

# Airline Deregulation and Industry Wage Levels

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Deregulation in the airlines industry may have possibly reduced the ability of employees to receive high wages in consequence of its promotion of the entrance of nonunion competitors. Recent work by Moore (1986), Card (1986), Cappelli (1985), and Northrup (1984) indicates that, by 1983, the growth of the nonunion sector in the airline industry and the absence of mechanisms such as industry-wide labor contracts in this industry weakened the bargaining position of organized labor as compared to their past position (Hendricks, 1980). Nevertheless, airline unions seem to have remained in a better bargaining situation than unions in other industries, for the wage findings of these studies indicate that airline employees continued to receive wages above the national average, even though organized labor accepted severe wage concessions after deregulation.

These findings, however, do not provide empirical evidence about the role after deregulation of the structure of the labor and product markets in wage determination, nor do they reflect the relationship of wage levels to employees' personal characteristics and the industry unemployment rate. This study examines how deregulation affects labor earnings, given the relevance of other wage determinants in the airline industry following deregulation.

## WAGE DETERMINATION AFTER THE AIRLINE DEREGULATION ACT OF 1978

Keeler (1981) has shown that after the 1978 Airline Deregulation Act entrance of nonunion competitors contributed to the decline in air fares. Competitive pricing behavior presents a situation such that high priced carriers are faced with declining profits and shrinking product market share, which diminish the likelihood of carrier passing on 'excessive' labor costs to customers.<sup>1</sup> Large numbers of labor bargaining units unaccustomed to enforcing uniform wage contracts across carriers further reduces the ability of airline unions to prevent widespread wage concession in an increasingly competitive industry.<sup>2</sup> Additionally, the response by the federal government of enforcing section 305 of the Taft-Hartley act to layoff striking air traffic controllers most likely contributed to any erosion of union bargaining strength in airlines. Information presented in Table 1 show that the 1984 average weekly wage level for clerical workers employed in the airlines industry, however, was 18.58 percent higher than the levels received by their counterparts in other industries. The mean wage airline wage premium was 19.58 percent for craft workers. These wage results for airline workers are consistent with the mean wage findings of Moore (1986), Card (1986), and Cappelli (1985). Despite stepped up competition and the layoff of striking air traffic controllers it is possible, as Hendricks suggests, that high levels of union participation by employees other than air traffic controllers and high industry concentration may have stemmed the loss of bargaining power. In support of Hendricks' prediction Table 1 shows above average wage levels for airline employees, which may partially be a reflection of the unions' advantageous bargaining position as compared to their counterparts in manufacturing.

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There are, however, many other factors beyond the product and labor market structure that are important in determining employees' earnings. Workers may, for example, receive relatively high wages after deregulation because their personal characteristics are highly valued by employers. 1977 and 1984 measures of the industry workforce characteristics presented in Table 1 indicate that the average age, mean number of hours worked per week, percentage of female workers, and proportion of nonwhite clerical workers in airlines are similar to other industries. The average age and mean number of hours worked are similar for craft workers in airlines and manufacturing, but a significantly large percentage of white males are employed as craft workers in airlines than in manufacturing. Usually these workers receive higher wage levels than workers belonging to other race-gender groups. The workforce in airlines though consists of a significantly greater percentage of clerical and craft workers who have more years of schooling than workers in manufacturing. Further, the comparatively healthy labor market conditions in this industry likely contributed to the maintenance of mean wage levels above the national average. The statistically lower 1984 unemployment rate of 3.9 percent compared to 7.14 percent for manufacturing industries is indicative of the relatively better labor market conditions for workers in airlines than in manufacturing.<sup>3</sup>

On the other hand, compared to other industries, the airlines industry is characterized as employing a large percentage of craft workers who are not married and hiring an above average proportion of workers in both occupations that work in the southern United States. These two traits are typically associated with low wage levels.<sup>4</sup> The information presented in Table 1 indicates the need to disentangle the countervailing wage effects resulting from differences in the type of workers employed in the airlines industry and in manufacturing as well as the differences in industry unemployment rates.

**METHOD AND DATA**

*Wage Estimation Procedure*

Equation (1) is estimated to control for wage variation attributable to differences of workers personal characteristics and differences in industry unemployment rates. The estimation of this equation also allows measurement of the contribution of the above average degree of labor organization and industry concentration to the high wage levels in airlines before and after deregulation occurred. This wage equation is similar to the equation specified by Hendricks (1980), which he incorporates to measure the 1970 wage differentials between airlines and manufacturing workers.<sup>5</sup>

$$(1) \ln(\text{wage}_{ij}) = a + B_1x_{1,ij} + \sum_{h=2}^{12} B_hx_{h,ij} + e_{ij}$$

where,  $\text{wage}_{ij}$  is the wage of the  $j$ th person who is employed to perform the duties specified by the job description for the  $i$ th occupation, and  $x_{1,ij}$  is the industry identification variable that equals one if the  $j$ th individual is employed in the airlines industry and has the value of zero otherwise.  $x_{h,ij}$  indicates the  $j$ th person's personal characteristics when 'h' has values from 2 to 7; when 'h' equals 8 it indicates the geographic region where the individual is employed and indicates the average hours worked per week when it equals 9, it represents the industry unemployment rate when 'h' is 10, and it identifies the market structure characteristics pertaining to the industry the  $j$ th individual is employed in when 'h' has values from 11 to 12. Table 1 provides a list and definition of the personal characteristics and market structure variables incorporated in the wage level model. Mean and standard deviations of these variables are also included in Table 1.

The exponent of the estimate of the airline industry identification coefficient,  $B_1$ , less 1 is the estimated wage differential associated with employment in the airline industry. The accuracy of this statement can be confirmed by first depicting the wage determination of airline workers with the functional form  $w_{i,j,na} = f(Z)$ , where  $w_{i,j,na}$  is the wage of the  $j$ th worker that is not employed in the airlines industry and  $Z$  is a set of variables denoting the labor and product market conditions as well as the personal characteristics of the worker. If airline workers receive higher wages than other workers the wage

**TABLE 1**  
Symbols, Definitions, and Descriptive Statistics#

Symbols	Definition	1977						1984					
		Clerical			Craft			Clerical			Craft		
		Airlines	Manufactures	Airlines	Manufactures	Airlines	Manufactures	Airlines	Manufactures	Airlines	Manufactures	Airlines	Manufactures
WAGE <sub>j</sub>	The weekly wage level of the $j$ th individual	\$267.94** (89.44)	\$199.57 (78.80)	\$402.55** (203.09)	\$339.46 (151.39)	\$363.20** (117.17)	\$271.65 (105.97)	\$513.33** (166.80)	\$71.65 (105.97)	\$429.45 (186.58)	\$13.33** (166.80)	\$429.45 (186.58)	
X <sub>1j</sub>	AIRLINES: a dichotomous variable that identifies whether the individual is employed in airlines or manufacturing	6.33%	93.66%	7.13%	92.14%	1.85%	98.14%	2.031%	97.96%	84.35%*	44.23%	84.35%*	
X <sub>2j</sub>	MARRY: a dichotomous variable equaling 1 if the $j$ th individual is married and 0 otherwise	66.21%* (47.62)	62.06% (48.54)	50.07% (50.07)	64.61% (47.84)	84.10%* (30.73)	89.74% (36.57)	84.35%*	44.23%	88.02% (41.42)	84.35%*	44.23%	
X <sub>3j</sub>	GENDER: a dichotomous variable equaling 1 if the $j$ th individual is male and 0 otherwise	34.59% (26.32)	33.09% (21.91)	34.89% (25.68)	34.32% (22.88)	97.44%* (35.86)	93.45% (32.53)	97.44%*	36.43%	85.78% (34.93)	97.44%*	36.43%	
X <sub>4j</sub>	RACE: a dichotomous variable equaling 1 if the $j$ th individual is white and 0 otherwise	91.89% (27.48)	92.68% (26.04)	90.69% (29.21)	91.06% (28.54)	97.43%* (16.01)	92.87% (25.73)	97.49%* (16.01)	28.86%	90.83% (28.86)	97.49%* (16.01)	28.86%	
X <sub>5j</sub>	AGE: identifies the $j$ th individual's age (in years)	36.40 (10.70)	36.19 (12.91)	35.42 (11.22)	36.21 (12.22)	41.05 (10.29)	39.87 (12.32)	38.97 (10.68)	40.02 (11.74)	40.02 (11.74)	38.97 (10.68)	40.02 (11.74)	
X <sub>6j</sub>	AGE-SQUARED: the $j$ th individual's age squared	1438.37 (804.41)	1476.34 (1025.49)	1379.07 (870.84)	1686.44 (1010.46)	1788.43 (886.80)	1741.30 (1016.87)	1630.10 (846.66)	1739.80 (983.08)	1739.80 (983.08)	1630.10 (846.66)	1739.80 (983.08)	
X <sub>7j</sub>	EDUCATION: the number of years of schooling obtained by the $j$ th individual	13.79* (1.27)	12.87 (1.78)	14.26* (1.63)	13.60 (1.74)	13.41* (1.58)	12.65 (2.23)	13.74* (1.53)	12.94 (2.186)	12.94 (2.186)	13.74* (1.53)	12.94 (2.186)	
X <sub>8j</sub>	SOUTH: a dichotomous variable equaling 1 if the individual resides in the southern U.S. and 0 otherwise	28.37%* (45.39)	23.31% (42.22)	31.39%* (46.68)	26.45% (44.13)	30.77%* (46.75)	25.90% (44.35)	38.46%* (49.28)	28.48% (45.15)	28.48% (45.15)	38.46%* (49.28)	28.48% (45.15)	
X <sub>9j</sub>	HOURS: the average number of hours worked per week	40.38 (2.46)	40.83 (3.40)	41.17 (4.26)	40.95 (3.48)	41.18 (2.91)	42.93 (5.71)	41.82 (4.91)	42.47 (5.30)	42.47 (5.30)	41.82 (4.91)	42.47 (5.30)	
X <sub>10j</sub>	UNEMPLOYED: industry unemployment rate	3.20%* —	6.45% (2.78)	3.90%* —	7.54% (3.27)	3.20%* —	5.97% (3.27)	3.90%* —	76.89% (3.27)	76.89% (3.27)	3.90%* —	76.89% (3.27)	
X <sub>11j</sub>	UNION: union participation rate	47.10%* —	36.22% (16.14)	44.80%* —	33.75% (15.57)	47.10%* —	39.67% (16.14)	44.80%* —	36.01% (15.57)	36.01% (15.57)	44.80%* —	36.01% (15.57)	
X <sub>12j</sub>	INDUSTRY CONCENTRATION: average weighted concentration ratio	50.00%* —	35.73% (16.73)	52.35%* —	34.67% (16.34)	50.00%* —	37.42% (16.73)	52.35%* —	36.01% (16.34)	36.01% (16.34)	52.35%* —	36.01% (16.34)	
Number of observations		74	1094	86	1119	39	2063	39	1920	39	2063	1920	

#Standard deviations are presented in parentheses  
\*Statistically significant mean wage differentials between airline and manufacturing workers at the .05 percent level  
\*\*Statistically significant mean wage differentials between airline and manufacturing workers at the .01 percent level

of airline employees can be represented as follows:

$$(2) \quad w_a = (1 - \theta)f(Z)$$

where  $\theta$  is the percentage difference between airlines and other workers' wage levels. Therefore the wage level for a group of airline workers and other workers that have similar personal characteristics and are employed in industries with similar market characteristics can be expressed as follows:

$$(3) \quad [w = (1 + \theta)^d(f(Z))]$$

where 'd' is a dichotomous variable equaling 1 if the employee works for the airline industry and 0 otherwise. Taking the natural log of both sides of equation (3) and expressing the equation in a stochastic form gives equation (4) shown below, which is analogous to Equation (1).

$$(4) \quad \ln(w_{ij}) = d(\ln(1 + \theta)) + \ln(f(Z)) + e_{ij}$$

where the estimate of

$$B_1 = \ln(1 + \hat{\theta}), d = x_{1,ij}, \text{ and } \ln(f(Z)) = \sum_{h=2}^{12} B_h x_{h,ij}$$

Solving for the estimate of the wage differential between airline workers and other workers reveals that  $\hat{\theta} = \exp(\hat{B}_1) - 1$ .

### Data

The three digit standard industrial classification (SIC) and the two digit census occupation classification for craft and clerical workers are the units of observation for the interindustry wage differential estimation.<sup>6</sup> Examining wage levels of a more detailed occupational category would reduce wage variation resulting from differences in job duties, but observing wages of craft and clerical workers allows the use of a large sample population. This caveat is taken into consideration when interpreting the wage results of airline employees. The 3 digit SIC covers 75 manufacturing industries and airlines. The weekly wage level of full-time employees is used to estimate wage differentials. Full-time employees are classified as individuals reporting to work at least 35 hours a week for more than 47 weeks a year.

Information used to measure changes in airlines workers' wages were obtained from three sources. Data from the 1977 and 1984 March and May Current Population Survey (CPS) provide information about the personal characteristics, weekly wages, employment status, and geographic location of employment for 1168 clerical workers and 2102 craft workers in 1977, and for 1205 clerical workers and 1959 craft workers in 1984. These observation periods permit the comparison of labor activity before and after significant regulatory change. Union participation estimates are calculated from CPS information. Industry concentration data are obtained from the 1977 and 1984 Census of Manufactures. The concentration ratios are weighted averages, which use the value added shipment of 4 digit industries as weights. Airline industry concentration ratios are constructed from data compiled in the "1977 and 1984 Air Transportation Annual Report." The Bureau of Labor Statistics provides data measuring industry unemployment rates.

### Possible Problems of Estimation

An ordinary least squares (OLS) procedure is commonly used to estimate equation (1); however, this statistical technique may yield parameter estimates that are inefficient, or biased. Inefficient parameter estimates occur when using the OLS estimation procedure if the error terms associated with industries composed of a few large firms have larger variances than the error terms related with industries that comprise many small firms. Concentrated industries typically consist of a few large firms that vary in their ability to pay high wages whereas industries with many small firms are likely to pay competitive

equilibrium wage levels. The Goldfeld-Quandt F-score is calculated for each occupation to test the validity of the hypothesis that OLS parameter estimates are inefficient. The 1977 F-scores are 1.29 for clerical and .89 for craft workers. 1984 F-scores are 1.47 for clerical workers, and .459 for craft workers.<sup>7</sup> These statistical results do not support the hypothesis that the OLS estimates are inefficient. The low F-scores may be indicative of union wage contracts for large firms that stipulate uniform wages for workers with similar work experience and occupational status.

The possibility that the level of industry unionization, and concentration are correlated will result in imprecise estimations of these parameters. The positive correlation between concentration and unionization are the likely outcome of the relative ease of organizing industries that consist of a few large firms.<sup>8</sup> Condition indices for the explanatory variables' principal component are presented in Table 2 to provide information about the severity of the collinearity. The results indicate that for 1977 and 1984, other than the age-squared principal component, the value of the condition index for each occupation is less than 30. The 1977 index for the age-squared principal component is 71.50 for clerical workers, and 80.20 for craft workers. 1984 calculations reveal that this condition index is 81.30 for clerical workers, and 86.24 for craft workers. Belsley (1985) indicates that a condition index value over 30 combined with the principal component of the index attributing to over 50 percent of the variance for two other coefficients suggests the existence of harmful levels of collinearity. The age-squared principal component, however, is only associated with over 50 percent of the variance of the age coefficient. This nonsupportive evidence for harmful collinearity may be the outcome of the large sample size and the inclusion of other relevant wage determinants in the wage equation.

It has been argued that union coverage is not exogenously determined in the wage model.<sup>9</sup> Besides providing a situation where workers are likely to be paid high wages, unions may find it easy to organize high wage industries. If this is the case, then the OLS estimation procedure will overstate the unionization wage effect. A regression specification error test (RESET) is used to investigate the existence of harmful simultaneity. This procedure also tests for the omission of variables and the misspecification of the functional form of the equation. The RESET F-scores for clerical workers are .772 for 1977 and 1.0930 for 1984.<sup>10</sup> Results of the RESET procedure for craft workers are .496 for 1977 and .523 for 1984. These statistical results do not support the hypothesis that the OLS estimates are biased. It is likely that the inclusion of wage determinants other than the level of industry unionization are comprehensive enough to yield unbiased estimates of the union coverage parameter.

TABLE 2  
Measures of Collinearity

Explanatory Variables	Condition Indices			
	Clerical		Craft	
	1977	1984	1977	1984
Intercept	1.00	1.00	1.00	1.00
Airlines	2.77	2.80	2.65	2.62
Married	3.10	3.19	2.74	2.85
Gender	3.93	4.22	3.10	3.15
Race	4.85	4.94	5.13	5.28
South	8.93	6.08	7.30	6.32
Age	47.94	46.5	31.25	31.61
Age-Squared	71.50	81.30	80.20	86.24
Schooling	11.32	10.14	11.013	9.989
Hours	23.19	24.11	16.94	18.14
Unemployed	9.09	7.66	15.56	14.33
Union	14.17	10.66	10.54	9.98
Industry Concentration	10.87	12.98	12.65	12.55

## CHANGES IN INTERINDUSTRY WAGE DIFFERENTIALS

Estimated wage differentials for 1977 between airline and other workers that control for differences in workers' personal characteristics, their region of workplace, the number of hours they work a week, and the industry unemployment rate where they are employed are presented in column 2 of Table 3. All of the coefficient estimates for the explanatory variables have the expected signs for both occupations. Other than the wage variation resulting from differences in race and marital status for clerical workers, the coefficients estimates are statistically significant. Coefficients measuring the relationship of wage levels with employees' marital status, age, years of education, hours worked per week and gender are statistically significant for craft workers. Wage results for 1977 also indicate that the sign of the parameter estimates measuring the relationship of wage levels with the industry unemployment rate and workers' region of workplace are negative and statistically significant for both occupations.<sup>11</sup>

After controlling for the differences of the personal characteristics of workers, their region of workplace, their hours worked per week, and the industry unemployment rate where they work, the difference between the wage levels of airline workers and other workers fell from a mean wage differential of 34.00 percent higher airline wage levels to 17.14 percent higher wage levels for airline clerical workers. Similarly, after considering these wage determinants, the differential between airline employees classified as craft workers and their counterparts in manufacturing fell from a mean wage difference of 33.70 percent to 23.55 percent. The compression of the difference between airlines and other workers wage levels supports the view that the mean wage measurement overstates this wage differential. The estimation results also indicate that, in 1977, airline workers received statistically significant higher wages than similar workers employed in industries with similar economic conditions, suggesting that factors beyond differences in workers' personal characteristics, their region of workplace, and the unemployment rate in the industry where they work contributed to the high wage national wage position in airlines.

Column 3 of Table 3 provides the 1977 wage estimation results after also considering interindustry variation of the labor and product market structure. Coefficient estimates measuring the relationship of wage levels with union participation rates and industry concentration levels are positive and statistically significant. This finding supports the assertion that highly unionized industries consisting of a few large firms are more likely to grant organized workers high wages.<sup>12</sup> Including the market structure variables in the wage estimation procedure results in a reduction of the airline wage premium for clerical workers from 17.14 to 13.38 percent for clerical workers, and 23.55 to 18.72 percent for craft workers. The smaller airline wage premium estimates indicate that high national levels of union participation and industry concentration attributed to the higher wage levels of airline workers in 1977. Although airline wage premiums are smaller when interindustry differences in the union participation rates and product market structure are considered, the differences between the wage levels of airlines and other workers are statistically significant. This wage finding comports well with the hypothesis that an industry, such as the airlines, that receives rate regulation where commissions set minimum fares is less resistant to union wage demands.<sup>13</sup>

Estimates in column 5 of Table 3 reveal that in 1984 the difference between the wage levels of airline workers and other workers fell when the interindustry variation of employees' personal characteristics, location of employment and industry unemployment rate were considered. The coefficient estimation of these wage determinants are statistically significant with the expected signs. Except for the increased statistical significance of marital status and the declining significance of the unemployment rate, the 1984 coefficient estimates for clerical workers' personal characteristics and region of workplace are similar to the 1977 estimates. All the explanatory variables are significant for craft workers for both years. A comparison of the 1977 and 1984 wage estimates indicate that the high wage levels of airline employees relative to other workers with similar characteristics fell from percentage differentials of 23.55 in 1977 to 6.99 in 1984 for craft workers and the same measurement fell from 17.14 to 11.32 for clerical workers. After pooling information from the 2 observation years, the comparison of the 1977 and 1984 airline wage premium for workers with similar characteristics indicates that the compression of the wage premium is statistically significant for craft workers but not for clerical workers.<sup>14</sup> In the sample population most

TABLE 3  
1977 and 1984 Estimates of Airline and Manufacturing Wage Differentials

Occupations	1977			1984		
	Mean wage differentials	Wage differences after controlling for differences in personal characteristics, hours worked, location of employment, and industry unemployment rate	Wage differences that consider differences in industry and personal characteristics, hours worked, location of employment, and industry unemployment rate	Mean wage differentials	Wage differences after controlling for differences in personal characteristics, hours worked, location of employment, and industry unemployment rate	Wage differences that consider differences in industry and personal characteristics, hours worked, location of employment, and industry unemployment rate
Clerical	34.00**	17.14**	13.38**	18.58*	11.32*	0.0156
Craft	33.70**	23.55**	18.72**	19.53*	6.99	0.0729

\*Significant at the 5 percent level for a two tailed test.

\*\*Significant at the 1 percent level for a two tailed test.

clerical workers employed in the airlines industry are ticket reservation agents. It may be the case that their job responsibilities command higher wages than their counterparts employed in other clerical positions. Ticket reservation agents are not employed by non-airline industries in the sample population.<sup>15</sup>

Differences between the wage levels of airlines employees and other employees, in 1984, decreases further after also controlling variation in interindustry union participation rates and concentration levels. Estimation results in column 6 of Table 3 indicate that, when differences of these industry characteristics are considered, the airline wage premium falls from 11.32 percent to .0156 for clerical workers. Similarly, controlling for differences in the industry characteristics results in the reduction of the estimated wage differential between craft workers in airlines and manufacturing from 6.99 percent higher wage levels for craft workers in airlines to .0729 percent lower wage levels than their counterparts in manufacturing. The 1984 wage findings support Hendricks' prediction that the high levels of unionization and concentration would continue to contribute to high airline wage levels. Even though these industry characteristics contribute to the high national wage position of the airlines industry, the resulting wage differential estimates that occur when these wage determinants are considered, indicate that in 1984 craft and clerical workers in airlines received wages similar to their counterparts in highly unionized and concentrated industries. This was not the case in 1977. Results from pooling 1977 and 1984 information indicate that the decline of the airline wage premium is statistically significant for both occupations.<sup>16</sup> The different wage findings for 1977 and 1984 are consistent with the view that compared to the past, the bargaining position of organized labor in airlines has weakened, but organized workers employed in the airlines industry are still in a better financial position than workers employed in less concentrated industries that have small union memberships.

## SUMMARY AND CONCLUSIONS

Earlier work by Hendricks (1980), using data for 1970, finds that airline workers received above average wages and that the characteristics of the workforce, and the high levels of union participation and industry concentration were major factors contributing to this wage position. Results of this study support his findings. Moore (1986), Card (1986), Cappelli (1985) and Northrup (1984) find that, by 1983, the mean wage level in airlines was still substantially higher than the national average. 1984 findings from this study suggest that the employment of workers with more years of schooling and facing better than average economic conditions, as measured by the low unemployment rate, in airlines provide good explanations for the high national wage levels in this industry. This is the expected wage level outcome of deregulation. However, as Hendricks predicted, the 1984 findings also substantiate that in a highly concentrated industry with a large number of organized workers, employees could continue to receive above average wages after deregulation. Even though these industry characteristics contribute to the high national wage position of the airline industry, since 1984 airline workers received wages similar to their counterparts in other highly concentrated and unionized industries. Airline employees' inability to maintain their high wage position over other industries with similar labor and product market structures may be indicative of the lack of industry wide labor contracts in this industry and the federal government's less lenient response to strikes by air traffic controllers.

## NOTES

1. The average profit margin of the major domestic carriers fell from a high of 15.23 percent in 1978 to a low of 4.86 percent in 1982. The shrinking profit margin that followed deregulation reveals the vulnerability of these carriers to increased competition and to changes in the business cycle. *Source:* Standard and Poor's Industry Surveys, October, 1985.
2. Ehrenberg (1979) considers labor costs to be excessive on average across occupations if the wage rates of an industry exceed the average wage rates for other workers with similar personal characteristics.
3. Before airline deregulation, air carriers were covered by the Railway Labor Act, which required collective bargaining representation by employee "craft or class." The provisions of this act were administered by the National Mediation Board. Under this administration labor relations in airlines were characterized by competition

- among unions and the proliferation of bargaining units across carriers. Hendricks (1980) estimates the formulation of 115 bargaining units in this industry.
3. Information used to measure industry unemployment rates is provided by the Bureau of Labor Statistics.
  4. Low regional wage levels in the southern U.S. are indicative of the lower cost of living in this region. See Dillion and Gang (1987). High wages for married workers arises if employers view this characteristic as an indication of greater worker job attachment. See Horton-Tremblay (1987) for further discussion on this subject.
  5. The difference between the wage equation specified by Hendricks and the equation used in this study is the inclusion of an union-concentration interaction term by Hendricks, and his exclusion of the unemployment and work location measurements. The union-concentration interaction term is excluded from the wage estimation to avoid the introduction of collinearity. Also, when the interaction term is considered it is statistically insignificant.
  6. Aircraft mechanics are considered craft workers. Ticket reservation agents, secretaries and stenographers are classified as clerical workers.
  7. Industries with a concentration ratio less than 30 are identified as having low concentration ratios in 1977. 460 of the clerical workers and 836 of the craft workers in the sample population are employed in these industries and the respective error sum of squares from the regressions are 63 for clerical workers and 110 for craft. Industries with a concentration ratio greater than 40 constitute highly concentrated industries and employed 490 of the clerical workers and 827 of the craft workers in the sample population. The corresponding error sum of squares from each regression are 86.80 for clerical and 97.06 for craft. The same values for the concentration ratios are used to identify the high and low levels of industry concentration in 1984. 444 clerical workers and 742 craft workers in the sample population are employed in the industries with low concentration ratios; and 414 clerical workers and 726 craft workers are employed in highly concentrated industries. The 1984 error sum of squares for the low concentration regressions are 165 for clerical and 298 for craft. Error sum of squares for the highly concentrated industries are 265 and 127 respectively for clerical and craft workers. This information is used to calculate the Goldfeld-Quandt F-score.
  8. The unionization-concentration correlation coefficient has the value of .446 in 1977 and .412 for 1984 and is statistically significant at the one percent level.
  9. See Hirsch and Berger (1984) and Ashenfelder and Johnson (1972) for further discussions on the simultaneity between unionization and wage levels.
  10. The RESET procedure as suggested by Ramsey (1974) is used to investigate the simultaneity hypothesis. See Loeb (1977) for further presentation of this specification test.
  11. Work location and unemployment rate estimates are reflective of the resultant higher wages from better economic conditions.
  12. The positive relationship between the industry concentration and wage levels are consistent with the findings of Freeman (1983), Karrier (1985) and Salinger (1984).
  13. Hendricks (1977), finds that airline and trucking employees received higher wage levels than their counterparts in regulated industries where a maximum rate was set.
  14. The t-statistic calculated to test the hypothesis of significant changes in the airline wage premium from 1977 to 1984 was 1.450 for clerical workers and 2.018 for craft workers.  
An f-test comparing the pooled regression with separate regression for the two years is distributed as  $F(10, 2341) = .052973$  for clerical workers and  $F(10, 4038) = .023957$  for craft workers. These results suggest that the hypothesis of coefficient homogeneity across years cannot be rejected for the two observation periods at the .01 level.
  15. 36 percent of the clerical workers employed in the airlines industry in the 1984 sample are ticket reservation agents.
  16. T-statistics calculated to test the hypothesis of significant changes in the 1977 and 1984 wage differentials between airline and other workers after controlling for interindustry differences in industry concentration and union participation rates is 2.237 for clerical workers and 2.485 for craft.  
A test for significant change from 1977 to 1984 in the relationship between wage levels and explanatory variables other than airline wage premiums is not significant. The f-statistic used for this test is .0057829 for clerical workers, which is distributed at  $f(12, 2333)$  and is .015922 for craft workers, which is distributed at  $f(12, 4043)$ .

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