

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

by

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These are our opinions and not those of the U.S. Census Bureau

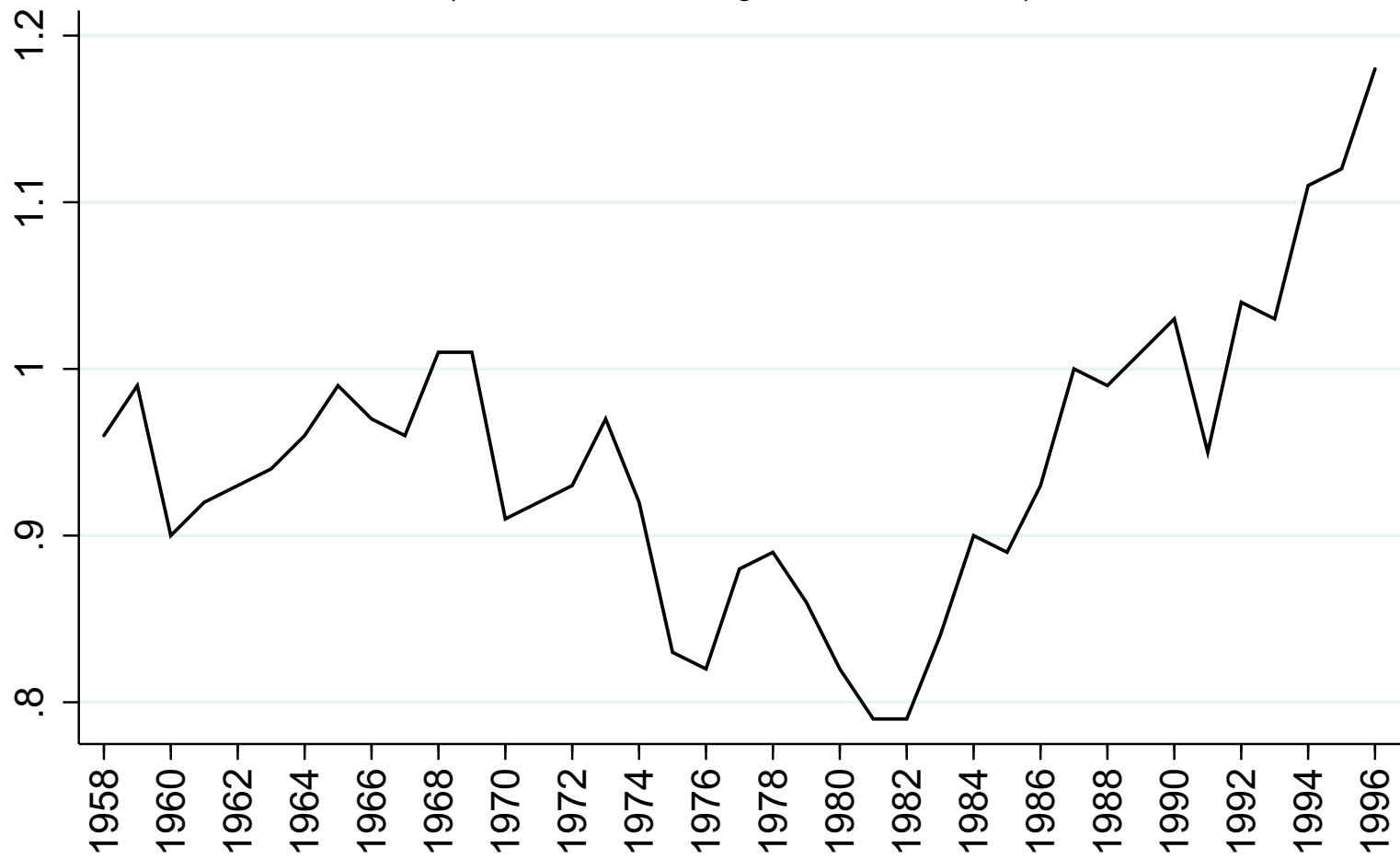
Does Competition Spur Productivity? If so, how?

- Important question
- Examine question in U.S. cement industry
 - Huge increase in foreign comp in early 1980s

We find that

- Competition increased productivity
 - TFP surges after increase in foreign comp (Figure 1)
- How did competition increase productivity?
 - Foreign competition led to closing of strong national union
 - This led restrictive work practices to be dropped
 - This led to large productivity gains

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



How Do We Argue Δ_s in Work Rules Key?

- Study union contracts over time
 - Analyze contracts of nearly 100 U.S. cement plants
 - Also analyze contracts of Canadian cement plants
- Study other factors that are likely candidates
 - From PCA, know lots about plant technology
 - Merge technology data in Census plant-level data

Steep discounts by foreign producers (1984)

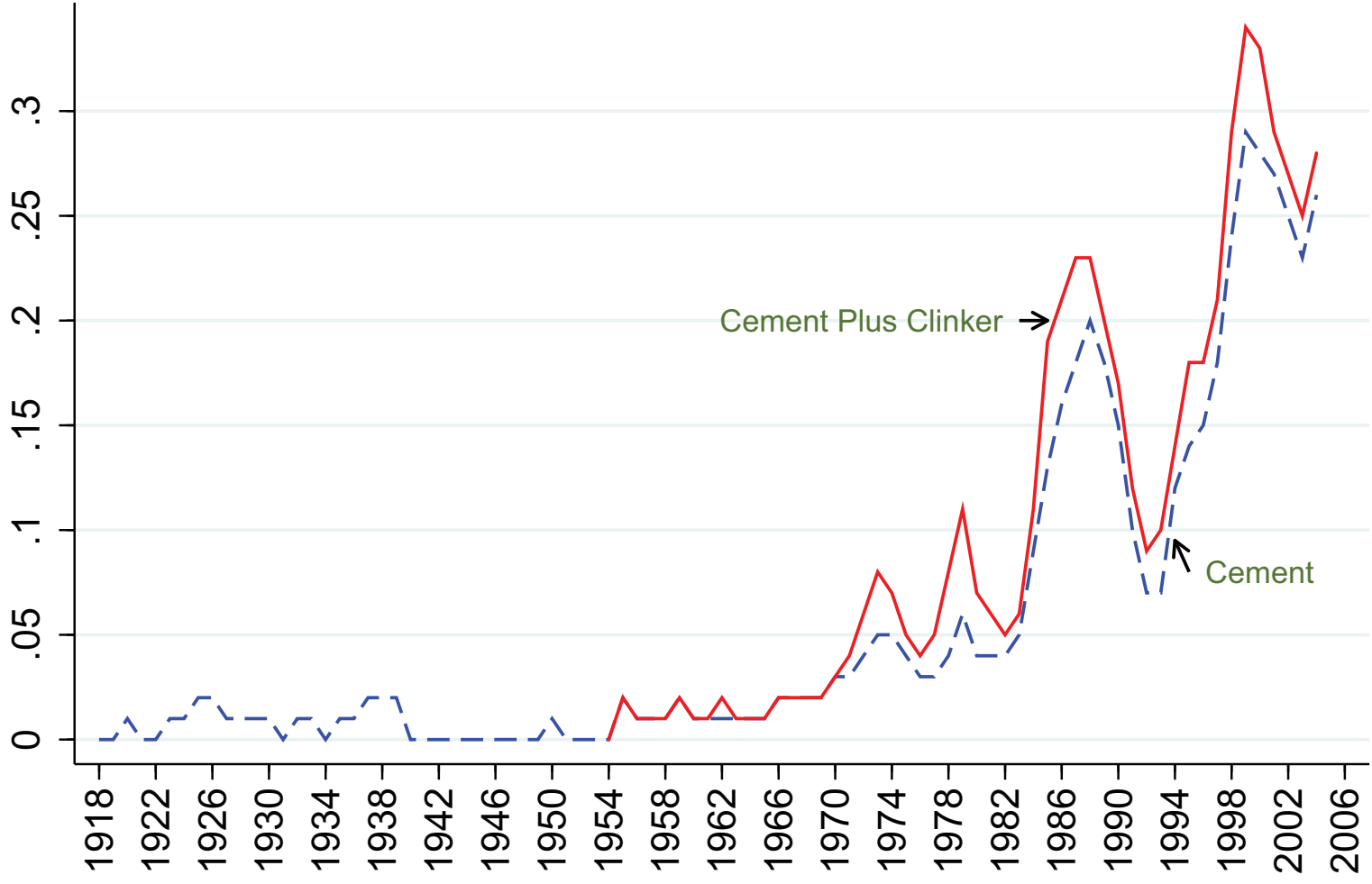
Southern California factories (FOB): \$59.67 per ton

Port of LA (CIF): Japan \$32.29; Spain \$35.18

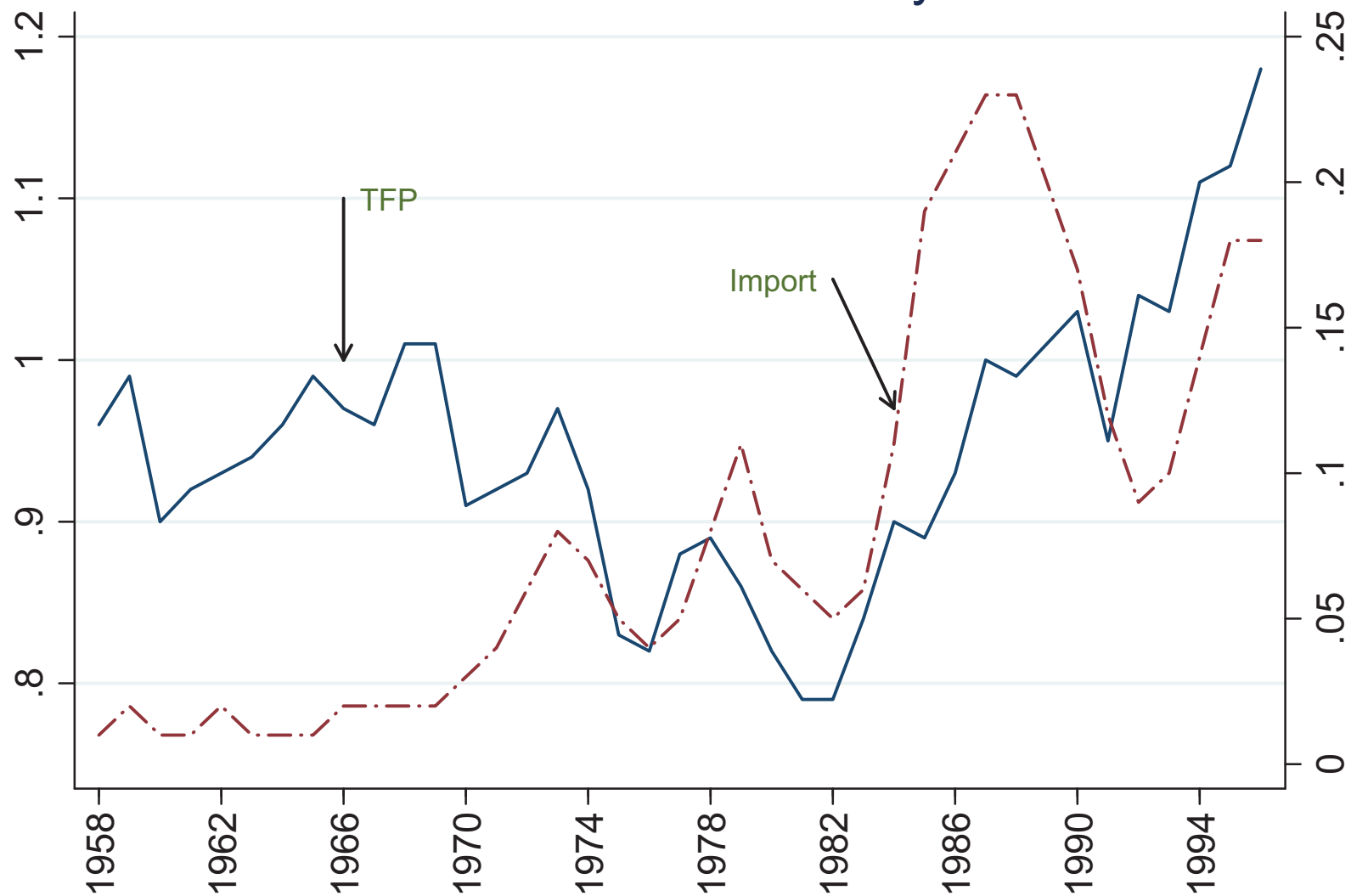
Southern Texas factories (FOB): \$47.61

Port of Houston (CIF): Italy \$33.96; Mexico \$ 26.21

Figure 4.
U.S. Cement Imports
(Relative to U.S. Production)



Total Factor Productivity and Cement Imports U.S. Cement Industry



Work Practices as of 1978

Union president [CLGWU] boasts:

“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”

Common contract clauses in 1978

Job Protection Clause

“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.”

Jobs Belong to Departments

“.. 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.”

No Contracting Out

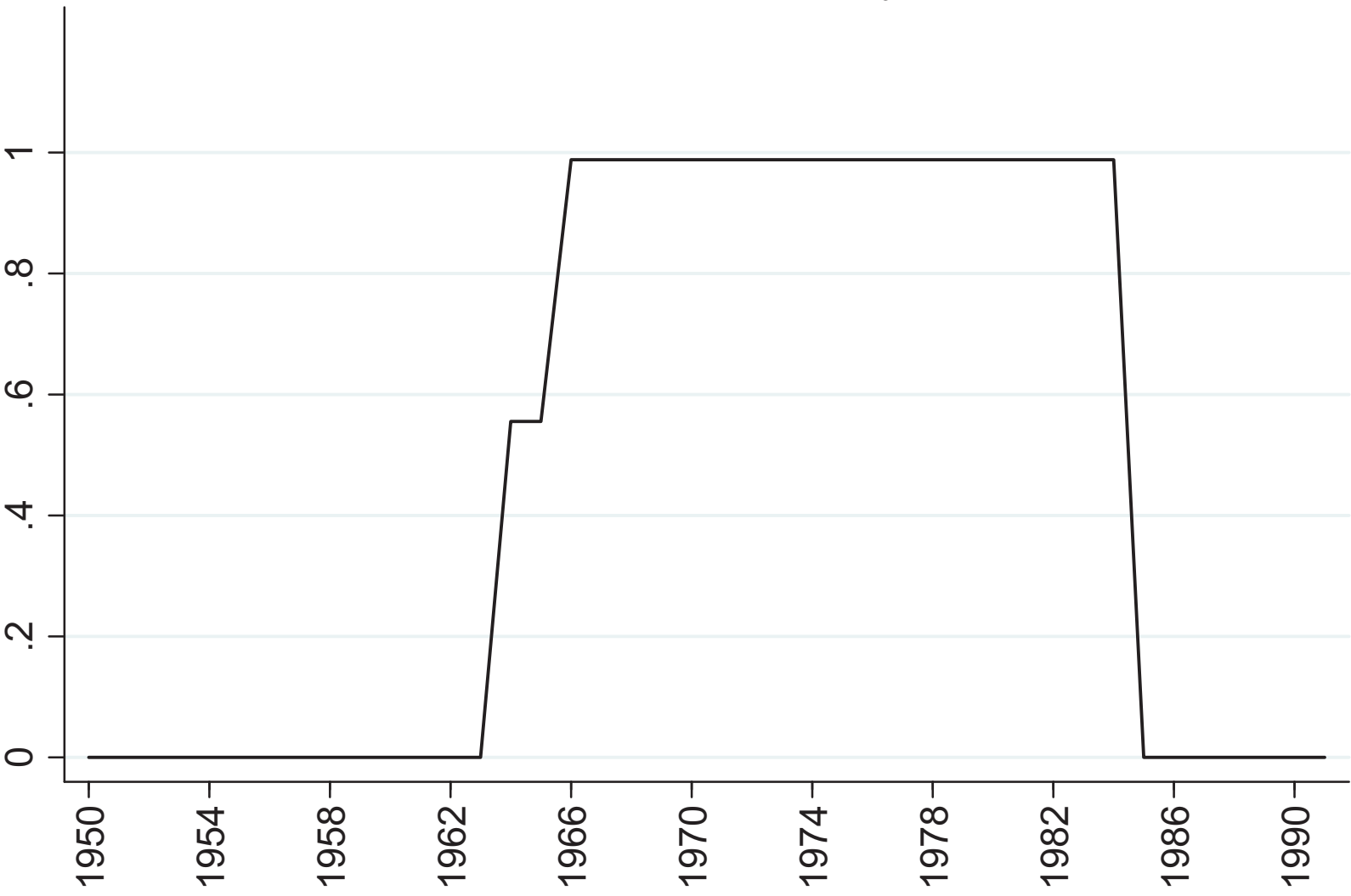
“All production and maintenance work customarily performed by the Company in its plant and quarry and with its own employees shall continue to be performed by the Company with its own employees.”

Formal Analysis of U.S. contracts

- Collected contracts for 96 U.S. cement plants (150 at peak)
- Analyze how contracts change over time.
- Focused on two clauses: Job protection and contracting out

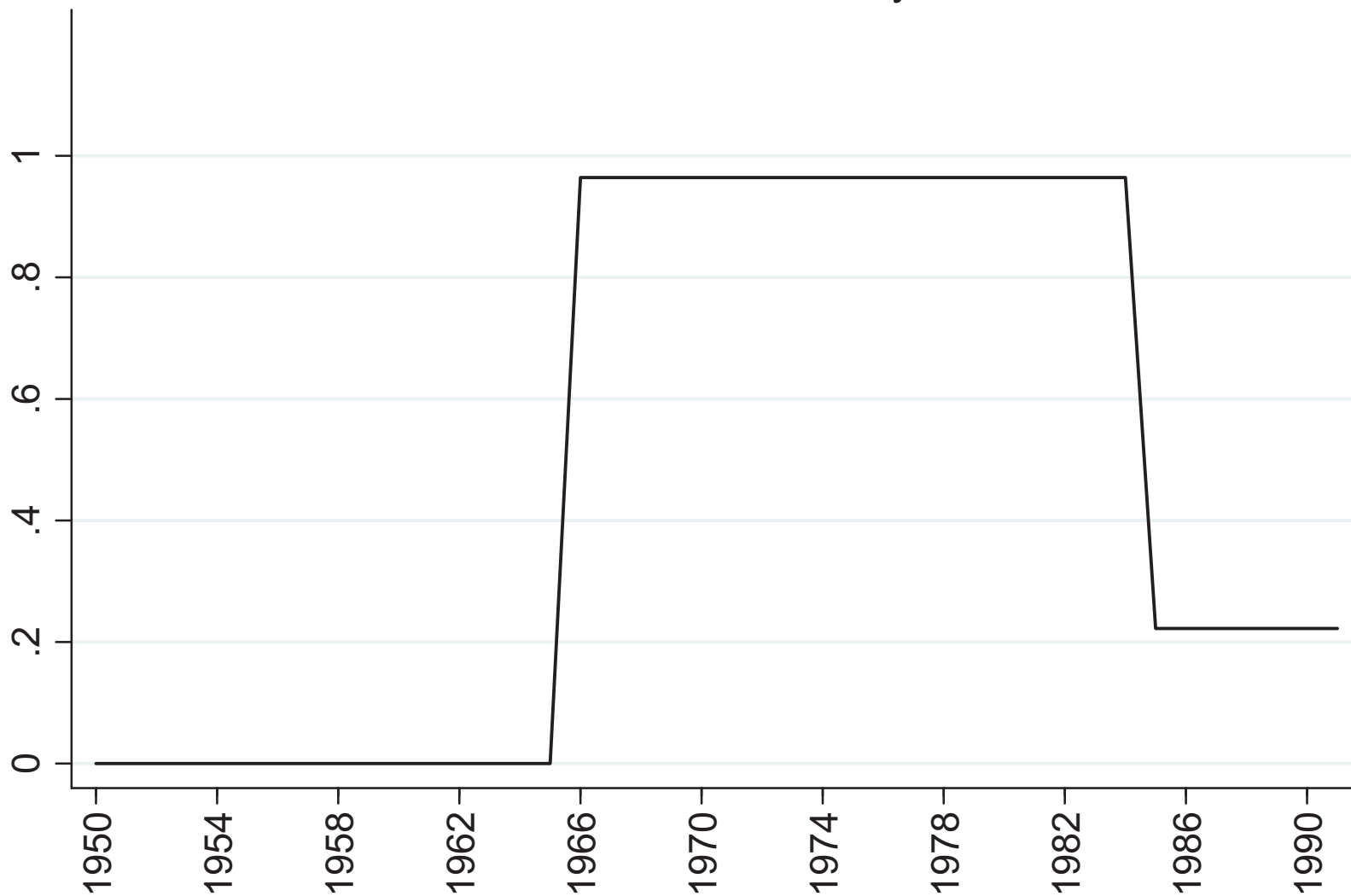
Fraction of Plants That Banned Contracting Out

U.S. Cement Industry



Fraction of Plants with Job Protection Clause

U.S. Cement Industry



Note on Post-1984 Contracts

- CLGWU collapsed in 1984
- Post-1984 contracts are from several different unions

Was Union Weak Before 1960s?

- Analysis above suggests union weaker before 1960
- Union was not strong until nationwide strike in 1957

Industry Productivity From WWII until 1990s

- Industry productivity growing from WWII until 1957
- Falls during 1960s/70s
- Surges in mid 1980s

Figure 6.
Energy Productivity
U.S. Cement Industry

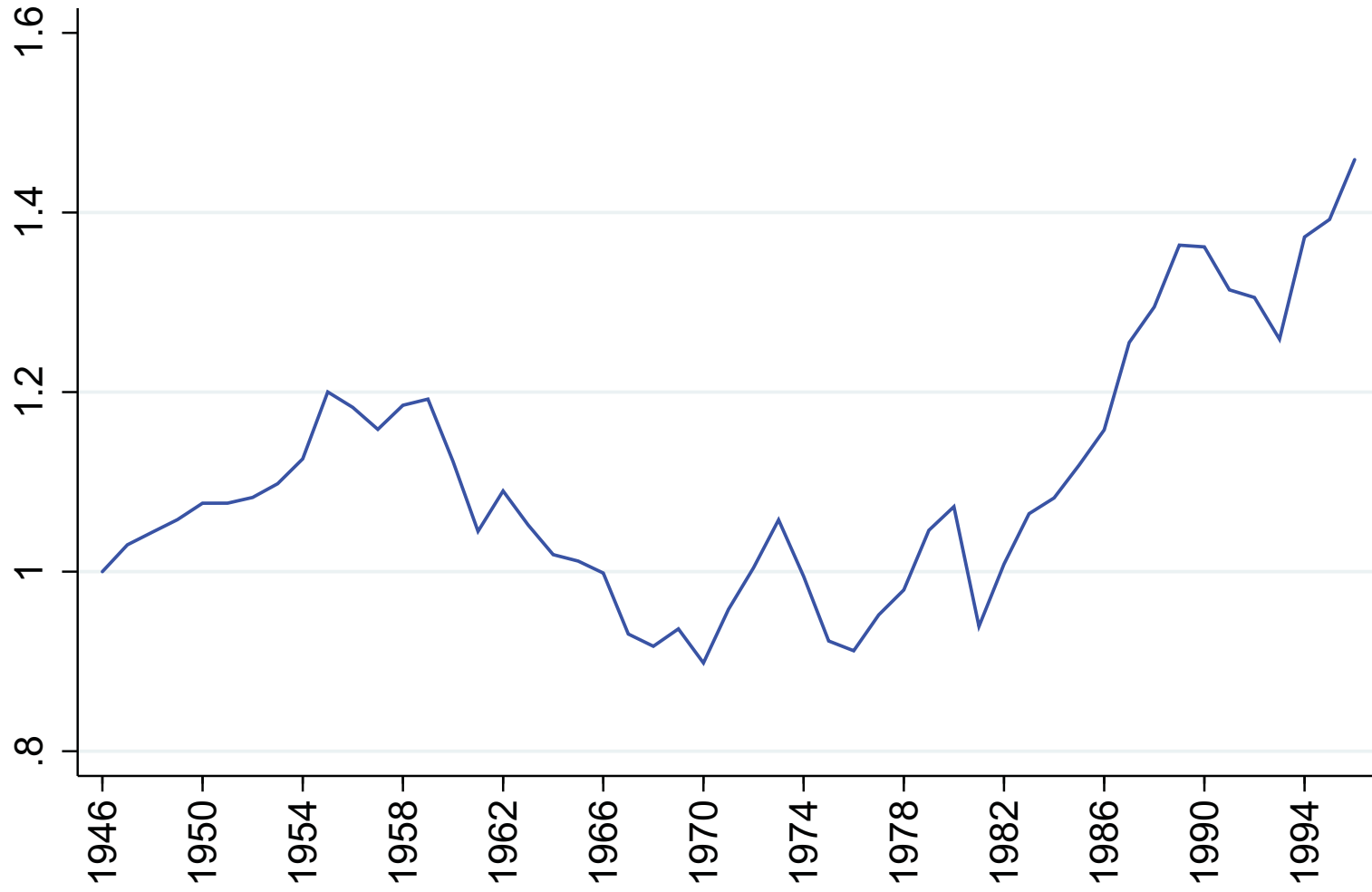


Figure 7.
Capital Productivity
U.S. Cement Industry

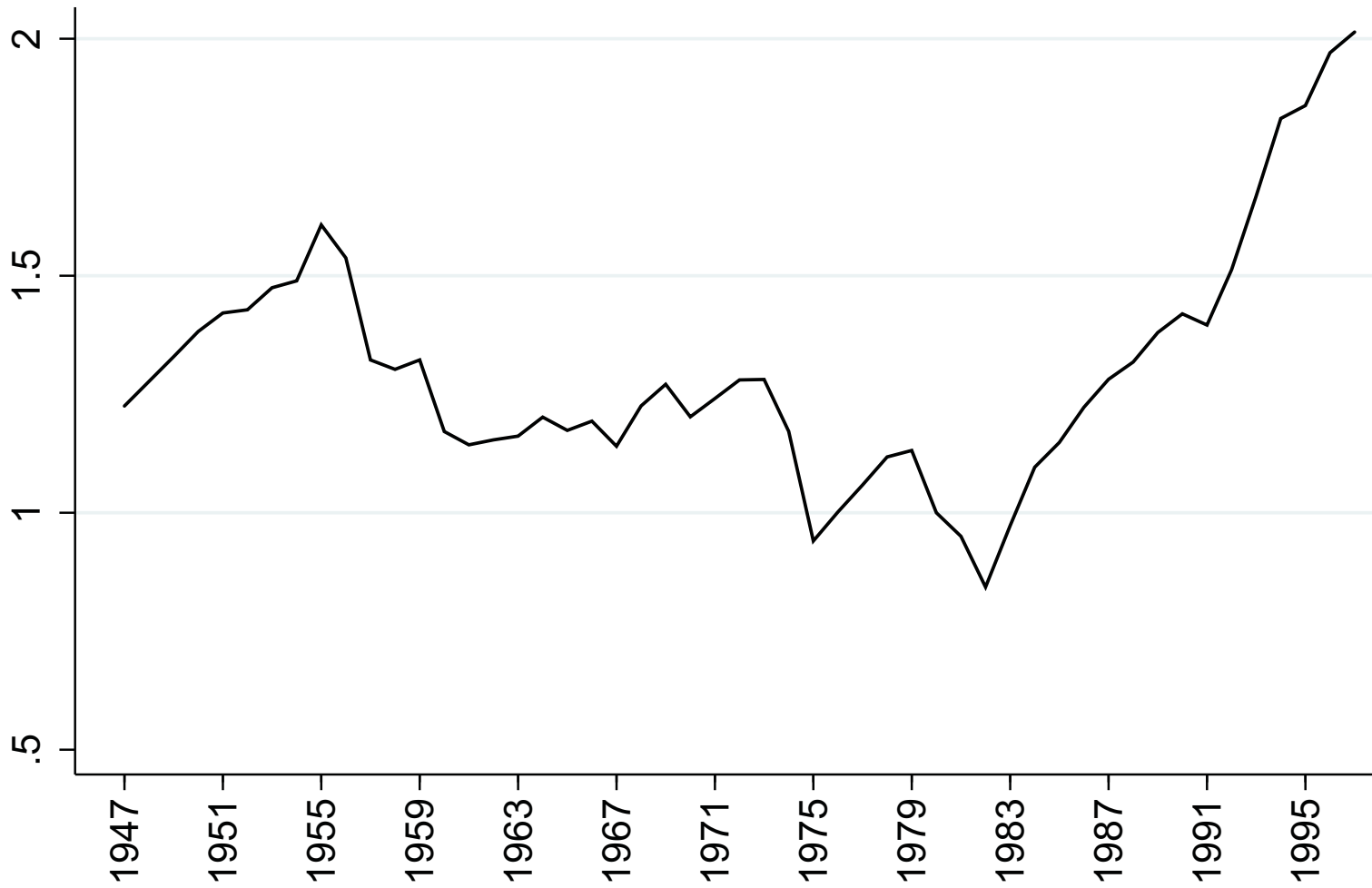
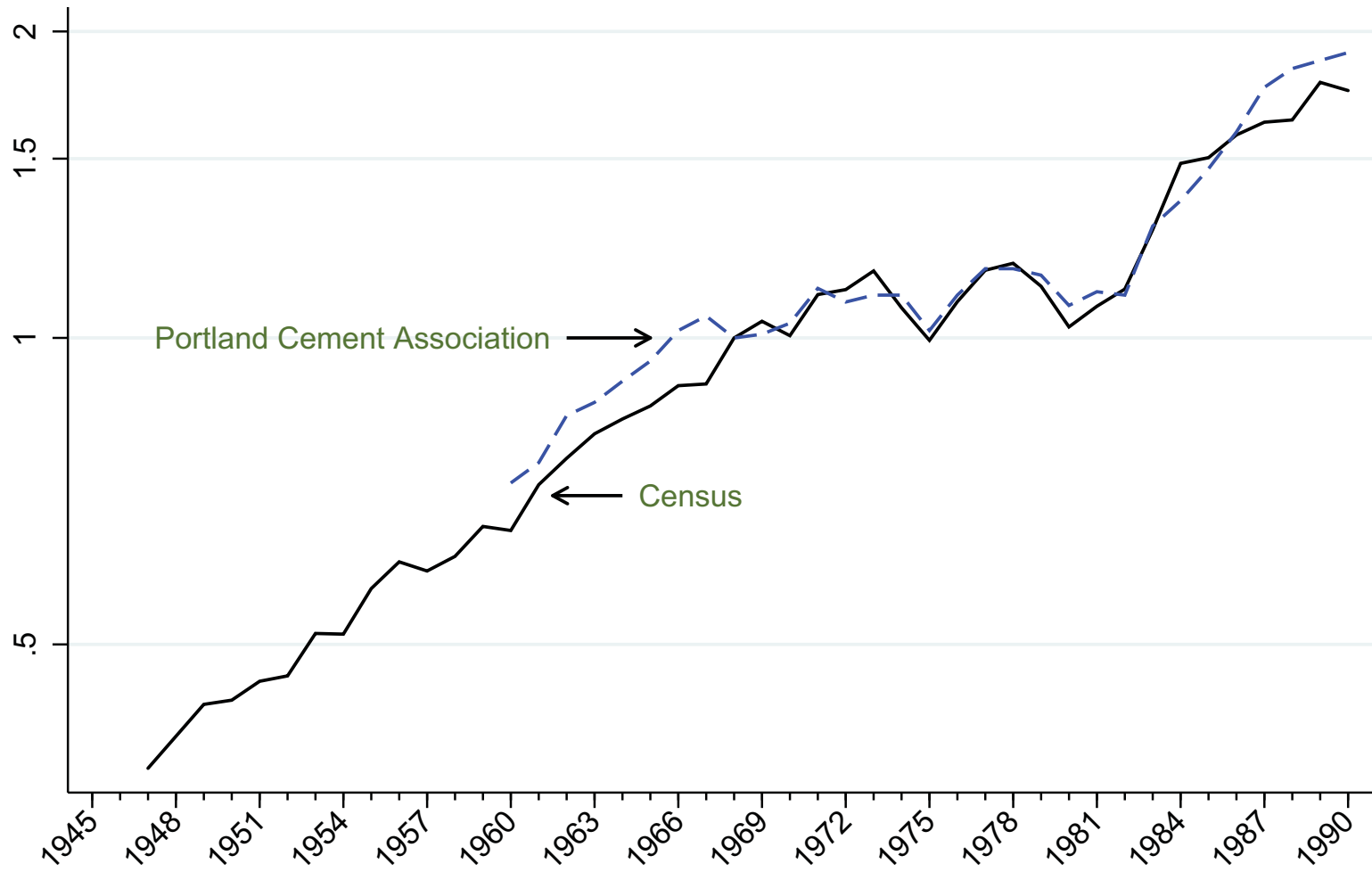


Figure 8. Labor Productivity U.S. Cement Manufacturing

(Tons per hour, log scale, 1968=1)



Why Did Labor Productivity Stop Growing?

- Job protection clause inserted in 1965
- What does time-series of industry employment look like?

Variation in work practices across U.S. Plants

- Variation in 1960s: not much
- Variation in 1980s: Headline “Not Much”
- What plants kept job protection?
 - Plants away from coast, in union country
 - Can’t really do much at this point: Disclosure

Formal Analysis of Canadian contracts

- CLGWU organized Canadian plants too
- We have 14 thus far (25 plants at peak)
- Again, focus on two clauses
- Canadian contracts less restrictive before 84, more after

Figure 10.
Total Factor Productivity
US and Canadian Cement Industry
(1978=1)

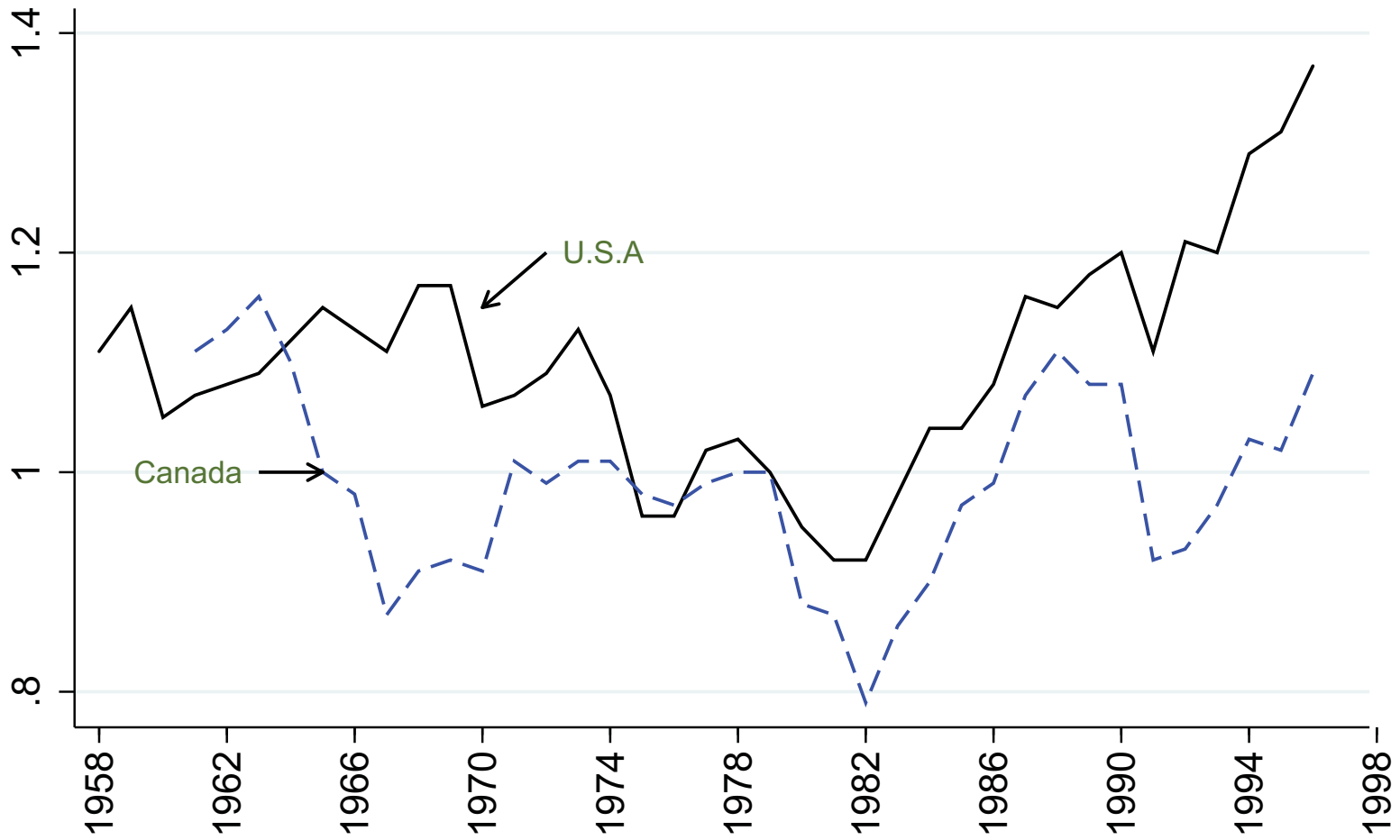
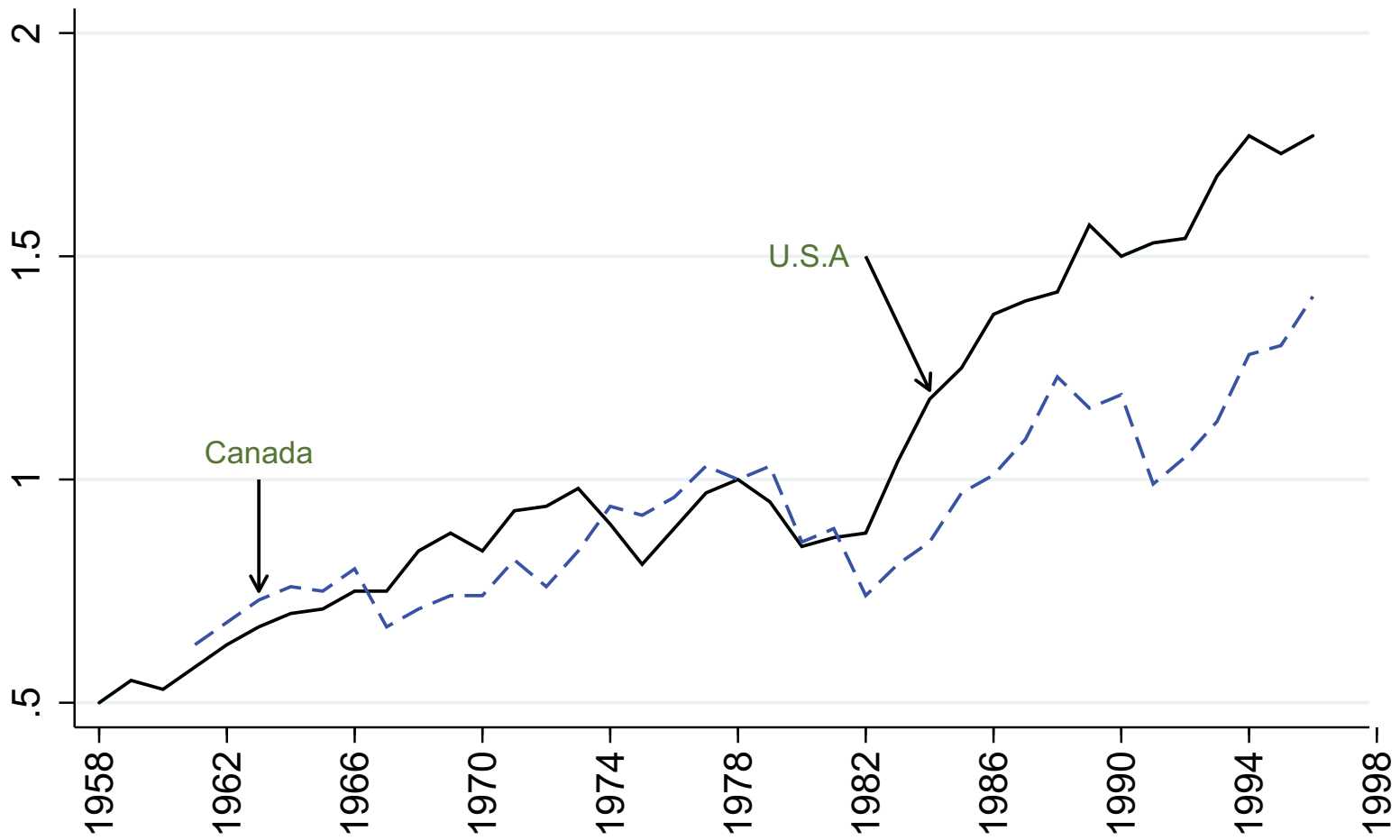


Figure 11.
Labor Productivity
US and Canadian Cement Industry
(1978=1)



Other factors important? Closing of plants

- Industry labor productivity growth 1982/87 about 40%
- Productivity decomposition shows
 - “Within” plant share accounts for 75%
 - Reallocation, including closing plants, for 25%

Other factors? Changes in Technology,

- Construct set of other factors that may have been important
 - Census: changes in ownership
 - PCA: changes in technology,
- These do not seem to be important

Plant-Level Regressions

We run regressions of the form

$$\Delta \ln(y_{it}/n_{it}) = \beta \Delta X_{it} + \delta_t + \mu_{it}$$

where

- $\Delta \ln(y_{it}/n_{it})$ is growth in plant i 's labor productivity
- ΔX_{it} includes changes in:
 - avg.kiln size, # kilns, ownership, adopt kiln?, discard kiln?
- δ_t are time effects

	Regression 1	Regression 2
	(time dummies)	(time dummies)
1977-82	-0.142*	-0.124*
1982-87	0.324*	0.330*
1987-92	-0.014	0.002
1992-97	0.091	0.107

Regression 1 includes only time dummies

Regression 2 includes time dummies and ΔX_{it}

Changes in Technology Insignificant?

- Δs in average kiln size not significant (wrong sign)
- Cross section: $corr(\text{average kiln size}, y/n)$ is strong, positive
- Consistent with aggregate evidence
 - Kiln size grows faster in 70s (0.95% pa) than 80s (0.35%)
 - Industry labor productivity not growing 70s, takes off 80s

Other Factors? Distance to Ports

- Some factors cannot be measured, like worker cooperation
- Expect more cooperation the greater the competition threat
- Expect more in, say, Southern California, than say Colorado

Include Port-Distance and Time Interactions

- Let distance_i = distance of plant i to closest deep water port
- Define index: $\exp(-\lambda * \text{distance}_i) \varepsilon(0, 1)$, $\lambda = .005$
- Define port-distance and time interaction:
 - $\exp(-\lambda * \text{distance}_i) \times \delta_t$

Conclusion

Start with Victor story