Wages and Workplace Characteristics

- New literatures pulling in *plant-level information* (i.e. industrial organization) in fields that once focused on *industry level*
  - Trade literature, Eaton and Kortum
  - Labor literature, matched employee/employer data sets
    - Abowd and Haltiwanger census project with U.S. data
    - Projects with European data (Lenz-Mortensen)
- Useful to review results of the older literature with individual-level data (and some limited plant information)
  - Key finding for wages: when control for observable worker human capital characteristics (e.g. education), there remains a *huge* relationship between plant information (industry, size)
    - Bottom line: Capital intensive industries, big plants, pay higher wages for everybody (janitors and CEOs alike).
    - Try to control for ability can't get this to go away.

- Original literature 20 years old, but fresh stuff to do now because
  - o New data sets.
  - o Likely new facts on the ground. Key point of earlier literature is that industry differentials persist. Maybe something going on since the 1980s. Look at airline industry now. Fascinating question of the industrial organization of how a high wage industry turns into a low wage industry.
  - o New theoretical tools. Eckstein-Wolpin…
  - o See interesting links with IO and trade.

Older Literature

- Industry Wage Differentials
  - o Kruger and Summers *Econometrica*(1988)
  - o Katz and Summers *Brookings* (1989)
  - o Use Current Population Survey (CPS)
- Firm Size
  - o Brown and Medoff (1988)
  - o Haltiwanger and Davis, *Brookings* 1991
  - o Use CPS and LRD (plant level data)
- Union Wage Effect
  - o Lewis (1963)

Krueger and Summers

- Earning variable: usual weekly earnings/usual weekly hours

TABLE I

ESTIMATED WAGE DIFFERENTIALS FOR ONE-DIGIT INDUSTRIES—MAY CPS[a]
(Standard Errors in Parentheses)

Industry	(1) 1974	(2) 1979	(3) 1984	(4) 1984 Total Compensation
Construction	.195	.126	.108	.091
	(.021)	(.031)	(.034)	(.035)
Manufacturing	.055	.044	.091	.131
	(.020)	(.029)	(.032)	(.032)
Transportation & Public Utilities	.111	.081	.145	.203
	(.021)	(.031)	(.034)	(.034)
Wholesale & Retail Trade	−.128	−.082	−.111	−.136
	(.020)	(.030)	(.033)	(.033)
Finance, Insurance and	.047	−.010	.055	.069
Real Estate	(.022)	(.035)	(.034)	(.034)
Services	−.070	−.055	−.078	−.111
	(.021)	(.030)	(.032)	(.032)
Mining	.179	.229	.222	.231
	(.035)	(.058)	(.075)	(.075)
Weighted Adjusted Standard Deviation of Differentials[b]	.097**	.069**	.094**	.126**
Sample Size	29,945	8,978	11,512	11,512

TABLE III

ALTERNATIVE DEGREES OF CONTROL FOR LABOR QUALITY—MAY 1979 CPS, PENSION SUPPLEMENT

	Controls	Weighted Adjusted SD of Industry Wage Differentials	Correlation With Table II
(1)	8 occupation dummies, sex, nonwhite, region dummies (3), central city dummy, union dummy, ever married, ever married* sex, and veteran status	.114**	.994
(2)	Row (1) controls plus 12 age structure variables	.108**	.998
(3)	Row (2) controls plus 4 education variables	.108**	1.000
(4)	Row (3) controls plus 4 tenure variables	.104**	.995

** F test that industry wage differentials jointly equal 0 rejects at the .00001 level.

Unmeasured worker quality?

Add Worker Fixed Effects:

$$\Delta w_t = \Delta D_t^{*\prime} \alpha + \Delta \varepsilon_t$$

(Note has to deal with measurement error problem too)

TABLE IV

THE EFFECTS OF UNMEASURED LABOR QUALITY[a]

Industry	(1) Fixed Effects Unadjusted for Measurement Error	(2) Fixed Effects Adjusted for Measurement Error I[b]	(3) Fixed Effects Adjusted for Measurement Error II[c]	(4) Levels
Construction	.063	.098	.174	.174
	(.033)	(.060)	(.060)	(.024)
Manufacturing	.028	.055	.107	.064
	(.031)	(.058)	(.058)	(.022)
Transportation and	.019	.060	.049	.114
Public Utilities	(.035)	(.059)	(.059)	(.024)
Wholesale and	−.042	−.068	−.125	−.133
Retail Trade	(.031)	(.056)	(.056)	(.023)
Finance, Insurance	.027	.017	.018	.035
and Real Estate	(.036)	(.061)	(.061)	(.025)
Services	−.040	−.088	−.128	−.079
	(.032)	(.056)	(.057)	(.023)
Mining	.067	.122	.142	.156
	(.004)	(.057)	(.058)	(.040)

TABLE V[a]

THE EFFECTS OF UNMEASURED LABOR QUALITY FOR A SAMPLE OF DISPLACED WORKERS

Industry	(1) Fixed Effects Unadjusted for Measurement Error	(2) Fixed Effects Adjusted for Measurement Error I[b]	(3) Fixed Effects Adjusted for Measurement Error II[c]	(4) 1984 Cross-Section
Construction	.000	.001	.005	.174
	(.051)	(.051)	(.052)	(.060)
Manufacturing	.053	.058	.059	.055
	(.049)	(.048)	(.050)	(.060)
Transportation and	.010	.011	.013	.117
Public Utilities	(.054)	(.054)	(.055)	(.064)
Wholesale and	−.058	−.062	−.068	−.097
Retail Trade	(.050)	(.049)	(.050)	(.061)
Finance, Insurance	.015	.015	.016	−.024
and Real Estate	(.056)	(.055)	(.056)	(.067)
Services	−.062	−.067	−.065	−.097
	(.050)	(.050)	(.051)	(.062)
Mining	.289	.306	.330	.366
	(.036)	(.036)	(.037)	(.137)

Working conditions?

TABLE VI

ANALYSIS OF INDUSTRY WAGE DIFFERENTIALS WITH AND WITHOUT CONTROLS FOR WORKING CONDITIONS—QES 1977[a]

Industry	Coefficient (SE) (1)	(2)
Construction	.113	.100
	(.098)	(.100)
Manufacturing	.050	.046
	(.086)	(.087)
Transportation	.113	.124
	(.095)	(.096)
Wholesale & Retail Trade	−.056	−.061
	(.090)	(.091)
Finance, Insurance and Real Estate	.071	.053
	(.104)	(.105)
Services	−.107	−.104
	(.090)	(.091)
Mining	.233	.308
	(.205)	(.220)
10 Working Condition Variables[b]	no	yes
Weighted Adjusted Standard Deviation of 2-Digit Industry Premiums	.113*	.118*
R^2	.496	.519

Katz and Summers: Industry Rents and Implications

(Bring in the IO, well a little)

Claim 1. Shareholders don't get much rents, but workers do. For workers see Krueger and Summers. For firms:

Table 1. Capital Rents in Twenty U.S. Manufacturing Industries, 1960–85[a]

	1960–85		*1981–85*	
Industry	*After-tax profit rate*	*q*	*After-tax profit rate*	*q*
Lumber	0.050	1.16	0.009	0.64
Furniture	0.043	0.91	0.043	0.99
Stone, glass, clay	0.043	0.91	0.011	0.52
Primary metals	0.028	0.69	−0.022	0.43
Fabricated metals	0.057	0.97	0.037	0.77
Machinery, except electrical	0.061	1.43	0.021	0.93
Electrical machinery	0.070	1.68	0.045	1.31
Transportation equipment	0.066	1.09	0.054	0.73
Scientific instruments	0.091	3.24	0.042	1.22
Miscellaneous manufacturing	0.071	1.33	0.056	1.14
Food	0.060	1.21	0.061	0.91
Tobacco	0.081	1.19	0.095	0.93
Textiles	0.042	0.82	0.018	0.59
Apparel	0.070	1.16	0.074	1.01
Paper	0.066	1.43	0.038	1.02
Printing	0.086	1.90	0.073	1.45
Chemicals	0.069	1.64	0.038	0.91
Petroleum	0.053	0.87	0.028	0.53
Rubber	0.054	1.24	0.021	0.78
Leather	0.064	1.09	0.043	0.84
Weighted average[b]	0.060	1.28	0.035	0.85

Claim 2: regularities in the pay structure across time, countries, occupations

Time:

Figure 1. U.S. Wage Structure, 1974 versus 1984
Ln wage premiums for manufacturing industries

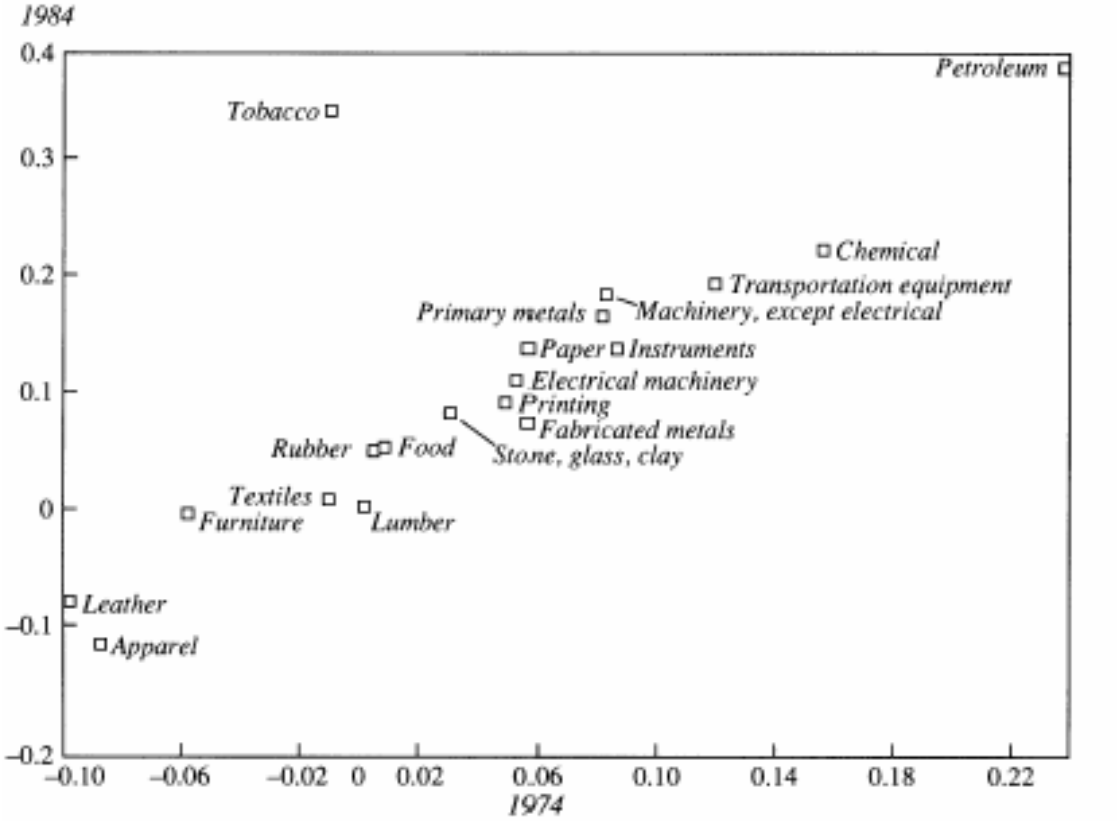


Table 4. Correlations of Natural Log Manufacturing Wages among Nine Countries, 1983[a]

Country	*Australia (year)*	*Chile (year)*	*France (hour)*	*Germany (hour)*	*Japan (year)*	*Korea (hour)*	*Sweden (year)*	*United Kingdom (year)*	*United States (hour)*
Australia	1.00	0.66	0.80	0.81	0.84	0.67	0.77	0.78	0.92
Chile	. . .	1.00	0.60	0.60	0.69	0.46	0.67	0.56	0.67
France	. . .	. . .	1.00	0.89	0.80	0.53	0.64	0.77	0.85
Germany	. . .	. . .	. . .	1.00	0.94	0.62	0.75	0.93	0.95
Japan	. . .	. . .	. . .	. . .	1.00	0.59	0.80	0.95	0.92
Korea	. . .	. . .	. . .	. . .	. . .	1.00	0.68	0.59	0.66
Sweden	. . .	. . .	. . .	. . .	. . .	. . .	1.00	0.79	0.79
United Kingdom	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1.00	0.86
United States	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1.00

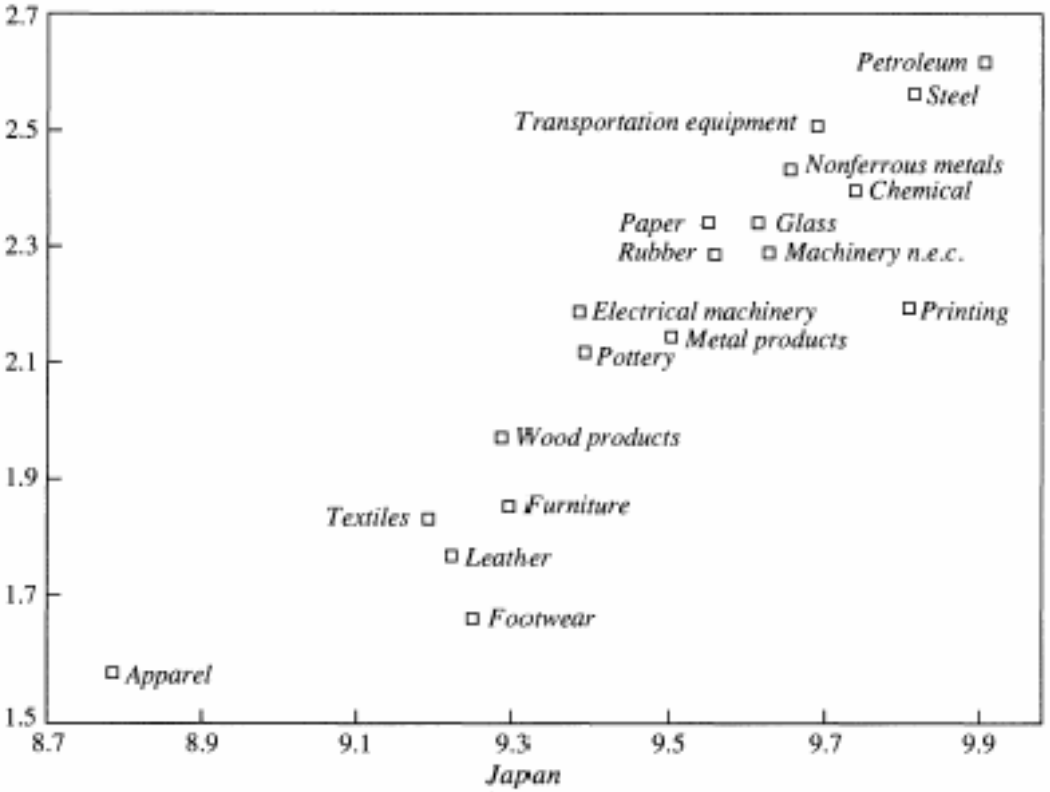
Source: Authors' calculations using data from the United Nations, Department of International Economics and Social Affairs, *Industrial Statistics Yearbook, 1984*, vol. 1: *General Industrial Statistics* (1986).

a. Year denotes yearly wages; hour denotes hourly wages. Wages are for operatives, except for France, where the wage is the average wage of all workers. The data cover 19 manufacturing industries. Data are available for only 18 industries for Korea and Australia, 17 for Germany, and 15 for France. Each pairwise correlation uses the maximum number of industries possible.

Figure 2. Wage Structure, United States versus Japan, 1983[a]

Ln wages of operatives[b]

United States



Source: Authors' calculations using data from United Nations, Department of International Economics and Social Affairs, *Industrial Statistics Yearbook, 1984*, vol. 1: *General Industrial Statistics* (1986), pp. 313, 584.

a. International standard industrial classification industries.

b. Annual earnings for Japan; hourly earnings for the United States.

Claim 3: Workers must be getting rents because they quit less in high wage jobs

Table 7. Quit Rates and Industry Wage Differentials in Seventy-Four U.S. Manufacturing Industries[a]

Item	*Dependent variable: quits per 100 employees per month in 1981*[b]		
	Mean	*(1)*	*(2)*
Ln wage premium	0.23	−4.26	−3.71
	(0.11)	(1.42)	(0.95)
Ln average hourly wage	2.06	−0.65	. . .
	(0.21)	(0.76)	
Fraction union members	0.27	. . .	−0.03
	(0.14)		(0.56)
Average years of schooling	12.02	. . .	−0.28
	(0.82)		(0.11)
Fraction female	0.29	. . .	0.67
	(0.16)		(1.07)
Average years of experience	20.50	. . .	−0.15
	(2.10)		(0.03)
Fraction married	0.71	. . .	0.83
	(0.06)		(1.23)
Fraction married females	0.19	. . .	−0.42
	(0.10)		(1.59)
Intercept	. . .	3.64	7.97
		(1.27)	(1.65)
$\bar{R}^2$	. . .	0.62	0.72
Number	74	74	74

Sources: The quit rate is from *Employment and Earnings*, vol. 29 (March 1982), table D-2, p. 110. The ln wage premium, average hourly wage, fraction married, and fraction married females were calculated from the Full Year 1984 CPS. Fraction union members average years of schooling, and average years of experience were calculated from the Full Year 1983 CPS. Fraction female is from *Employment and Earnings*, vol. 30 (January 1983), table 10, p. 150.

a. Three-digit CIC industries.

b. The mean (standard deviation) of the dependent variable is 1.30 (0.76). The numbers in parentheses in (1) and (2) are standard errors.

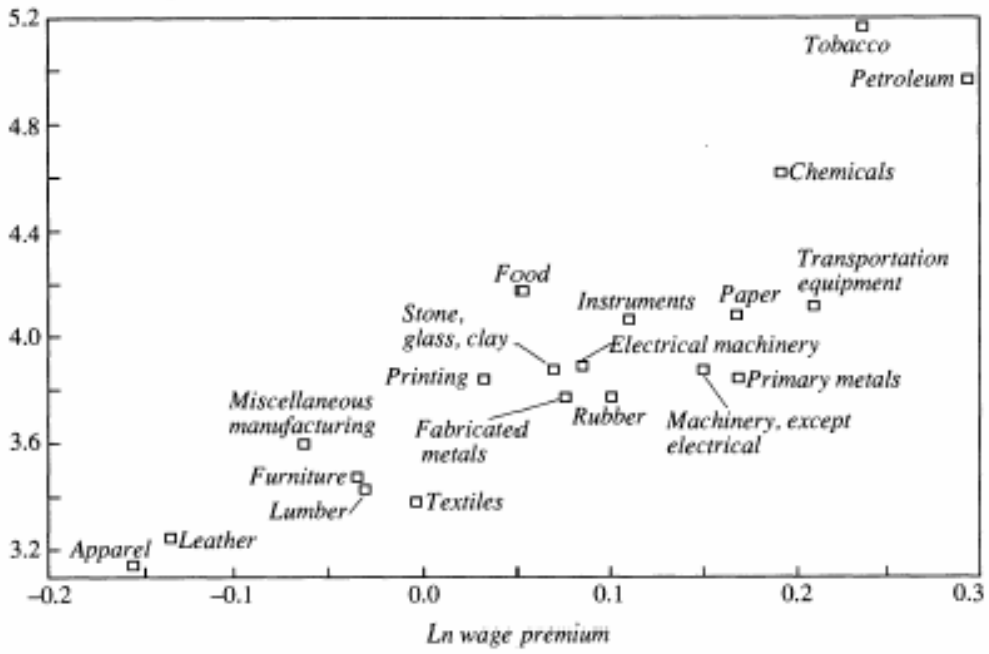
Claim 4: Wage differetials attributed to bargaining are due to more fundamental forces

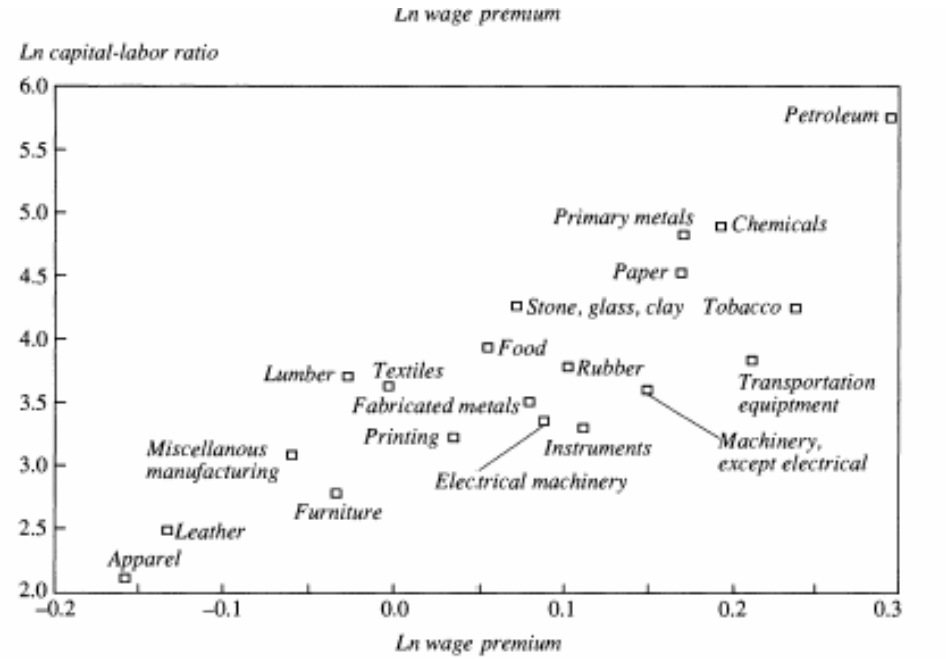
Table 8. Industry Average Wages and the Extent of Unionization in U.S. Manufacturing, 1929, 1953–58

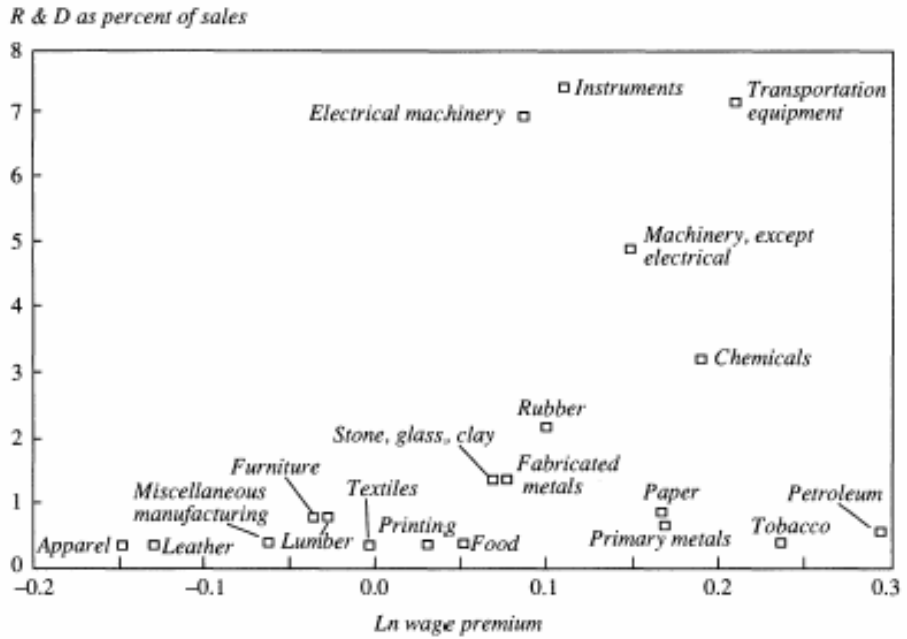
Industry	*Relative average annual full-time compensation (manufacturing average = 1.00)*		*Extent of union organization (percent)*	
	1929	*1958*	*1929*	*1953*
Tobacco	0.62	0.71	12	58
Textiles	0.73	0.64	3	30
Lumber	0.74	0.68	12	21
Leather	0.83	0.64	12	39
Apparel	0.85	0.61	29	53
Furniture	0.88	0.74	3	29
Food	0.95	0.86	4	45
Paper	0.96	0.99	2	45
Miscellaneous manufacturing	0.99	0.90	3	18
Stone, clay, glass	0.99	0.95	9	45
Rubber	1.00	1.01	0	54
Electrical machinery	1.04	1.02	12	56
Nonferrous metals	1.05	1.02	4	46
Chemicals	1.06	1.15	0	39
Iron and steel	1.10	1.11	5	58
Transportation equipment	1.10	1.15	0	52
Automobiles	1.14	1.25	0	80
Machinery, except electrical	1.15	1.06	13	45
Petroleum	1.21	1.54	0	67
Printing and publishing	1.26	0.98	23	38

Source: Derived from H. G. Lewis, *Unionism and Relative Wages in the United States: An Empirical Inquiry* (University of Chicago Press, 1963), pp. 289–90.

Figure 3. Comparisons of Wage Premiums with Other Variables in Twenty Two-Digit Industries




Ln wage premium
Ln capital-labor ratio
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
–0.2
–0.1
0.0
0.1
0.2
0.3
Petroleum
Primary metals
Chemicals
Paper
Stone, glass, clay
Tobacco
Food
Lumber
Textiles
Rubber
Transportation equiptment
Fabricated metals
Printing
Instruments
Machinery, except electrical
Miscellanous manufacturing
Electrical machinery
Furniture
Leather
Apparel
Ln wage premium


R & D as percent of sales
8
7
6
5
4
3
2
1
0
Instruments
Transportation equipment
Electrical machinery
Machinery, except electrical
Chemicals
Rubber
Stone, glass, clay
Fabricated metals
Furniture
Miscellaneous manufacturing
Textiles
Paper
Petroleum
Printing
Tobacco
Apparel
Leather
Lumber
Food
Primary metals
–0.2
–0.1
0.0
0.1
0.2
0.3
Ln wage premium

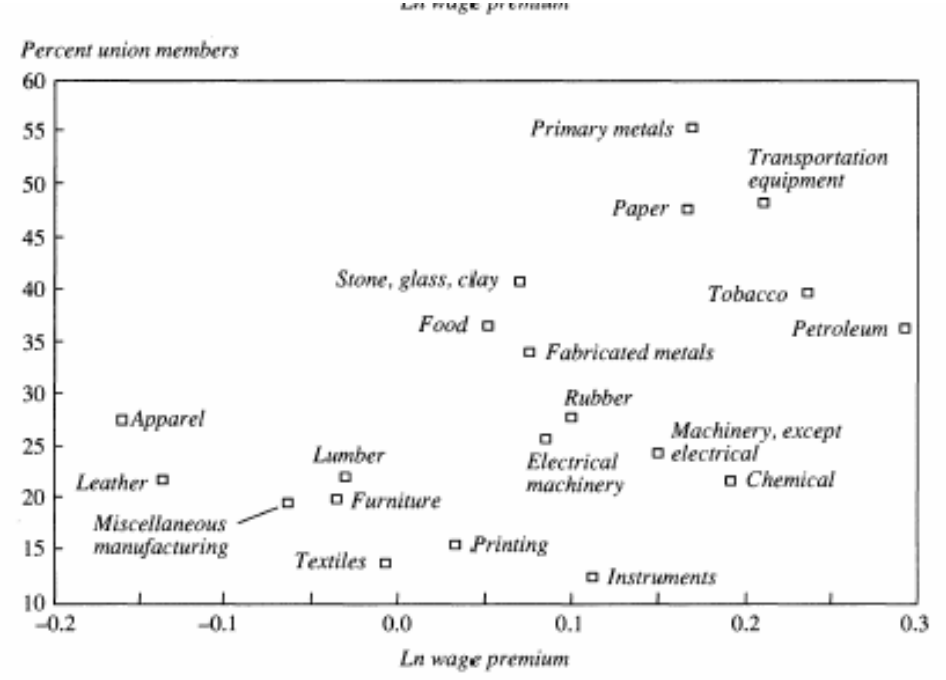

Percent union members
60
55
50
45
40
35
30
25
20
15
10
–0.2
–0.1
0.0
0.1
0.2
0.3
Ln wage premium
Primary metals
Transportation equipment
Paper
Stone, glass, clay
Tobacco
Food
Petroleum
Fabricated metals
Rubber
Apparel
Machinery, except electrical
Lumber
Electrical machinery
Leather
Chemical
Furniture
Miscellaneous manufacturing
Printing
Textiles
Instruments

Table 9. Correlations of Wage Differentials, Rents Measures, and Industry Characteristics for Seventy-four U.S. Manufacturing Industries[a]

Item	*Ln wage premium*	*Profit rate*	*Profits per worker*	*q*	*Total rents per worker*	*Ln capital per worker*	*R&D over sales*	*Percent union*	*CR4*
Ln wage premium	1.00	0.06	0.47	0.15	0.74	0.66	0.38	0.42	0.40
After-tax profits over capital	. . .	1.00	0.30	0.64	0.24	−0.15	0.30	−0.33	0.10
After-tax profits per worker	. . .	. . .	1.00	0.22	0.93	0.68	−0.00	0.01	0.12
Market value over capital (*q*)	. . .	. . .	. . .	1.00	0.21	−0.06	0.46	−0.43	0.15
Total rents per worker	. . .	. . .	. . .	. . .	1.00	0.76	0.18	0.18	0.26
Ln capital per worker[b]	. . .	. . .	. . .	. . .	. . .	1.00	−0.07	0.30	0.22
R&D expenditures over sales	. . .	. . .	. . .	. . .	. . .	. . .	1.00	−0.23	0.32
Percent union members	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1.00	0.35
Four-firm concentration ratio (CR4)	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1.00

Sources: See the appendix.

Table 10. Selected Regressions of Industry Wage Differentials and Industry Characteristics in U.S. Manufacturing[a]

Item	*Dependent variable: ln industry wage premium*[b]		
	Mean	*(1)*	*(2)*
After-tax profits per worker (thousands of 1984 dollars)	5.43 (6.38)	0.0080 (0.0014)	. . .
Fraction union members	0.26 (0.13)	0.249 (0.068)	0.225 (0.053)
Average number of employees per establishment	62.50 (39.4)	0.0012 (0.0002)	0.0005 (0.0002)
q ratio[c]	1.30 (0.74)	. . .	0.024 (0.010)
Capital per worker (millions of 1984 dollars)	0.64 (0.82)	. . .	0.22 (0.07)
Fraction female	0.29 (0.16)	. . .	−0.16 (0.04)
Average years of experience	20.40 (1.90)	. . .	0.012 (0.004)
Average years of schooling	12.00 (0.83)	. . .	0.070 (0.010)
Ln employment growth, 1973–84	−0.061 (0.311)	. . .	0.026 (0.020)
Intercept	. . .	0.48 (0.02)	−1.01 (0.15)
$\bar{R}^2$	. . .	0.54	0.83
Number	72	72	72

Sources: See the appendix.

a. Three-digit CIC industries.

b. The mean (standard deviation) of the dependent variable is 0.23 (0.11). The numbers in parentheses in (1) and (2) are standard errors.

c. Market value divided by capital.

Size Wage Premium
Payroll Per Employee by Establishment Size and Year
(Normalized relative to average across all manufacturing establishments

Employment Size Category	1947	1954	1967	1977	1987	1997
1-99	.91	.86	.88	.85	.82	.85
100-249	.96	.94	.89	.87	.89	.92
250-499	.98	.96	.91	.89	.92	.95
500-999	1.01	1.02	.98	.99	1.02	1.02
1,000-2499	1.05	1.09	1.09	1.14	1.20	1.20
2,500+	1.13	1.19	1.26	1.39	1.48	1.54