THE IMPACT OF POST-PATCO LABOR RELATIONS ON U.S. UNION WAGES

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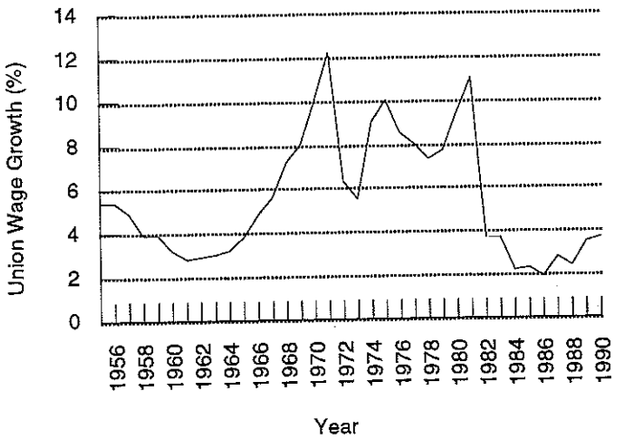
INTRODUCTION

A secular decline in union membership has been underway for more than forty years. Nevertheless in the 1980s there seems to have been a qualitative shift in the power of unions which is independent of their secular decline. Before the 1980s labor-management relations tended to rely on a 'soft strategy' of negotiation and persuasion in trying to settle labor disputes. When disputes occurred, firms used managers or temporary workers to replace striking workers. However, beginning in the 1980s a 'hard strategy', which relies on coercion and the threat of unemployment, has replaced the 'soft strategy'.[1] Its hallmark is the use of permanent replacement workers to end or prevent strikes.

The right of employers to replace striking workers was granted by the 1935 National Labor Relations Act and reaffirmed in a 1938 Supreme Court decision: The National Labor Relations Board (NLRB) vs. Mackay Radio and Telegraph Co. The Mackay decision held that employers had the right to replace strikers when a strike was for economic reasons (i.e., for higher pay or improved benefits). Despite its legality since 1935, replacing stricking workers permanently was not widely practiced before the 1980s [Wachter and Carter, 1989]. According to Bandazak [1992], firms had largely avoided using permanent replacements because they judged it to be unmanageable and bad for public image. However, the August 1981 dismissal and replacement of striking members of the Professional Air Traffic Controllers Organization (PATCO) coincided with a sharp change in U.S. labor policy. Siegel [1984], Reich, [1993], Esteicher [1994] and Spriggs [1991] argue that the firing of the PATCO workers sent employers a message that the hiring of permanent replacement workers was an acceptable business practice.

In the aftermath of the PATCO strike firms have used permanent workers in several high profile strikes (Greyhound, Continental Air, Phelps Dodge, Boise Cascade and Diamond Walnut). Still, whether or not the use of permanent replacements has increased in the 1980s and 1990s is the subject of debate. A Government Accounting (GAO) [1991] report looks at the use of replacements in 1985 and 1989 and concludes that there was no significant increase. Arguably, the GAO report looks at strikes in only two one-year time periods in the 1980s, and more importantly, does not com-

FIGURE 1
Union Wage Growth



pare the use of permanent replacements in the 1950s, 1960s and 1970s with their use after the PATCO strike. Wachter and Carter [1989] argue that management practices changed significantly in the 1980s and that increased use of permanent replacements is at the heart of this change. They argue, although direct evidence is not available, that evidence of growing numbers of union decertifications and changes in the intensity of strikes are supportive of their claim. LeRoy [1995] also found that strikes in the 1980s lasted longer and involved more strikers and replacements than strikes in the previous three decades. In fact, he concludes that in the 1980s a growing number of employers have either used permanent replacements or stated their intention to use permanent replacements. This conclusion is supported by a 1990 survey of 204 employers by the Bureau of National Affairs, in which 80 percent of the respondents said they would consider hiring permanent replacements in a labor dispute [Bandazak, 1992]. Clearly, for most types of labor the perceived threat that workers will be permanently replaced if they go on strike has risen.

In addition to the replacement of the PATCO workers, a series of other decisions have helped transform the labor relations landscape in the United States. The Reagan Administration began transforming the manner in which labor law was interpreted and enforced by the executive branch by appointing National Labor Relations Board members who were far more sympathetic to the interests of employers and less so to the interests of organized labor [Comstock and Fox, 1994]. The Supreme Court has also shifted the balance of labor law in favor of employers in two decisions, TWA vs. IFFA and Belknap vs. Hale, both involving replacement workers [Spriggs, 1991]. Further evidence of the change in labor-management policy in the aftermath of the PATCO

strike is the fact that organized labor waited until the 1980s to call for passage of a bill, The Workplace Fairness Act, to overturn the Mackay decision and outlaw the use of permanent replacements [Miller, 1990].

These changes in federal policy seem to signal a shift in the bargaining power toward management relative to unions. Although federal policy may have had a significant impact on union wage growth and on average wage levels of union members, it may not have been the initial source of this shift in the balance of power. Rather, the labor policy changes may have resulted from transformations in the political power of management relative to unions, particularly in light of the long-term decline in the percentage of the labor force (and therefore the electorate) that was unionized. Furthermore, these policy changes may have simply been one symptom of a critical juncture in the private labor markets themselves, which left management with greater bargaining power relative to unions. Regardless of the sources of any shift in labor relations, the scope of our analysis remains the same, to evaluate whether such a shift occurred which impacted union wage growth beginning in 1981.

Our analysis tests the hypothesis that the PATCO strike marked a point in time which brought a significant increase in bargaining power by management relative to labor unions. If so, this would be measurable by a significant dampening of rates of union wage growth, lower average union wages, and reduced accumulated wage payments. As can be seen in Figure 1, union wage growth declined precipitously after 1981. However, a simple comparison of wage growth rates before and after the PATCO strike cannot distinguish whether this decline can be attributed to the usual economic determinants or to a structural shift in relative bargaining power.

To obtain estimates which separate the effects of a structural shift coincident with the PATCO strike from those of other factors (such as the general decline in union strength and the recession of 1982), we employ two different procedures. In the first, data from the period 1954-90 are used to estimate two different Phillips Curve union wage growth equations, each of which measures the impact of the PATCO strike via a dummy variable. Both equations produce estimates which indicate that the PATCO strike had a statistically significant negative impact upon union wage growth rates. The second method forecasts union wage growth for the period 1982 to 1990, via two Phillips curve models, which are estimated with data from 1954 to 1981. The results overproject the union wage growth rate and the average union wage level for the period. Both of the forecasted series indicate that wage growth was initially impacted strongly by the events surrounding the PATCO strike, but that this impact diminished somewhat by the late 1980s. We then use the forecasts to calculate estimates of the difference between actual average wage payments to the typical unionized worker and their respective forecast values and the difference between the forecast and actual accumulated wage bills from 1982 to 1990. These estimates indicate that total wage payments to union workers were significantly lower than they would have been under pre-PATCO conditions.

Although the focus of this analysis is wage growth among union workers, it should be noted that recent estimates of wage growth rates for the entire labor force using Phillips curve equations have uniformly overpredicted actual wage growth rates for

the early to mid 1980s [Mitchell, 1987; Vroman and Abowd, 1988]. These findings have sparked a discussion of the possible development of a structural shift in the Phillips curve, and whether such a shift may have been precipitated by a reduction in the relative bargaining power of labor unions in the United States beginning with the PATCO strike at the end of 1981.

In an empirical test of this hypothesis, Neumark [1993] includes a post-1980 dummy variable as well as measures of union density, decertification election win rates, certification election win rates, and work stoppages in a Phillips curve model to see if these measures of union strength significantly impact the wage growth rate for all labor in the United States. The resulting estimates of his tests indicate that there is no significant relationship between union strength and wage growth rates. Moreover, the post-1980 dummy variable indicate that there was not a statistically significant change in the relationship between union strength and wage rate increases in the 1980s. These results imply that the above mentioned shift in the Phillips curve could not have been caused by declining union strength.

Our analysis tackles a different question than Neumark's: we concentrate on wage growth for the unionized labor force as opposed to the entire labor force. Given the size of the unionized work force relative to the entire U.S. labor force, changes in union strength may significantly impact union wage growth without significantly influencing overall wage growth. Thus the finding that the PATCO strike had a significant impact on union wages is not inconsistent with Neumark's results.

MODELS AND ESTIMATES

One manner in which we evaluate the relationship between the PATCO strike and increases in union wages is to augment a single equation Phillips Curve model of union wage growth, as discussed, by adding a dummy variable which gauges this relationship. Two versions of the Phillips Curve model of union wage growth are used to estimate this relationship. Both include a dummy variable which measures any structural change in union wage growth that occurred immediately after 1981 (PATCO members were fired in August of 1981).

The first model is a simple augmented Phillips curve representation of wage growth:[2]

$$(1) \qquad \dot{w}_t = \alpha + \beta_1 PATCO_t + \beta_2 ur_t + \beta_3 \dot{p}_{t-1} + \beta_4 s_t + \beta_5 t_t + \beta_6 f_t + u_t,$$

where $\dot{w}_t$ is the growth rate of union wages, $PATCO_t$ is a dummy variable, equal to zero from 1954 through 1981 and one afterwards; ur_t is the U.S. unemployment rate; $\dot{p}_{t-1}$ the lagged inflation rate; s_t the union strike rate (which is defined as the ratio of the number of union work stoppages to the number of union workers); t_t a time trend; f_t a dummy variable which accounts for federally mandated wage and price freezes instituted during the Nixon Administration; and u_t a normally distributed stochastic error term. As with other analyses of wage growth, β_2 and β_3 are expected to be negative and positive, respectively. β_2 should be negative by the empirically supported proposition that higher unemployment rates induce workers to moderate their wage expectations while β_3 should be positive because workers form their wage expectations in large part from the inflation rate. β_4 is expected to be positive by the hypothesis that a higher strike rate is indicative of greater union strength, which on average enables unions (whether each individual union is striking or not) to garner higher wage increases. The sign of the parameter for t_t, which is included to control for any time related factors that impact union wage growth and are not specifically included in the model, is indeterminate. The variable f_t is a dummy variable equal to one for the years 1972 and 1973 and zero otherwise, so β_6 should be negative under the assumption that the federally mandated price freezes stop union wage growth. The focus of our analysis is the sign of β_1. If the PATCO strike had a significant negative effect on union wage growth, β_1 will be negative; if not, β_1 will be greater than or equal to zero.[3]

To provide an additional test of the hypothesis, we also estimate the adaptive expectations form of the above model:

$$(2) \qquad \dot{w}_t = \alpha + \beta_1 PATCO_t + \beta_2 ur_t + \beta_3 \dot{p}_{t-1} + \beta_4 s_t + \beta_5 t_t + \beta_6 f_t + \beta_7 \dot{w}_{t-1} + u_t,$$

TABLE 1
OLS Estimates - Dependent Variable: $\dot{w}_t$

Variable	Model (1) Coefficient	Model (2) Coefficient
Constant	-0.1656	0.1338
	(-0.067)	(0.059)
$PATCO_t$	-3.2206	-3.229
	(-2.562)	(-2.829)
$\dot{w}_{t-1}$	—	0.3769
	—	(2.678)
s_t	2.4989	1.6467
	(2.667)	(1.813)
$\dot{p}_{t-1}$	0.5001	0.2590
	(2.620)	(1.678)
ur_t	-0.2424	-0.3319
	(-1.050)	(-1.564)
t_t	0.1294	0.1378
	(2.245)	(2.629)
f_t	-0.1695	-1.9451
	(-0.166)	(-1.709)
R^2	.8278	.8629
Adj. R^2	.7922	.8287
DW	1.412	—
Durbin's h	—	.7636
Std. Error	1.2909	1.1721

(t-statistics are given in parentheses)

β_7 is expected to be positive and less than one by the proposition that greater union wage increases in the previous year will positively impact union wage expectations in the current year.

The results of OLS estimation of equations (1) and (2) are presented in Table 1. The goodness-of-fit characteristics for both equations are relatively strong.[4] The estimated coefficients for the control variables ($\beta_2 - \beta_6$) in equation (1) all have the expected signs and, with the exception of the coefficients for the unemployment rate and federal price freezes, differ significantly from zero at $\alpha = .05$. The estimated value for β_1 is -3.2 which implies that union wage growth rates were on average 3.2 percent lower after the PATCO strike than before, after controlling for other economic determinants of union wage growth. This coefficient estimate is statistically different from zero at the 95 percent level of confidence.

The estimated coefficients for the adaptive expectations model (equation (2)) all have the expected signs and, with the exception of the lagged inflation rate and the unemployment rate, are significantly different from zero at $\alpha = .10$. The inclusion of lagged union wage growth in the adaptive expectations model improves the model's overall fit and diminishes the estimated impact of inflation on union wage growth as compared with the simple wage growth model. Again, the estimated value for β_1 indicates that on average post-PATCO union wage growth rates were 3.2 percent below their pre-PATCO levels, after controlling for other economic determinants of union wage growth. This parameter estimate is statistically different from zero at the 99 percent level of confidence.

The resulting estimates of models (1) and (2) provide strong evidence that the replacement of striking PATCO members in 1981 was a watershed event in the history of U.S. labor relations. Both models demonstrate that, after accounting for the other economic factors that typically determine wage growth, average negotiated union wage growth rates were significantly dampened by a structural shift in their determination which occurred concurrently with the PATCO strike.[5] Although the above analysis is useful for evaluating the average difference between the periods surrounding the air traffic controllers' strike, it does not support any conclusions about the dynamic behavior of wage growth. In particular, was the structural shift in labor relations temporary or permanent? The analysis that follows enables us to determine the length of time over which the structural shift lasted and to estimate its impact on average wages and total wage payments.

THE FORECASTS

The second method estimates the same two Phillips Curve models (without the PATCO dummy variable) in conjunction with the time series prior to the PATCO strike to forecast union wage growth rates for the period following the strike:

(1a) $$\dot{w}_t = \alpha + \beta_1 ur_t + \beta_2 \dot{p}_{t-1} + \beta_4 s_t + \beta_4 t_t + \beta_5 f_t + u_t,$$

TABLE 2
OLS Estimates - Dependent Variable: $\dot{w}_t$

Variable	Model (1) Coefficient	Model (2) Coefficient
Constant	0.0359	0.9549
	(0.012)	(0.404)
$\dot{w}_{t-1}$	—	0.5895
		(3.871)
s_t	2.6817	1.4290
	(2.408)	(1.520)
$\dot{p}_{t-1}$	0.6232	0.3593
	(3.519)	(2.277)
ur_t	-0.2557	-0.4205
	(-0.836)	(-1.703)
t_t	0.0829	0.0499
	(1.157)	(0.827)
f_t	0.1924	-2.2830
	(0.163)	(-2.009)
R^2	.7890	.8730
Adj. R^2	.7411	.8349
DW	1.398	—
Durbin's h	—	.3968
Std. Error	1.4002	1.1097

(t-statistics are given in parentheses)

(2a) $$\dot{w}_t = \alpha + \beta_1 ur_t + \beta_2 \dot{p}_{t-1} + \beta_4 s_t + \beta_4 t_t + \beta_5 f_t \beta_6 \dot{w}_{t-1} + u_t,$$

If the PATCO strike did, in fact, mark a structural shift in U.S. labor relations, the actual annual union wage growth rates will be significantly below the forecasts. Comparison of the forecasts with actual data for the 1982-90 period can also yield estimates of the magnitude of post-PATCO labor relations on average union wages. These estimates are then used to calculate the impact on total wage payments made to union laborers.

The resulting estimates of the two equations are presented in Table 2. For the simple wage growth model, the goodness-of-fit characteristics are fairly strong. The parameter estimates for the unemployment rate, federal price freezes, and time trend are not significantly different from zero, but the other key economic variables do differ statistically from zero at $\alpha = .05$. The goodness-of-fit characteristics for the adaptive expectations model are stronger, and with the exception of the parameter estimates for the strike rate, unemployment rate, and trend variables, are significantly different from zero at the 90 percent level of confidence. The unconditional forecasts are presented alongside the actual union wage growth rates in Table 3.[6] Those observations which lie outside the 90 percent confidence interval around each

TABLE 3
Actual and Forecasted Wage Growth Rates

Year	Actual $\dot{w}$	Model (1a) $\dot{w}$	Model (2a) $\dot{w}$
1982	3.7	7.97[a]	9.50[a]
1983	3.7	5.37	7.05[a]
1984	2.2	3.94	5.35[a]
1985	2.3	4.69[a]	4.88[a]
1986	1.9	4.60[a]	4.59[a]
1987	2.8	3.51	4.03
1988	2.4	4.74	4.60[a]
1989	3.5	5.34	5.34
1990	3.7	5.72	5.94[a]

a. indicates that the actual value is outside of the 90 percent confidence interval around the forecast value.

TABLE 4
Actual and Forecasted Wage Indices (1981=100)

Year	Actual $\dot{w}$	Model (1a) $\dot{w}$	Model (2a) $\dot{w}$
1981	100.00	100.00	100.00
1982	103.70	107.97	109.29
1983	107.54	113.77	117.29
1984	109.90	118.25	123.50
1985	112.43	123.80	135.95
1986	114.57	129.49	141.67
1987	117.77	134.04	147.77
1988	120.60	140.39	154.25
1989	124.82	147.89	162.05
1990	129.44	156.55	172.15

forecast are denoted. Both models produce forecasts which consistently overpredict union wage growth rates for the 1982-90 period, indicating that union wage growth was significantly retarded by some factor(s) other than its conventional determinants ($\dot{w}_{t-1}$, s_t, $\dot{p}_{t-1}$, and ur_t) beginning with the period immediately following the PATCO strike. Furthermore, the magnitude by which both models overforecast wage growth tends to decline over the forecast period, indicating that the negative impact upon union wage growth rates diminished over time.

Additionally, the average wage level presents an alternative indicator of the impact of post-PATCO labor relations on union workers. Table 4 presents the actual union wage index (base 1981=100) along with the wage indices resulting from the two

forecast series of wage growth rates. Both of the forecast series predict that hourly wages would have been substantially higher than union wages actually were by 1990. In order, the forecast series using model (1) predicts that union workers would have earned nearly 21 percent higher wages in 1990 under pre-PATCO conditions, and model (2) projects that union wages would have been 33 percent higher in 1990.

The impact of the PATCO strike on the total wage bill paid by management to unionized labor over the period from 1982 to 1990 can easily be calculated. By computing the difference between the forecast and actual wage indices and summing over the time series, it is possible to obtain an estimate of the total real wealth transferred from union labor to management. Of course, these estimates only represent the *average* accumulated income loss for union labor. For the first set of forecasts union workers would have accumulated an additional $1.31 (in constant 1980 dollars) from 1982 to 1990 for every dollar earned in 1981. So, an employee who earned $15,000 in 1981, would have accrued an additional $19,650 in 1981 constant dollar wage earnings by 1990 if the conditions determining his or her wage growth had remained the same as those that had existed from 1954 to 1981. The estimated accrued income loss based on the second set of forecasts is $2.23 for ever dollar earned in 1981, or $33,450 for a worker who earned $15,000 in 1981.

THE STRIKE RATE IN THE POST-PATCO ERA

One possible mechanism through which an increase in management bargaining power could have negatively impacted union wage growth is by discouraging strikes. To test this hypothesis, we added the PATCO dummy variable to a model of the union strike rate. If strikes were hindered by post-PATCO labor relations, the parameter estimate for the PATCO dummy variable would be negative. The following equation is estimated via generalized least squares for the period from 1949 to 1990:[7]

$$(3) \qquad s_t = a + b_1 PATCO + b_2 ur_t + b_3 \dot{p}_t + b_4 \pi_t + b_5 d_t + b_6 \dot{n}_{t-1} + b_7 t_t + e_t$$

where s_t represents the union strike rate, π_t is U.S. aggregate corporate profits, d_t is a dummy variable which is equal to one the year following the federally mandated wage and price controls and zero otherwise, $\dot{n}_{t-1}$ is the wage growth rate for the entire labor force, t_t is a trend variable, e_t is the error term and all other variables are defined as above. Since high unemployment rates hinder union effectiveness, b_2 is expected to be negative. High inflation rates contribute to increasing wage expectations on the part of workers, in turn increasing the likelihood that labor-management relations will result in a work stoppage. Therefore, b_3 is expected to be positive. Rising corporate profits are indicative of greater management capacity to meet union appeals, implying that b_4 should be negative. Because the federally mandated wage and price freezes imposed by the Nixon Administration eliminated the possibility of wage increases, unions clearly had little to gain by striking until the following year, indicating that b_5 is expected to be positive. Higher recent wage increases reduce the prospect that unions will need to face the burden of a strike to pursue their interests.

TABLE 5
Dependent Variable: s_t
OLS Estimates - Model (3)

Variable	Coefficient	t-ratio
Constant	1.9407	12.068
$PATCO_t$	-0.0281	-0.049
$\dot{p}_t$	0.0116	.354
$\dot{n}_{t-1}$	0.0546	1.509
ur_t	-0.1254	-3.470
Π_t	-2.5950	-0.707
d_t	0.4605	1.730
t_t	0.0005	1.368
R^2	.8530	
Adj. R^2	.8163	
DW	1.36	
Std. Error	0.2232	

TABLE 6
Descriptive Statistics

Variable	Mean	Standard Deviation
$\dot{w}_t$	6.28	2.75
s_t	12.73	3.41
$\dot{p}_t$	4.58	3.80
ur_t	5.62	1.42
$\dot{n}_t$	5.62	2.24
Π_t (bil. $)	38.98	27.68

Thus, b_6 should be negative. The expected sign for the parameter for t_t, which is included to account for any general trend in the strike rate determination unaccounted for by the other independent variables, is ambiguous. If the PATCO strike signaled a decline in strikes, b_1 would be negative.

Table 5 presents the least squares estimates of equation (3). The goodness-of-fit statistics are strong and the coefficient estimates all have the anticipated signs. With the exception of the inflation rate, profits, and lagged wage growth the coefficient estimates for the economic control variables are statistically different from zero at $\alpha = .10$. The parameter estimate for the PATCO dummy variable is not statistically different from zero, implying that the union wage growth rate must have declined as a result of factors *other than* a change in unions' willingness to strike.

CAVEATS AND SUMMATION

Of course, presentation of these results should be accompanied by several important caveats. As with other studies which use a single point in time to measure a policy change, this analysis is unable to identify the source of the change in union wage growth rates, average wages, and total wage payments. Additionally, this analysis does not control for growth in non-wage compensation such as retirement and health benefits which now represent a greater proportion of total employee compensation than has historically been the case. While this omission may impact the reported estimates, the shift toward non-wage compensation has been a more gradual phenomenon of the late 1980s early 1990s, thus it probably does not explain the wage shifts observed in this investigation.

Taken together, however, the results of this analysis provide fairly strong evidence that events surrounding the PATCO strike of 1981 significantly impacted the wage growth rate and, therefore, the average wage level among union laborers at least in the short-run. Most significantly, all estimates presented in this paper indicate that this in turn reduced the total wage bill paid by management to union labor over the 1982-90 period. Future research could try to pin-point the mechanism through which the changes detailed in this paper occurred.

DATA REFERENCES

The measure used to represent the union wage growth rate variable ($\dot{w}_t$) in this analysis is the annual median rate of change in negotiated wages in major collective bargaining units for private nonfarm industries as published in the *Handbook of Labor Statistics*. The other endogenous variable, s_t, is defined as the ratio of the annual total number work stoppages involving 1,000 workers or more to the total number of union workers. The work stoppage data and number of labor unions is published by the Bureau of Labor Statistics. The U.S. unemployment rate and U.S. corporate profits were published in *U.S. Business Statistics*. The inflation rate is defined as the annual growth rate of the all items CPI-U as published in *U.S. Business Statistics*. Finally the wage growth rate for the entire labor force, , is defined as the growth rate of annual average hourly earnings of private nonagricultural workers as published in the *Handbook of Labor Statistics*. Descriptive statistics for all variables used in this study are given in Table 6.

NOTES

1. For a more complete discussion of the concepts of 'soft strategy' and 'hard strategy' and the underlying conditions which make each strategy viable, see Barbash [1985].
2. The data used to estimate the models are described in the Data References section following the text and tables.
3. An additional specification consideration was whether to include a measure of union participation, such as the percentage of the labor force unionized, as an explanatory variable. However, the parameter estimates for such a variable failed to be statistically different form zero, indicating that the percentage of the labor force organized is not a significant determinant of union wage growth rates

after controlling for other factors. This may be due in part to the fact that the percent of the labor force unionized is already part of the strike rate variable (its denominator is equal to the the percent of the labor force unionized times the labor force).

4. The Durbin-Watson statistic was indeterminate, so the model was re-estimated using the Cochrane-Orcutt procedure. Since the corrected estimates were not substantively different from the uncorrected estimates, the latter are reported here.
5. The two models were also estimated with slope dummy variables included to measure whether the slope coefficients for the unemployment rate, the strike rate, and the inflation rate changed after the PATCO strike. None of the slope dummies differed statistically from zero, indicating that the shift in union wage growth rates was not caused by changes in the ways the usual economic factors determine wage growth. These results are not reported.
6. The forecasts use the actual values of the independent variables with the exception of lagged wage growth in the adaptive expectations model, where we employ the forecast for the previous period.
7. For examples of models of strike incidence, see Vroman [1989] or Paldam and Pedersen [1982].

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