cement Imports  
(Relative to U.S. Production)



--- Cement      — Cement Plus Clinker

Figure 2.  
Total Factor Productivity  
U.S. Cement Industry  
(NBER Manufacturing Database, 1987=1)



# Figure 3. Partial Productivities U.S. Cement Industry

(NBER Manufacturing Database) (In Log's)

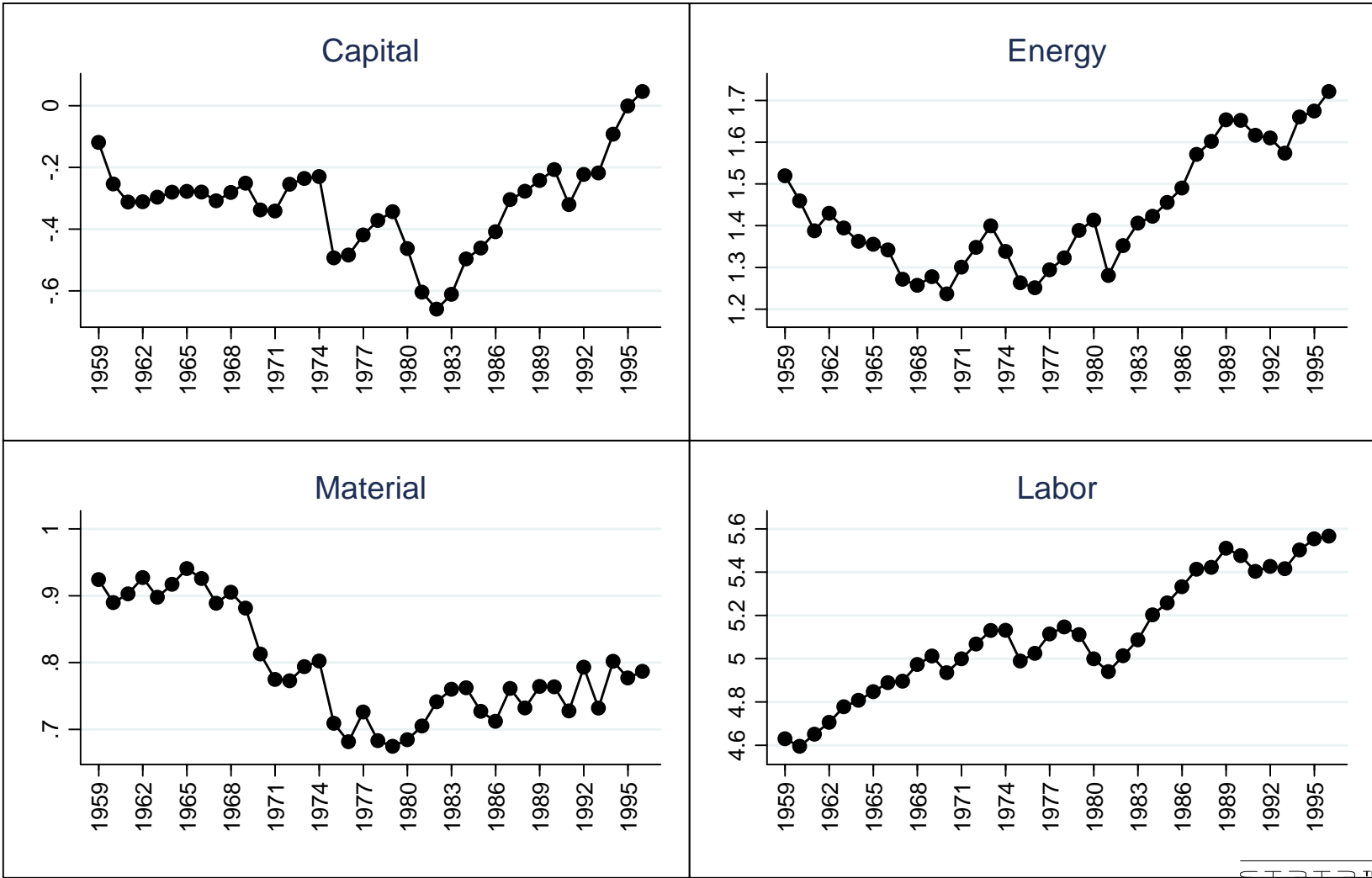
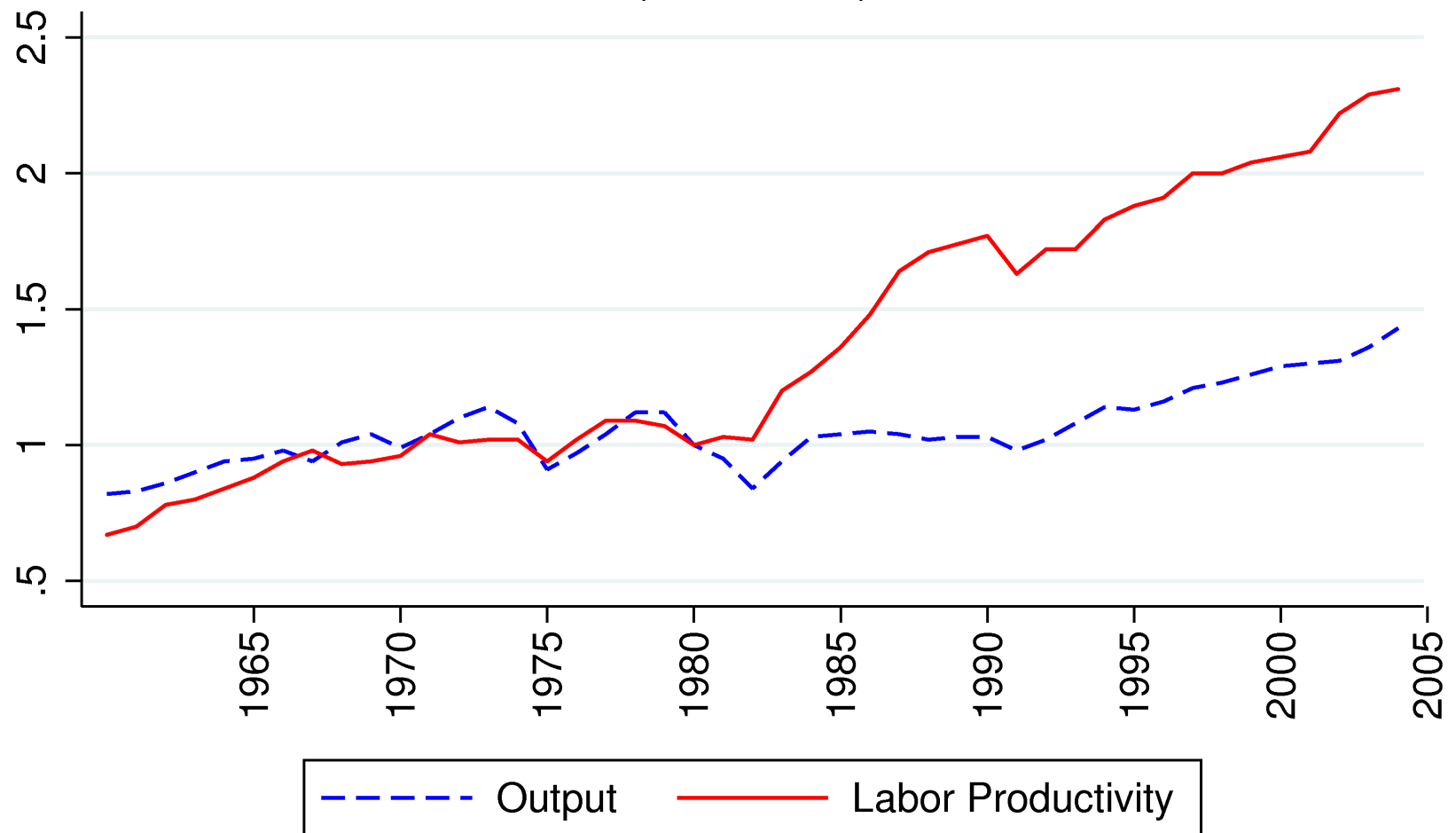


Figure 4. Production vs. Labor Productivity  
Portland Cement Association  
U.S. Cement Industry  
(1980=1.00)



Review

# History of Unionization in Industry

- After WWII, nearly all plants unionized
- Most plants – Cement, Lime and Gypsum Workers (CLGW)
- Weak union until 1957, national strike idled half of plants
- From 1957 on (till imports), CLGW greatly extended power

By 1978, CLGW president could boast

“No other industrial workers in the country can point to contracts that impinge on and restrict the rights of management as much as cement contracts do”

# Analysis of Contracts

- Discuss contract clauses and expected productivity consequences
- Show when clauses diffused into industry
- Look at intro and removal of clauses & changes in productivity



# Contract Clauses & Productivity Consequences

- *Seniority rights*
  - If worker  $x$  loses job can bump any less senior worker
  - Worker does not even have to be able to do job
  - Must be able to do job in “reasonable amount of time”
- Productivity consequences:
  - Human capital (experience) lost with bumps
  - Mgmt no right in assignments
  - Morale? (cascading job bumping)

# Contract Clauses & Productivity Consequences

- *Job Protection*
  - “Employees will not be terminated by the Company as the result of mechanization, automation, change in production methods, the installation of new or larger equipment, the combining or the elimination of jobs.”
- Productivity consequences
  - Dulls incentives to invest/innovate

# Contract Clauses & Productivity Consequences

- *Jobs Belong to Departments and Individuals*
  - “.. when the Finish Grind Department is completely down for repairs, the Company will not use Repairmen assigned to the Clinker Handling Department on repairs in the Finish Grind Department.”
- Productivity consequences
  - When machines go down, they are down longer than necessary (output=0 longer than necessary)
  - Capital, labor, energy productivity lower as result

# Reflections on trip to Germany

- German company invites union reps to visit plants
- Many interesting reflections in *Voice*

“We were also told that if they have a breakdown during a shift, they use the people on that shift to make the repairs, if possible.” ....

“They have breakdowns, as we do. The big difference is that almost anyone pitches in to fix it.”

# Contract Clauses & Productivity Consequences

- *Contracting out*
  - “All production and maintenance work customarily performed by the Company in its plant and quarry and with its own employees shall continue to be performed by the Company with its own employees.”
- Productivity consequences
  - Like infinite tariff at plant’s gate

# Diffusion of Contract Clauses

- Contracts very thin in early 1950s ( $\approx$  4 pages)
- Contracts grow in length (by 1970s,  $\approx$  80+ pages)
- Table 1 reports diffusion of two of the clauses above
  - Contracts on 90 plants and counting
  - Clauses adopted in early to mid 60s
  - Disappear in 80s in most contracts

Table 1

## Union Contract Provisions

## US Cement Industry

	Job Protection Clause				
	Before 1963	1963	1965	1966-1984	1985-1998
Number of Locals(plants) for which we have contracts	4	36	49	84	12
Number of Locals which have clause	0	0	47	81	3
	Strong Contracting Out Clause				
	Before 1963	1963	1965	1966-1984	1985-1998
Number of Locals(plants) for which we have contracts	4	36	49	84	12
Number of Locals which have clause	0	20	49	83	0

Note: Total Number of Locals = 90

## Did 1980s contract $\Delta_s$ spur productivity?

- Look at productivity over 3 eras (pre 57, 60s/70s, 80s+)
  - Total industry
  - Two sub-industries
- Look at differences across plants in adoption dates



## At industry and two sub-industries level

- Look at partial productivities: electricity, fuel, capital, labor

## We find that

- From end of WWII, until late 1950s, all productivities grow
- Then all stop growing, some fall, with exception of labor
  - It stops growing soon after 1965 (no-job-termination clause)
- Productivities flat, or fall, until imports, with exception of fuel
  - With energy crisis, major investments in fuel-efficient eq.

Figure 5. Electricity Productivity  
U.S. Cement Production Per Unit of Electricity  
(Thousand Short Tons per Million kWh's)

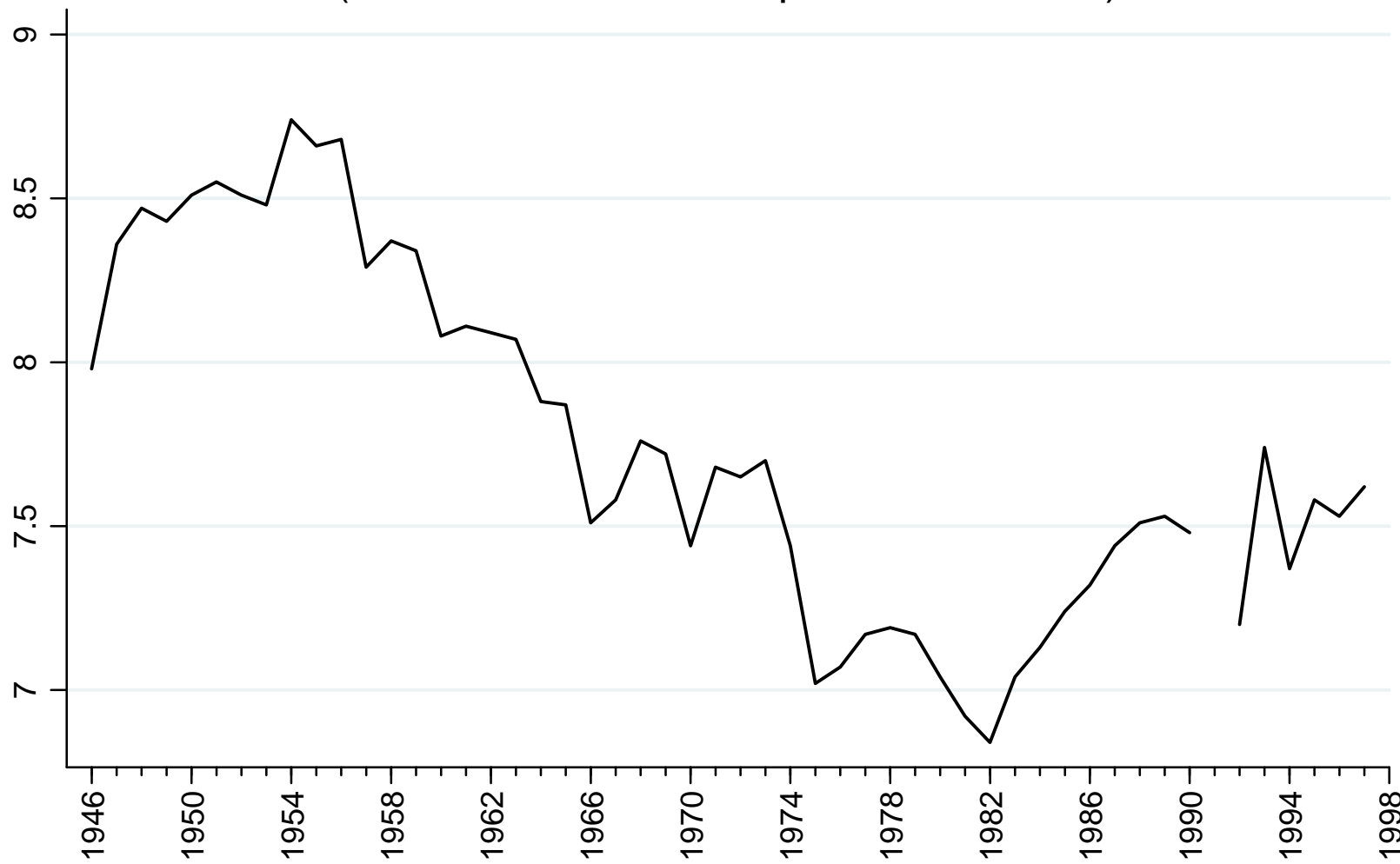


Figure 6. Fuel Productivity  
U.S. Clinker Production per Unit of Fuel  
(Log of Thousand Short Tons per Million BTU's)

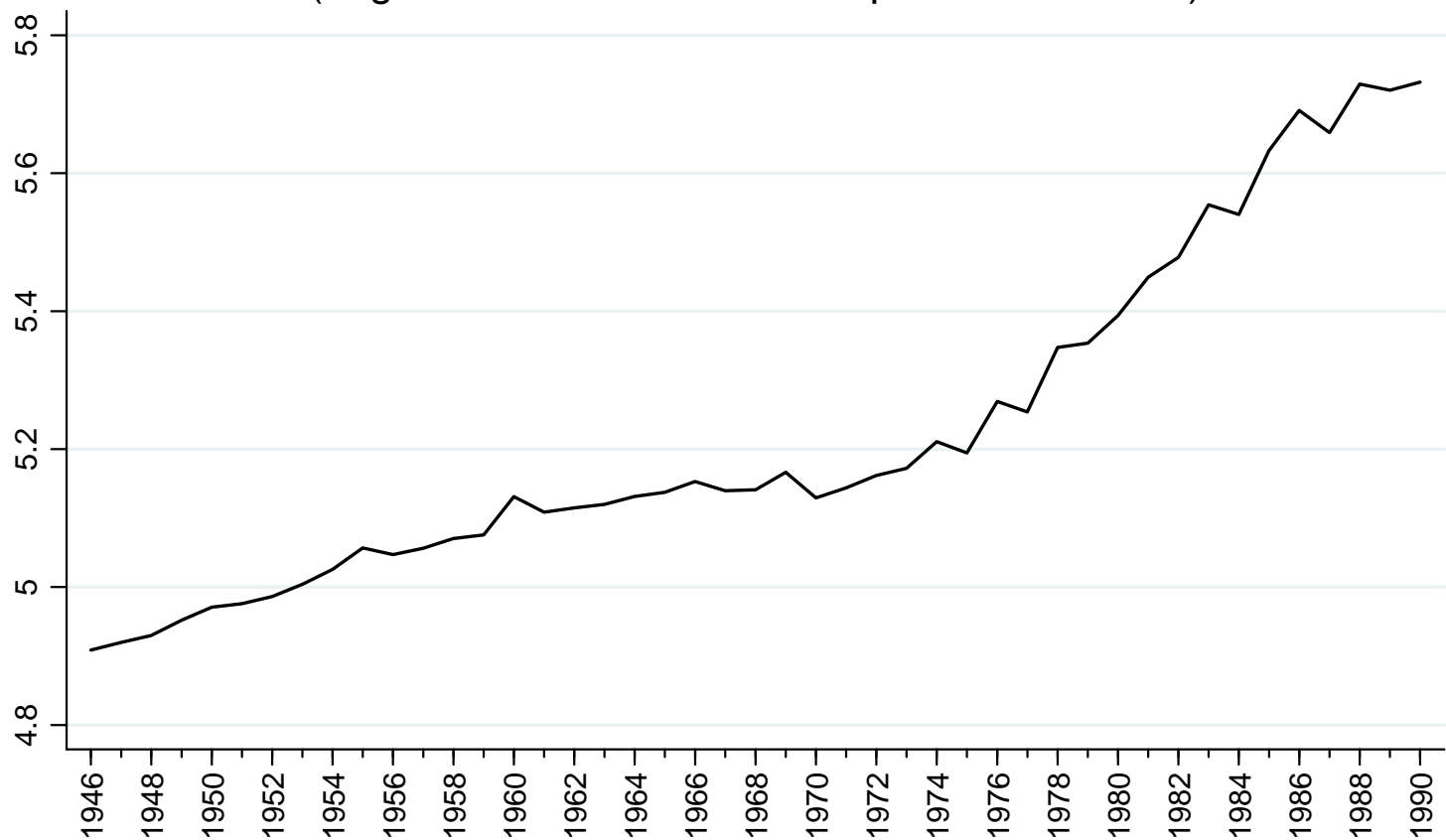


Figure 7.  
Capital Productivity  
U.S. Cement Industry

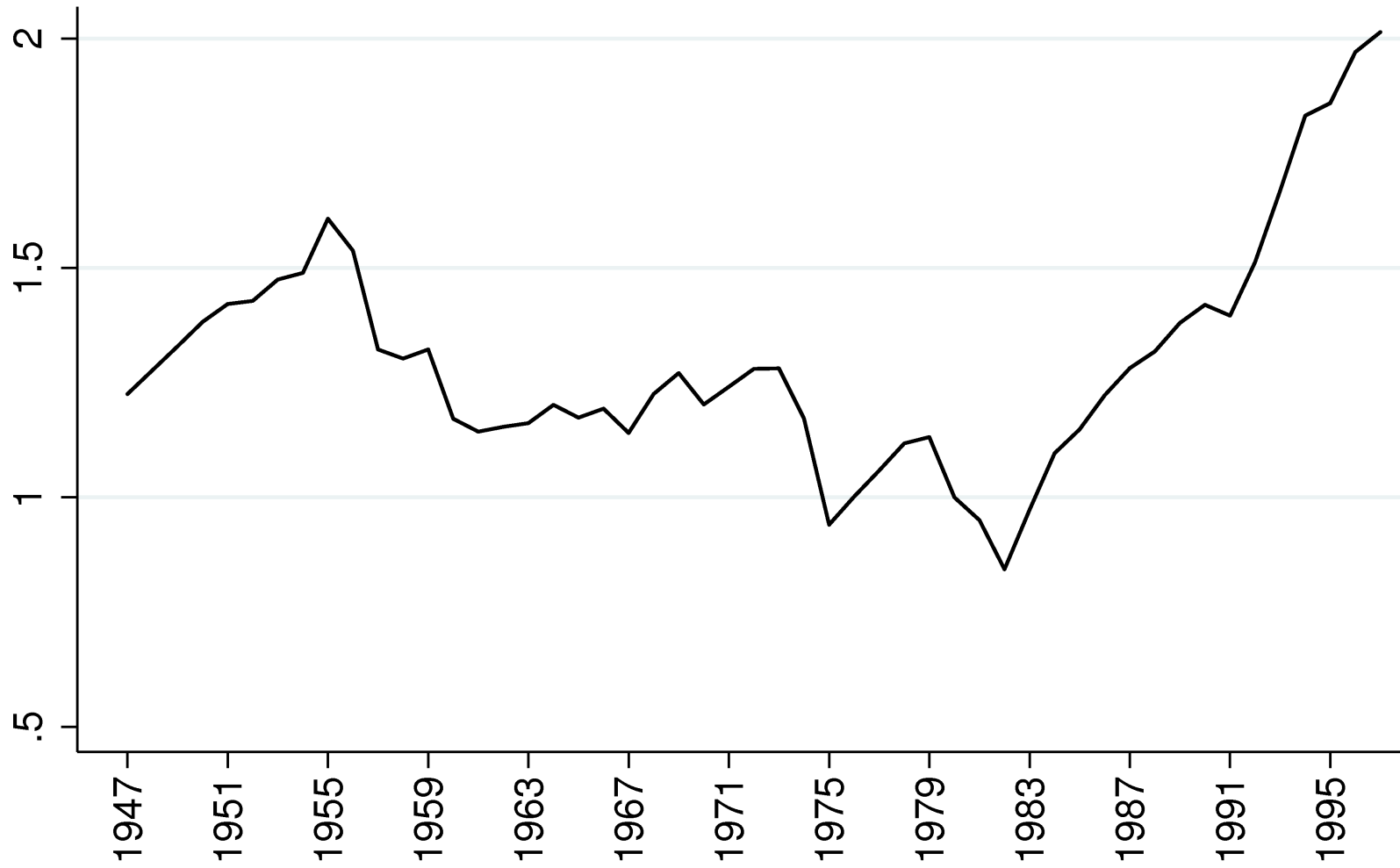
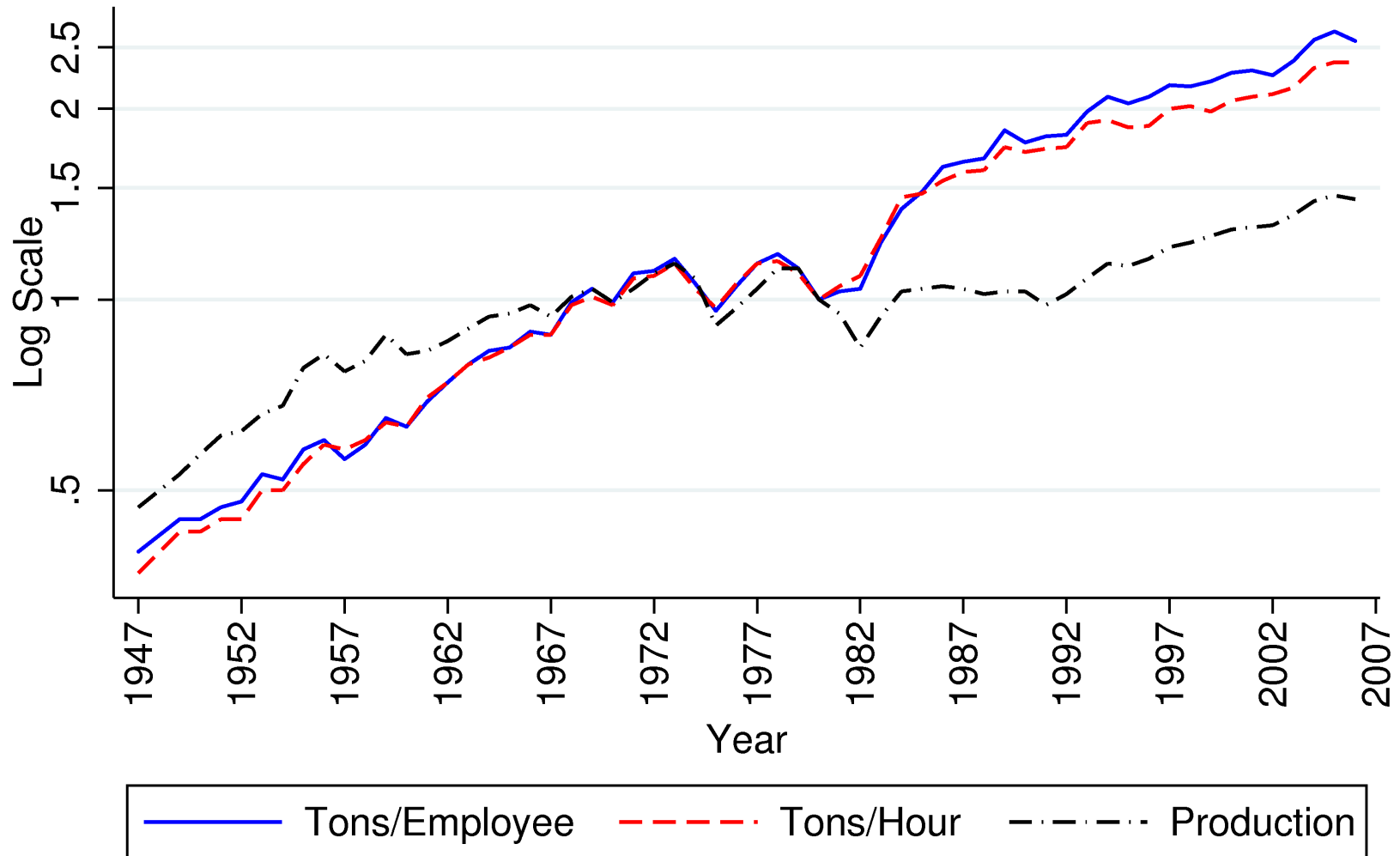


Figure 10.  
Labor Productivity & Production 1947–2006  
(1980=1.00)



## TFP for industry from WWII

- Increases smartly to 1957, then follows NBER pattern

Figure 11. Electricity Productivity  
U.S. Cement Production Per Unit of Electricity  
(Thousand Short Tons per Million kWh's)  
By Process

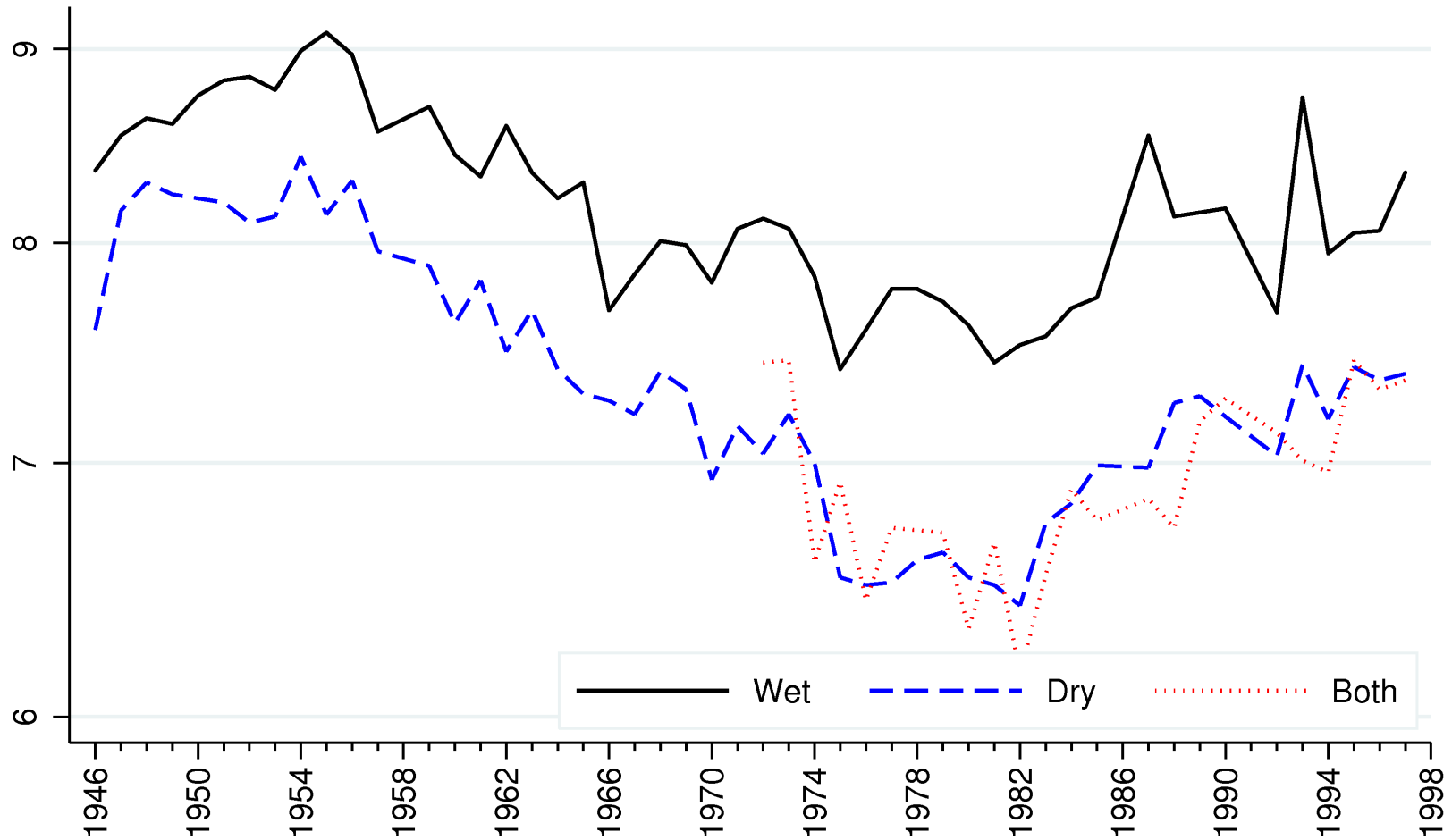
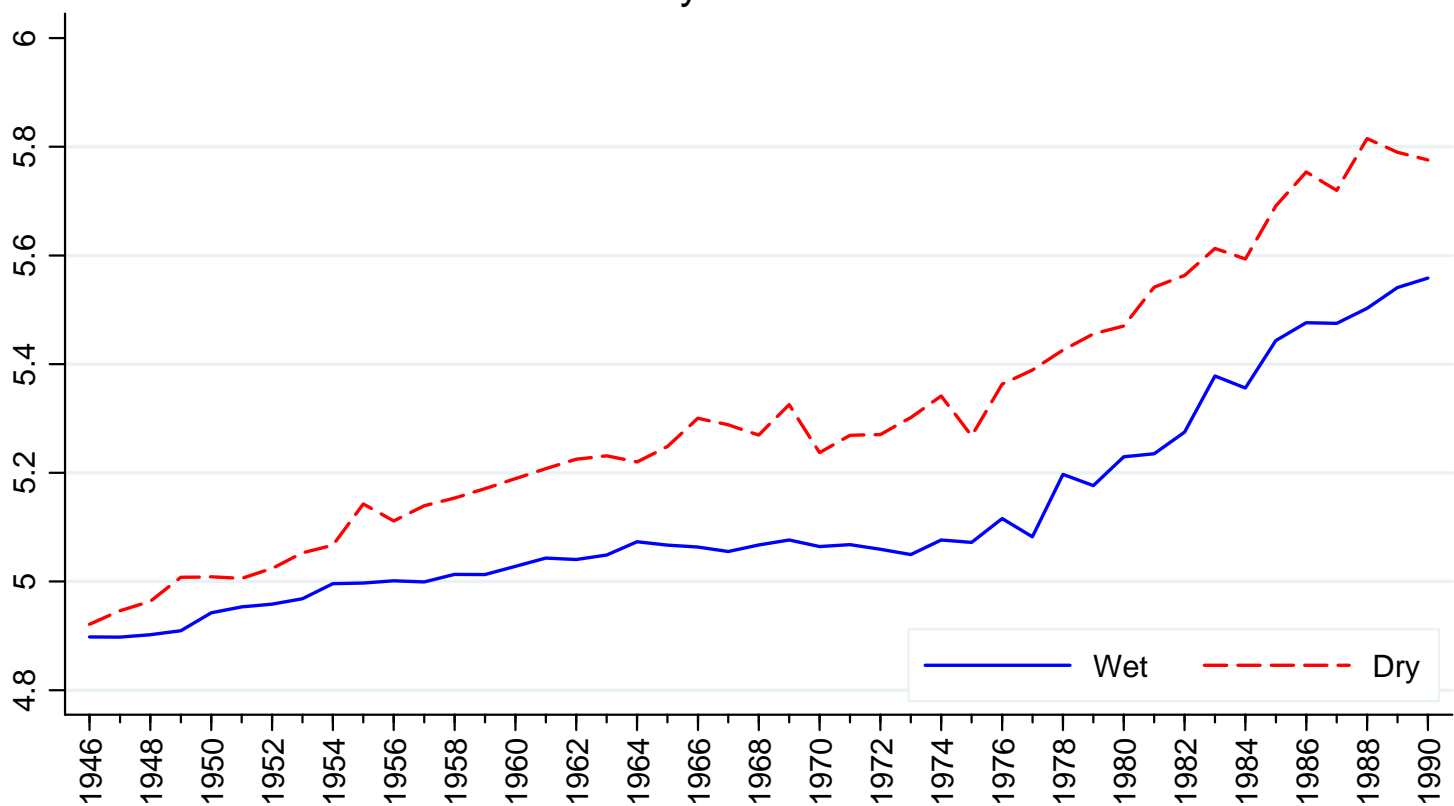




Figure 12. Fuel Productivity  
U.S. Clinker Production per Unit of Fuel  
(Log of Thousand Short Tons per Million BTU's)  
By Process



## Differences across plants in adoption dates ....

- Are these related to  $\Delta s$  in plant relative productivities?
  - Many plants simultaneously drop, and discard, clauses
- Some variations in the 1980s we can exploit

Review

## Other Sources of 1980s Productivity Gain?

- Was selection (closing of low-productivity plants) a big source?
- New Technology?

## Selection: Labor Productivity

- Most of 80s productivity surge due to “within” plant growth

Table 3

## Labor Productivity Growth Decomposition

Census Years	Aggregate Productivity Growth	Within Component	Within Share
1972-1977	0.055	0.019	
1977-1982	-0.028	-0.058	
1982-1987	0.386	0.280	72.5%
1987-1992	-0.012	-0.035	
1992-1997	0.164	0.125	76.2%

# New Technology

- No new significant technology in 1980s
- If embodied in machines, note: 1970 investment much greater than 1980s

## Related Literature

- Many recent studies show
  - **Unilateral** tariff reductions increase industry productivity
    - \* Productivity gains in continuing plants
- That is what we find here, of course



# Advantages of Studying Specific Industry

- Concerns with measurement are fewer
- Better chance at uncovering mechanism driving “within” growth
- Understanding the mechanism can lead to theory

# Facts Hard to Explain in Standard Models

- Facts from this industry, and from unilateral tariff reductions.
- Facts: plants make investments when industries shrinking
- Selection models cannot
- Standard technology adoption model cannot
  - Fixed cost of adoption, bigger market means more adoption

# What Type of Theory Can Explain Facts?

- Suppose adoption of new technology may initially raise costs
- Then upon adoption, may lose sales to competitors
- One cost of adoption: opportunity cost of lost profits
- Those opportunity costs are high when prices (tariff) high
- When tariffs unilaterally cut, market smaller, but opportunity costs smaller

See Tom Holmes for details

# Increase in foreign ownership

- By 1982, owned lots of capacity, climbs since
- Foreign owners more easily change work rules
  - No long-term relationships
  - From what we see, they were fiercer
- Foreign owners can bring in their local managers
  - Mindset of U.S. managers #@!!!%
- FDI?