Labor strikes have long held the interest of economic historians, social scientists, industrial relations specialists, and statisticians. The reason is that secular movements and short-term fluctuations in strike activity are an invaluable source of quantitative information about the state of labor-capital relations, working-class militancy, and general socioeconomic unrest. In part because strike participation was commonly viewed during the nineteenth century as a form of criminal activity, but also because strikes are overt, dramatic expressions of discontent, data on industrial disputes have been carefully compiled over long time periods in most industrial nations. The size, duration, and frequency of strikes are of course not the only indices of working-class grievances. Chronic absenteeism, high labor turnover rates, pilferage, work slowdowns, outright sabotage, as well as various kinds of political protest and rebellion, are also significant manifestations of discontent which, unlike strikes, have unfortunately not been recorded with any regularity. Nevertheless, strikes remain an important instrument of collective working-class economic action, and they pose a direct challenge to the authority of management, capital and, increasingly, government in industrial societies.

This study focuses on strike activity during the 1950–1969 period in ten advanced industrial societies: Belgium, Canada, France, Italy, Japan, the Netherlands, Norway, Sweden, the United Kingdom, and the United States. Two considerations motivated the selection of these nations for investigation. First, working-class economic and political organizations, have on the whole been free of direct repression in these societies since World War II, and patterns of labor-management confrontation can therefore be meaningfully compared. Second, reliable data on socioeconomic and political variables necessary for the empirical evaluation of theoretical arguments are available for each of these countries during most of the postwar period.

The main body of the paper has three principal parts. The first section deals with issues of strike measurement and introduces a three-dimensional characterization of strike activity which forms the basis of subsequent statistical analyses. The next section examines trends in industrial conflict in the postwar period and is designed to dispose of the argument that strike activity and labor militancy are “withering away” in advanced industrial societies. The third and most important part of the study develops a number of theoretically plausible statistical models to explain short-term fluctuations in the volume of strikes. The models investigated in this section incorporate a variety of economic and political factors that are commonly believed to influence strike activity. The economic factors include (1) movements in real wages, which are given an expectation-achievement theoretical rationalization; (2) the demand for labor, as indexed by the unemployment rate; and (3) changes in the ratio of aggregate profits to total employee compensation, that is, changes in the relative share of labor vs. capital in the national income. Among the most important political influences evaluated in these models are (1) the incentive of labor-oriented Socialist parties to discourage strike activity on the part of their working-class constituents, which is posited to be a function of the competitive position of labor-Socialist parties in the political system; and (2) the relative size of Communist parties, which are viewed as significant agencies for the mobilization of labor discontent. A fourth and concluding section of the paper reviews the evidence concerning the impact of economic and political factors on fluctuations in industrial conflict and develops some implications of the statis-
tical results for labor militancy in advanced industrial societies and working-class rationality in the use of the strike weapon.

**Strike Measurement**

The International Labor Office compiles and publishes data on three basic components of industrial conflict that are supplied by national labor ministries: number of strikes, number of workers involved (strikers), and number of man-days lost. Annual data on these components are reported for economy-wide totals and for nine separate sectors of economic activity. Since strikes rarely occur in the agricultural sector (and those that do are not recorded with great accuracy), it is sensible to exclude agriculture from international and intertemporal comparisons. The mining sector has also been excluded from this analysis because of the rather special character of labor-capital relations in that industry.\(^1\) Hence this study focuses on aggregate strike activity outside of agriculture and mining.

Following the earlier, seminal work of Forchheimer, Knowles, and Goetz-Girey, and the more recent work of Shorter and Tilly, the basic industrial conflict components are used in conjunction with data on employment to form three theoretically distinct strike dimensions — size, duration, and frequency:\(^2\)

**Size:** Strikers per strike

**Duration:** Man-days lost per striker

**Frequency:** Strikes per 1,000 civilian wage and salary workers.

Each of these dimensions is suitable for cross-time, cross-country analysis; however, it is advantageous to array them into a three-dimensional solid or cuboid that represents the profile or “shape” of strikes in a particular nation during a particular time-period. Figure 1 displays two distinctive, hypothetical strike shapes. 1 (a)


Small proprietors, entrepreneurs, *rentiers* and other self-employed persons are on the whole not relevant to industrial conflict but constitute a significant fraction of the civilian labor force in some nations and time periods. Therefore they have been excluded from the frequency ratio. The self-employed do of course occasionally strike (witness, for example, the strikes by independent French shopkeepers over the government’s profit and price controls in 1973, or the strikes by independent truckers over fuel pricing issues in the United States). However, such events are not included in the industrial conflict data reported to the I.L.O. and are in any case not germane to the line of analysis pursued here.
depicts the profile shown by Shorter and Tilly\textsuperscript{3} to describe nineteenth and early twentieth century strikes in many industrial nations. The typical strike during this initial stage of industrialization was comparatively small in size (few strikers per strike) reflecting the small scale of early establishments; of long duration (many man-days lost per striker) evidencing the bitter, protracted resistance that newly-formed unions encountered from employers; and relatively low in frequency (few strikes per 1000 workers), indicating the rather weak organization and mobilization of the labor force.

Figure 1(b) represents a "modern" strike profile which Shorter and Tilly suggest was more common in the mid-twentieth century. It shows a vastly increased average strike size which was in part produced by the consolidation of industrial establishments, somewhat higher frequency corresponding to the heightened mobilization and organization of the working class, and markedly reduced duration. Hence what might be called the "trench warfare" pattern of infrequent, long, but relatively small strikes that typified disputes between capital and newly organized labor in the nineteenth century seems to have been supplanted by a "guerrilla warfare" pattern of frequent, short, and relatively large "lightning" strikes in more recent decades.

Aside from the structural changes that undoubtedly contributed to this historical evolution of strike profiles (growth in firm size, the extension of labor organization, and so on), there appears to be a rational basis for labor's abandoning the trench warfare pattern of Figure 1(a) in favor of the guerrilla warfare approach in strike profiles may partly reflect a working-class learning process informed by the historical experience of labor-capital struggles.

Contemporary cross-national patterns provide some additional evidence that rational working-class behavior may underlie observed differences in aggregate strike shapes. For example, in France and Italy where the most important unions are essentially Leninist organizations with relatively small memberships and slender financial resources, the guerrilla warfare strike profile of Figure 1(b) is pronounced. Organized labor in these nations could not well withstand long sieges or tests of strength against management and therefore the relatively large, brief, and frequent "lightning" strike prevail.\textsuperscript{5} The strike profiles of the United States and Canada, on the other hand, more nearly resemble the trench warfare pattern of Figure 1(a). Unions in these countries have large dues-paying memberships and as a result command the substantial strike funds necessary to engage in comparatively long trials of strength against management.

Although comparative time-series analysis of strike profiles is a potentially useful line of inquiry, the primary purpose of this paper is to develop statistical models explaining short-run postwar fluctuations in overall strike magnitudes. What we need is a single series that captures the net "damage" or impact of strikes. Perhaps the most suitable index of overall strike activity is the volume of the three-dimensional strike profile. The volume of any cuboid is of course the product of its three dimensions. Accordingly we calculate a quantity akin to the physical concept of volume:

$$\text{Strike Volume} = \frac{\text{Man-days lost}}{1000 \text{ wage and salary workers}} = \text{Frequency} \times \frac{\text{Duration}}{\text{Size}} = \frac{\text{Man-days lost}}{1000 \text{ workers}} \times \frac{\text{Strike}}{\text{Striker}}$$

of Figure 1(b). Although the evidence on this score is slim, Knowles's study of industrial conflict in Great Britain and Peterson's analysis of work-stoppages in the United States indicate that strike outcomes were more likely to be favorable to employers when conflicts were infrequent, long in duration, and small in size, whereas the probability of worker's victory was enhanced when strikes were frequent, short in duration, and large in size.\textsuperscript{4} Thus, the long-term change

\textsuperscript{3}Edward Shorter and Charles Tilly, "The Shape of Strikes in France."


\textsuperscript{5}The contrast between the traditional, war-of-attrition strike familiar to most Americans and the guerrilla warfare strategy described in the text is put into even sharper focus by the description of the latter pattern given by Blumenfeld: "Italian unions, which have no strike funds, have developed a whole range of disruptive activities. Among these are the 'chessboard' strike, involving only selected departments; the 'paybook' strike in which every worker whose paycard carries an odd number engages in disputes on odd days of the week, while workers with even numbers fight out their claims on the even days; and strikes in which blue-collar workers lay down their tools in the morning but return to work after lunch, only to find that the white-collar clerks are out — thus stopping work for an entire day with the loss of only a half a day's pay." See Yorick Blumenfeld, "Industrial Strife in Western Europe," Editorial Research Reports, 21 (June 1971),
Man-days lost from strikes per 1000 wage and salary workers not only has substantial theoretical justification, being the volume of a three-dimensional profile that characterizes strike activity at any time or place, but also has obvious intuitive appeal as a comprehensive index of industrial conflict. Since it represents the net impact of a nation’s overall strike profile it permits comparative, dynamic analyses that are not confounded by changes in a single conflict dimension. Erroneous conclusions about the “withering away” of industrial conflict, which can arise by focusing exclusively on one strike dimension and mistaking decreases in it for decreases in overall strike activity, are therefore avoided. Notice, for example, the reduction in strike duration but not in overall strike volume between Figures 1a and 1b.

A Withering Away of the Strike?

Perhaps the most influential comparative investigation of strike activity is Ross and Hartman’s Changing Patterns of Industrial Conflict (1960). One of the principal conclusions of this study is that industrial conflict has (with few exceptions) virtually “withered away” in advanced industrial societies. Ross and Hartman attribute this decline in strike activity to changes in employer policies, dispute-settlement techniques, governmental functions, and union programs, as well as to the persistence of full employment, the decline of ideology and class bitterness, the improvement of living standards and embourgeoisement of the working class, and to the enormous growth in white collar, professional and service class employment that has accompanied the shift from industrial to “postindustrial” socioeconomic formations.

The following section evaluates a number of these propositions more formally — here we focus directly on the “withering away” thesis. Ross and Hartman construct a large number of strike indices in the course of their analysis, but unfortunately the withering away argument depends heavily on only two measures: man-days lost per union member (“Membership Loss Ratio”) and man-days lost per striker (“Duration”). The former ratio is a particularly weak index from which to draw general conclusions about the time path of industrial conflict. For some countries union membership data are notoriously inaccurate (e.g., France and Italy), and the meaning of unionization differs so greatly across nations that international comparison of a union membership ratio is highly suspect. More important, the general temporal decline Ross and Hartman observe in man-days lost per union member is at least in part an artifact of the union membership rate of growth exceeding that of the total wage and salary labor force during the period of massive labor mobilization treated by their study (1900–1956). In other words, if union membership was growing with respect to time more rapidly than the total wage and salary labor force, then it is possible for man-days lost per union member to exhibit a downward time trend, while man-days lost per worker was holding steady or even increasing through time. Indeed, the data series reported by Ross and Hartman in the appendices of their study indicate this was true in many industrial societies.

Decreases over time in the second index, man-days lost per striker (duration), are of course not artificial, but do not necessarily imply a declining strike volume, as the reduction in strike duration but not overall strike volume between Figures 1(a) and 1(b) illustrates. The most direct way to evaluate the secular evolution of aggregate strike activity is to examine the volume of strikes over time. Figure 2 presents graphs of strike volumes — man-days lost per 1000 wage and salary workers — for each of the ten nations investigated in this paper.

It is apparent from these graphs that despite the substantial growth of postindustrial, service-oriented sectors of economic activity in all of these nations, and notwithstanding the supposed decline of ideology and embourgeoisement of the working-class, there has been no general “withering away” of the strike in the postwar period. The strike volumes of most of the nations in Figure 2 simply do not exhibit any pronounced downward trend. Indeed, long-run time trend analyses of a more formal sort (not reported here) reveal that substantial declines in aggregate strike activity are found only in the smaller democracies of Northern Europe and Scandinavia.* The evolution of postindus-

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* An extensive analysis of twentieth century trends in industrial conflict is given in my paper “Long-Run Trends in Strike Activity in Comparative Perspective,” mimeo., 1976. Aaron’s thoughtful review of the evidence for six European nations, and Erickson and Grofman’s preliminary analyses of long-term trends in fifteen industrial societies also square with the conclusions drawn here. See Benjamin Aaron, “Methods of...
trial social structure, then, does not seem to have resolved the grievances or reduced the militancy of wage labor. As the French sociologist Alain Touraine has observed, "A purely consumer society in which the industrial sector would be very much restricted and the problems of work no longer of interest to leisured wage-earners is sociological fiction. . . . The chiefs of the industrial complex would not be so preoccupied with the problems of labor if they were not worried about new protests and sociopolitical militancy in a milieu they had judged conservative."  

Although the graphs in Figure 2 give no evidence of a general downward movement or "withering" of strike activity, the conflict series do show substantial cross-national variation and year-to-year fluctuation. The next section develops some statistical models designed to account for the short-term fluctuations casually.

**Statistical Models of Industrial Conflict**

A survey of the literature on industrial conflict suggests that most of the factors believed to influence intertemporal and international variations in strike activity can conveniently be partitioned into two broad categories. These are (1) the state of the economy, particularly, movements in real wages, profits, and the demand for labor; and (2) the configuration of parties in the political system, especially the competitive position of labor-oriented parties on the non-Communist left and the extent of Communist Party influence in the work force. This section briefly develops the relevant theoretical arguments, attempts to specify the appropriate structural equations, evaluates the capability of contrasting models to account for postwar (1950–1969) fluctuations in the volume of strikes in

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**BELGIUM**

![Chart](chart.png)

**Figure 2. The Volume of Strikes (Man-Days Lost Per 1000 Workers) in Ten Advanced Industrial Societies 1950–1969**

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Figure 2. Continued
FIGURE 2. Continued

ITALY

JAPAN
Figure 2. Continued

NETHERLANDS

NORWAY

(158)

(885)
SWEDEN

UNITED KINGDOM

Figure 2. Continued
the ten-nation sample, and tests the stability of model parameters across institutionally diverse industrial relations systems.

**Unemployment, Profits, and Real Wages.** It has frequently been argued (although not without qualifications) that the strike is a more effective weapon during periods of general prosperity than during periods of widespread economic hardship. Indeed, there is considerable evidence that strike activity tends to follow the business cycle, increasing at cycle peaks and dropping off during business downturns. Business cycle hypotheses and related propositions are best articulated in terms of unemployment, profits, and real wages.


The level of unemployment is perhaps the most sensitive indicator of general business conditions (countercyclical), and it is natural to expect working-class militancy to vary inversely with it. Low unemployment offers great strategic advantages to an aggressive labor force. A tight labor market means that management will have difficulty replacing potential strikers, who in any case can anticipate good prospects for securing permanent employment elsewhere if employers are able to replace them successfully. Opportunities for temporary or part-time employment during the course of a strike are also likely to be good. The situation is reversed when unemployment is high and there is an excess supply of labor. Strike-breakers are more easily recruited by employers and alternative job opportunities for strikers are reduced.9 Faced

9. It is not really necessary that employers actually replace strikers with great regularity—it is the psychological threat that is important, and this is heightened during periods of high unemployment. For example, after the 1970–71 recession in the United States, *The Wall Street Journal* ran a front page article on the "conciliatory mood" of U.S. workers. The story read in part: "... across the country at large and small companies, workers are choosing to be more conciliatory when faced with the threat of losing their jobs. This is
with decreased product demand, capital is unlikely to be affected adversely by a prolonged work stoppage, and may even welcome an interruption of production in a period of receding profits and excessive inventories. Hence, potential strikers are more vulnerable and militancy is discouraged. Letting $SV$ and $U$ denote strike volume and the level of unemployment, respectively, we therefore would expect $\frac{\partial SV}{\partial U} < 0$.

The effect of profits on strikes is more problematic. From the perspective of working class aggressiveness, the relevant quantity is returns to capital as a ratio of returns to labor, that is, Aggregate Business Profits/Total Employee Compensation. It seems reasonable to assume that when the profit ratio is increasing, workers will escalate their demands and press them more militantly. Other things being equal, this should produce an upward movement in the volume of strikes. However, management is more likely to yield to labor demands in such situations because of the severe opportunity costs of absorbing a strike when markets are expanding and profits are potentially high. As Hicks put it in his classic _The Theory of Wages_, "... when trade is good, the cost of a strike to the employers will be immensely enhanced. Once an employer is making large profits, and expects those profits to continue in the near future, he is an easy mark for union demands. He will nearly always be prepared to make some concession in order to avoid a strike." The net impact of changes in profits on strike activity is therefore uncertain. Letting $\Delta C$ denote the rate of change of the profit ratio, we have $\frac{\partial SV}{\partial \Delta C} \leq 0$.

My specification of the influence of real wages on industrial conflict is based on expectation-achievement theory. The thrust of the theory is that aggressive, violent, or protest behavior is caused in part by a gap between expectation and achievement. Variants of the theory have appeared in all branches of social science. For example, writing of civil violence, Gurr observes: "The fundamental cause of civil strife is deprivation-induced discontent: the greater the discrepancy between what men believe they deserve and what they think they are capable of attaining, the greater their discontent. The more intense and widespread discontent are in society, the more intense and widespread strife is likely to be." Similarly, James Davies has argued that collective disorder "... is most likely to take place when a prolonged period of rising expectations and rising gratifications is followed by a short period of sharp reversal, during which the gap between expectations and gratifications quickly widens and becomes intolerable." In a statement of the theory closer to the topic of this study, the psychologists Krench and Crutchfield have written: "A wage rate is psychologically inadequate, no matter how large in absolute amount, if it results in a wide discrepancy between the worker's level of aspiration and his level of achievement." Although expectation-achievement theory has not received consistent support from empirical studies and tends to understate or ignore altogether the importance of structural factors for conflict behavior, the basic thesis provides a plausible theoretical framework within which to specify the impact of real wage movements on strike activity. Since labor-management conflict

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10 "Real" wages refer of course to money wages deflated for price increases, that is, $R = W/P$ where $R$, $W$, and $P$ denote real wages, money wages, and a price index, respectively. A following section deals with the "money illusion" thesis that labor militancy responds to money wage increases alone.


12 James C. Davis, "The Curve of Rising and Declining Satisfactions as a Cause of Some Great Revolutions and a Contained Rebellion," in Graham and Gurr, p. 671.

typically centers on proportional wage increases rather than wage levels, a reasonable functional form in the present context is

\[
(1) \quad SV_t = \beta_0 + \beta_1(\Delta R_{t-1} - \Delta R^*_{t-1}) + \text{other factors} \]

\[
\partial SV_t / \partial (\Delta R_{t-1} - \Delta R^*_{t-1}) < 0,
\]

where \( SV_t \) = strike volume (man-days lost per 1000 workers)
\( \Delta R \) = actual percentage rate of change of real wages
\( \Delta R^* \) = expected percentage rate of change of real wages.

Strike volume in the current period is therefore hypothesized to be (partly) a function of the disparity between actual and expected real wage changes in the recent past. When \( \Delta R_{t-1} \) exceeds \( \Delta R^*_{t-1} \) strike activity should decrease, whereas if the gap between actual and expected real wage changes runs the other way, strike volume is anticipated to increase.\(^1\)

As things stand \( \Delta R^* \) is unobserved and Equation (1) is not estimable. Since attitudinal (survey) time-series data on labor force real wage expectations do not exist, we need a plausible model that specifies \( \Delta R^* \) in terms of observed quantities. The theoretical and statistical literature on the formation of expectations (expectation generating functions) presents several reasonable alternatives.\(^3\) Consider first the so-called “extrapolative” expectations model:

\[
(2) \quad \Delta R_t^* = \Delta R_{t-1} + \gamma(\Delta R_{t-1} - \Delta R_{t-2}).
\]

The extrapolative expectations model asserts that the expected change in real wages in the current period equals the actual change in the previous period plus a correction to allow for the trend observed over the preceding period. If \( \gamma > 0 \), the labor force expects past trends to continue (extrapolative expectations), whereas if \( \gamma < 0 \) a reversal of past trends is anticipated (regressive expectations). If \( \gamma = 0 \), real wage expectations are static.

Collecting the hypotheses regarding unemployment, profit ratios, and the gap between actual and expected real wage increases yields the following theoretical model:

\[
(3) \quad SV_t = \beta_0 + \beta_1(\Delta R_{t-1} - \Delta R^*_{t-1}) + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t.
\]

Substitution of the extrapolative model of (2) for \( \Delta R^*_{t-1} \) in (3) produces an estimating equation that is composed entirely of observed variables.

\[
(4) \quad SV_t = \beta_0 + \beta_1[\Delta R_{t-1} - (\Delta R_{t-2} - \gamma(\Delta R_{t-2} - \Delta R_{t-3}))] + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t
\]

\[
SV_t = \beta_0 + \beta_1[\Delta R_{t-1} - \Delta R_{t-2} - \beta_1 \gamma \Delta R_{t-2} - \beta_1 \gamma \Delta R_{t-3} + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t
\]

\[
SV_t = \beta_0 + \beta_1(\Delta R_{t-1} - \Delta R_{t-2}) - \beta_1 \gamma(\Delta R_{t-2} - \Delta R_{t-3}) + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t
\]

A second model for expectations is the “adaptive” scheme. As initially formulated by Cagan and Nerlove, this model is

\[
(5) \quad \Delta R_t^* - \Delta R_{t-1} = (1 - \lambda)(\Delta R_{t-1} - \Delta R^*_{t-1})
\]

\[
0 < \lambda < 1.
\]

The conventional adaptive model posits that expectations are revised linearly each period in proportion to some fraction of last period’s forecast error. Hence, current expectations are formed

\(^1\) Even the massive strikes of May–June 1968 in France (which were viewed largely as spontaneous “political” events in many popular and academic accounts) centered in the overwhelming majority of cases around traditional demands for wage increases and were called, promoted, and directed by the usual labor organizations. (See Claude Durand, “Revendications Explicites et Revendications Latentes,” Sociologie du Travail (October–Décembre 1973), pp. 394–409; and George Ross, “French Working Class Politics After May–June 1968: A New Working Class?” Paper delivered at the 1973 Annual Meeting of the American Political Science Association, New Orleans, Louisiana, September 1973. Such strikes of course have important political implications in the sense that they challenge state economic policies designed to hold down the rate of increase of wages and prices.

\(^3\) In the current period \( \Delta R \) is likely to be influenced by \( SV \) and so the model in (1) should be viewed as an abbreviated form of a larger system within which \( \Delta R \) and \( \Delta R^* \) are lagged endogenous variables.

by adapting or modifying previous expectations in the light of previous experience. This implies, however, that if real wage increases are accurately anticipated in the past, expectations are static, that is, when $\Delta R_{t-1} = \Delta R^*_{t-1}, \Delta R^*_t = \Delta R^*_{t-1}$. For our purposes it seems more reasonable to allow for a systematic escalation of labor-force real wage expectations over time. Accordingly, the standard adaptive expectations model is modified to provide for a trend:

\[(6) \quad (\Delta R^*_t - \Delta R^*_{t-1}) = (1-\lambda)(\Delta R_{t-1} - \Delta R^*_{t-1}) + \delta \Delta R^*_{t-1}\]

\[0 < \delta < 1\]

\[0 < (\lambda + \delta) < 1.\]

This model permits current expectations to escalate (or de-escalate) by the trend factor $\delta \Delta R^*_{t-1}$ even if actual and expected real wage increases in the recent past are identical.

Rewriting the modified adaptive expectations model of (6) yields

\[(7) \quad \Delta R^*_t = \Delta R^*_{t-1} + \Delta R_{t-1} - \lambda \Delta R_{t-1} - \Delta R^*_{t-1} + \lambda \Delta R^*_{t-1} + \delta \Delta R^*_{t-1}\]

\[\Delta R^*_t = (1 - \lambda)\Delta R_{t-1} + (\lambda + \delta)\Delta R^*_{t-1},\]

which upon repeated substitution gives

\[(8) \quad \Delta R^*_t = (1 - \lambda) \sum_{i=0}^{\infty} (\lambda + \delta)^i \Delta R_{t-i-1}.\]

The theoretical model for strike volume in (3) corresponding to the revised adaptive expectations scheme in (8) can now be written:

\[(9) \quad SV_t = \beta_0 + \beta_1 \left[ \Delta R_{t-1} - \left(1 - \lambda \right) \sum_{i=0}^{\infty} (\lambda + \delta)^i \Delta R_{t-i-2}\right] + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t.\]

The infinite, geometrically declining lag in $\Delta R_{t-i-2}$ means that (9) is not estimable in its present form. This is readily circumvented by applying the so-called "Koyck transformation." Lagging (9) one period and multiplying through by $(\lambda + \delta)$ we obtain

\[(10) \quad (\lambda + \delta)SV_{t-1} = (\lambda + \delta)\beta_0 + (\lambda + \delta)\beta_1 \left[ \Delta R_{t-2} - \left(1 - \lambda \right) \sum_{i=0}^{\infty} (\lambda + \delta)^i \Delta R_{t-i-2}\right]
\]

\[+ (\lambda + \delta)\beta_2 U_{t-1} + (\lambda + \delta)\beta_3 \Delta C_{t-1} + (\lambda + \delta)\epsilon_{t-1}.\]

Subtracting this expression from (9) produces an empirical estimating function with finite lag.

\[(11) \quad SV_t = \beta_0(1 - \lambda - \delta)
\]

\[+ (\lambda + \delta)SV_{t-1} + \beta_1(\Delta R_{t-1} - \Delta R^*_{t-1}) - \beta_2 \delta R_{t-2}
\]

\[+ \beta_2 U_t + (\lambda + \delta)\beta_3 \Delta C_{t-1}
\]

\[+ (\lambda + \delta)\epsilon_{t-1}.\]

Our final expectation-achievement function has a theoretical basis somewhat different from that underlying the previous models. In this specification, strike activity is determined by the gap between actual real wage changes over several recent periods and the expected long-run increase in real wages.

\[(12) \quad SV_t = \beta_0 + \beta_1(\Delta R' - \Delta R^*) + \text{other factors}
\]

\[\partial SV_t/\partial (\Delta R' - \Delta R^*) < 0,\]

where $\Delta R'$=actual real wage changes over several recent periods

$\Delta R^*$=the expected long-run increase in real wages.

Thus, the volume of strikes is hypothesized to increase or decrease depending on whether the rate of change of real wages during recent years has exceeded or fallen short of labor's long-run expectations.

\[37\] For those who prefer elegance, the result in (11) follows directly from lag algebra. Let $B$ equal a backshift operator such that $B^i Y_t = Y_{t-i}$, and rewrite (9)

\[(a) \quad SV_t = B_0 + \beta_1 \left[ \Delta R_{t-1} - ((1-\lambda) \sum_{i=0}^{\infty} (\lambda + \delta) B^i) \right] + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t.
\]

\[\Delta R_{t-i-2}\right] + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t.\]

\[\sum_{i=0}^{\infty} (\lambda + \delta)^i \Delta R_{t-i-2}\]

\[+ \beta_3 \Delta C_t + \epsilon_t.\]

\[\text{Clearing } 0_0 \text{ of the denominator } 1 - (\lambda + \delta) B \text{ yields the estimating equation given in (11).}\]

\[39\] This model is adopted from Orley Ashenfelter and George E. Johnson, "Bargaining Theory, Trade Unions, and Industrial Strike Activity, American Economic Review, 50 (March 1969) 35-49. I am grateful to Robert Solow for helping me derive the implications of various lag functions which led to the interpretation given here.
The mechanisms for $\Delta R'$ and $\Delta R^\bullet$ are as follows. Recent experience, $\Delta R'$, is defined simply as a finite moving average of previous real wage changes.

$$\Delta R'_t = \sum_{i=1}^J \alpha_i \Delta R_{t-i}$$

$$\sum \alpha_i = 1.$$  

Long-run expectations, $\Delta R^\bullet$, are formed as the weighted sum of a constant (very long-term) increase parameter ($L$) and a finite moving average of previous real wage changes.

$$\Delta R^\bullet_t = (1 - \rho) L + \rho \sum_{i=1}^K \phi_i \Delta R_{t-i}$$

$$\sum \phi_i = 1 \quad 0 < \rho < 1.$$  

The theoretical expectation-achievement model in (12) can now be expressed in terms of observed variables by substitution of (13) and (14).

$$SV_t = \beta_0 + \beta_1 \left[ \sum_{i=1}^J \alpha_i \Delta R_{t-i} - (1 - \rho) L + \rho \sum_{i=1}^K \phi_i \Delta R_{t-i} \right] + \text{other factors}$$

$$SV_t = [\beta_0 - \beta_1 (1 - \rho) L] + \beta_1 \sum_{i=1}^N (\alpha_i - \rho \phi_i) \Delta R_{t-i} + \text{other factors}.$$  

Rewriting, we have

$$SV_t = \beta_0' + \beta_1 \sum_{i=1}^N \mu_i \Delta R_{t-i} + \text{other factors},$$

where $\beta_0' = \beta_0 - \beta_1 (1 - \rho) L$

$$\mu_i = (\alpha_i - \rho \phi_i).$$  

The lag functions determining the behavior of (13)-(16) are likely to have the following properties. The weighted average of real wage changes defining $\Delta R'$ ("recent experience") will depend heavily on the outcomes of the latest periods, perhaps peaking after a few lags, and the experience of more distant periods will be rapidly discounted. Hence the $\alpha_i$ coefficients forming $\Delta R'$ should be governed by a low-order polynomial lag distribution with a steep rate of decay. In contrast, it is reasonable to anticipate the moving average component of long-run real wage expectations ($\Delta R^\bullet$) to be weighted more equally by current and past experience, which implies a linear or quasigeometric lag distribution with a relatively slow rate of decay in the $\phi_i$. The difference of these lag functions ($\mu_i$) is therefore likely to exhibit an inverted U-shaped distribution, which is conveniently estimated by the polynomial distributed lag method of Shirley Almon.

To sum up at midstream, the discussion thus far has developed three plausible models specifying the impact of unemployment, business profits, and real wage changes on the volume of strikes:

**Expectation-Achievement Gap: Extrapolative Expectations**

$$SV_t = \beta_0 + \beta_1 (\Delta R_{t-1} - \Delta R_{t-2}) - \beta_1 \gamma (\Delta R_{t-2} - \Delta R_{t-3}) + \beta_2 \Delta C_t + \epsilon_t$$

$$\beta_1 < 0, 0 < \gamma < 1, \beta_2 < 0, \beta_3 < 0.$$  

**Expectation-Achievement Gap: Adaptive Expectations (with trend)**

$$SV_t = \beta_0 (1 - \lambda - \delta) + (\lambda + \delta) SV_{t-1} + \beta_1 (\Delta R_{t-1} - \Delta R_{t-2}) - \beta_1 \delta \Delta R_{t-3} + \beta_2 U_t - (\lambda + \delta) \beta_2 \Delta C_t - (\epsilon_t - \lambda + \delta) \epsilon_{t-1}$$

$$0 < (\lambda + \delta) < 1, \beta_1 < 0, 0 < \delta < 1, \beta_2 < 0, \beta_3 < 0.$$  

**Expectation-Achievement Gap: Long-Run Expectations (polynomial distributed lag)**

$$SV_t = \beta_0' + \beta_1 \sum_{i=1}^N \mu_i \Delta R_{t-i} + \beta_2 U_t + \beta_3 \Delta C_t + \epsilon_t$$

$$\beta_0' < 0, \beta_1 \Sigma \mu_i < 0, \beta_2 < 0, \beta_3 \leq 0,$$

where $\Delta R=$the percentage rate of change of real wages,

$U_t=$the percentage of the civilian labor force unemployed, and

$\Delta C_t=$the rate of change of aggregate profits/total employee compensation.

Table 1 reports the estimation results for Equations (17a)-(17c). Notice that the estimation

strategy is to pool all observations (20 year time-series, 10 nations), so that strictly speaking the functions should be indexed $SV_{nt} = f(\Delta R_{nt}, U_{nt}, \Delta C_n); n = 1 \ldots 10, t = 1950 \ldots 1969$. Furthermore, all parameters except the constant term are constrained at this point to be invariant through time and space. This amounts to replacing the general intercept constant, $\beta_0$, with a series of country-by-country dummy variables, $\sum_{n=1}^{10} \alpha_n$, which pick up the net effects of nation-specific, time-invariant, structural-historical factors not captured explicitly (causally) in the equations.\(^{22}\)

Therefore the models are geared to explaining fluctuations in strike activity in the presence of a location parameter or ignorance term that varies across countries.

The estimates for (17a) and (17b) in Table 1 indicate that neither the extrapolative expectations model nor the adaptive expectations model performs very well in this body of data. The coefficients of the real wage change ($\Delta R$) terms are without exception statistically insignificant and in several cases have the wrong sign. The extrapolative equation (17a) was estimated both linearly (by ordinary least squares) and nonlinearly (along the lines proposed by Marquardt)\(^{23}\) with the constraint that the parameter $\gamma$ lie in the interval 0 to 1. The adaptive expectations function (17b) was similarly estimated by ordinary least squares and by a nonlinear-instrumental variables procedure designed to preserve consistency in the presence of the lagged endogenous $SV_{t-1}$ term and potentially autocorrelated disturbances.\(^{24}\) The constraints imposed in this non-

\(^{22}\) A fixed, dummy variable approach to the pooled estimation problem is taken here in preference to the alternative random variables, "error components" approach because of computational ease, and also because an important assumption necessary to preserve the consistency of the latter method — that "specific ignorance" be independent of regressors — seems unreasonable. Extensive analyses of pooled estimation strategies are given by G. S. Maddala, "The Use of Variance Components Models in Pooling Cross Section and Time Series Data," Econometrica, 39 (March 1971), 341–358; Marc Nerlove, "Further Evidence on the Estimation of Dynamic Economic Relations from a Time Series of Cross Sections," Econometrica, 39 (March 1971), 359–382; and T. D. Wallace and Ashig Hussain, "The Use of Error Components Models in Combining Cross Sections with Time Series Data," Econometrica, 37 (January 1969), 55–72. Note also that the long-run increase expression (1-p) L in (15) is necessarily embedded within the nation-specific intercepts of (17c) and therefore is effectively "lost" for inferential purposes (i.e., these parameters are unidentified).


\(^{24}\) Note that even if the disturbance of the original adaptive expectations function in (9) is "white noise," application of the Koyck transformation introduces a first-order moving average error process in the estimating equation (17b). As it turned out, however, the errors displayed negligible serial correlation in all equations and so instrumental variables as well as the rather complicated estimation procedures required to secure efficiency in a pooled data model proved unnecessary. A discussion of the estimation problems

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Table 1. Strike Volumes in Ten Advanced Industrial Societies, 1950–1969

<table>
<thead>
<tr>
<th>Equation</th>
<th>$U_1$</th>
<th>$U_{t-1}$</th>
<th>$\Delta C_t$</th>
<th>$\Delta C_{t-1}$</th>
<th>$\sum_{t=1}^{5} \Delta R_{t-1} \Delta R_{t-3}$</th>
<th>$\Delta R_{t-2}$</th>
<th>$SV_{t-1}$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(17a)</td>
<td>-74.2</td>
<td>484.9</td>
<td></td>
<td>3.3</td>
<td>6.5</td>
<td></td>
<td></td>
<td>.52</td>
</tr>
<tr>
<td>(17b)</td>
<td>-47.8</td>
<td>39.1</td>
<td>792.7</td>
<td>-7.3</td>
<td>-6.5</td>
<td></td>
<td></td>
<td>.52</td>
</tr>
<tr>
<td>(17c)</td>
<td>-94.1</td>
<td>452.5</td>
<td>-44.7</td>
<td>-2.0</td>
<td></td>
<td></td>
<td></td>
<td>.53</td>
</tr>
</tbody>
</table>
linear regression were $0<\lambda+\delta<1$ and $0<\delta<1$. Despite great efforts to maximize the success of these models, it appears that strike activity in advanced industrial societies during the postwar period is not well explained by expectation-achievement gap functions of the extrapolative or adaptive variety.

The regression results in Table 1 do, however, provide evidence in favor of the "long-run" (polynomial distributed lag) expectation-achievement gap model of (17c). Recall that this model asserts that if actual real wage increases over several recent years exceed labor's long-run expectations, then the volume of strikes should decline. The significant negative estimate for the $\sum_{i=1}^{n} \Delta R_{i-1}$ lag coefficients clearly supports the long-run expectations hypothesis, and suggests that labor has a "memory" extending many periods back through time in the sense that a change in real wages influences strike activity (negatively or positively) for several subsequent years.

The level of unemployment ($U_t$) consistently displays a significant and sizable negative coefficient as hypothesized. This indicates that the strategic considerations outlined earlier govern labor's use of the strike and that strikes should be viewed as tactical weapons in struggles against management and not as poorly timed, spontaneous protests. Moreover, this relationship suggests that labor grievances are, as Rees'25 put it, "durable" or at least "semi-durable," and that industrial conflict therefore represents a rational translation of working class discontent into overt action.

The parameter for the rate of change in profit ratios ($\Delta C_t$) is insignificant in all regressions. This probably reflects the contrasting effects attributed to profits earlier—increasing labor's demands and aggressiveness on the one hand, but decreasing capital's incentive to resist on the other. Thus, profits do not appear to have a very important influence on fluctuations in industrial conflict and the profit term should therefore be deleted from a revised model.26

Industrial Relations Systems and Strike Dynamics. The validity of previous conclusions concerning the impact of real wages, unemployment, and profit ratios on strike activity rests in part on the assumption that the structural coefficients are more or less constant through time and space. Although there is little reason to suspect systematic time-wise shifts in these coefficients during the postwar period, there is cause to question whether the parameters are equivalent cross-nationally, given the diversity of national institutional arrangements. When considering the importance of institutional diversity in explaining cross-national differences in strike activity, industrial relations specialists have given great attention, not surprisingly, to contrasting systems of industrial relations. (Certain features of the political system are also considered important, but this is taken up later.) The usual argument is that centralized systems of collective bargaining, in which labor and management organizations impose real behavioral constraints on their respective clienteles (with or without government coordination), serve to diminish or contain the level of industrial conflict. As Ross and Hartman put it: "Just as unions in centralized systems eliminate improvident emotional gestures.

25 Albert Rees, "Industrial Conflict and Business Fluctuations."
26 Although the profits result is theoretically plausible, the statistical insignificance of this variable may stem from excessive measurement error. Profits data are easily subjected to the artistry of corporate accountants, are well-known to be "hidden" as costs via accelerated depreciation tax laws, and are difficult to determine for unincorporated businesses. Furthermore, a significant fraction of the labor force in all economically advanced societies is employed in nonprofit activities. The profits-to-wages ratio is also correlated with real wages. Differences in profit compensation for total annual employee compensation per civilian labor force member produced results virtually identical to those in Table 1.
by the rank and file, likewise employer associations exclude reckless or primitive attitudes to which small businessmen in particular are subject. The knowledge that any strike will be large and expensive serves as a deterrent to both sides. Furthermore, employers within an industry do not have to worry about suffering a competitive disadvantage when all of them are subject to the same demands. At the same time unions tend to be less aggressive since different branches are not competing to make the best showing within an industry."20

There is less than unanimous agreement, however, that centralized labor-management bargaining systems contain strike activity quite as effectively as Ross and Hartman and others have suggested. Malles, for example, expresses doubt as to whether "there is any correlation at all between a particular type of industrial relations system and the incidence of industrial warfare."21 Sturmthal has even argued that highly centralized labor organizations and bargaining structures can lead to heightened grass roots unrest because of the "distance" created between the rank and file and the level at which decisions are made.22

Three modal types of collective bargaining systems are readily identified in the descriptive literature:23

1. Decentralized systems characterized by firm-level bargaining (e.g., Canada, Japan, and the United States) or by anarchic labor-management relations embedded within a formal superstructure of multi-employer bargaining that imposes few constraints on the principal actors (France, Italy).

2. Centralized systems typified by industry-wide bargaining or by multi-employer bargaining with industry-wide constraints (e.g., Belgium until 1959, the Netherlands after 1963, and the United Kingdom throughout most of the postwar period).

3. Highly centralized systems within which economy-wide bargaining, or industry-wide bargaining with economy-wide constraints, prevails (e.g., Belgium after 1959, the Netherlands prior to 1964, Norway, and Sweden).

Simple calculation of strike volume means for each type of bargaining system leaves no doubt that during the postwar period the average level of strike activity covaried with the degree of centralization: mean man-days lost per 1000 wage and salary workers are 425, 172, and 67 for decentralized, centralized, and highly centralized systems, respectively. In this paper, however, interest is focused primarily on the stability of the structural (regression) coefficients of real wages, unemployment, and profits across these diverse systems of industrial relations. Recall that the most successful equation in Table 1 was the "long-run" expectations model of (17c):

\[
SV_t = \beta_0' + \beta_1 \sum_{i=1}^{5} \mu_i \Delta R_{t-i} + \beta_2 \bar{U}_t + \beta_3 \Delta C_t + \epsilon_t.
\]

Let \( D_1 \) denote a binary variable equal to unity for centralized collective bargaining systems and equal to zero otherwise, and let \( D_2 \) denote a dummy variable equal to unity for highly centralized bargaining systems and zero otherwise. (Decentralized systems comprise the null case.) It is now possible to specify an alternative, unconstrained model that permits

the parameters to vary across the three types of industrial relations systems. (The intercept-constant, \( \beta_i' \), already takes a unique value for each country and so is not affected by this respecification.)

\[
SV_i = \beta_0' + \beta_1 \sum_{i=1}^{5} \mu_i \Delta R_{i-1} \\
+ \alpha_i \sum_{i=1}^{5} \pi_i (\Delta R_{i-1} \times D_i) \\
+ \gamma_i \sum_{i=1}^{5} \omega_i (\Delta R_{i-1} \times D_2) + \beta_2 U_i \\
+ \alpha_2 (U_i \times D_1) + \gamma_2 (U_i \times D_2) \\
+ \beta_3 \Delta C_i + \alpha_3 (\Delta C_i \times D_1) \\
+ \gamma_3 (\Delta C_i \times D_2) + \epsilon_i.
\]

Table 2 reports the estimation results for the respecified long-run expectations model of (19). Clearly, these estimates lend support to the earlier presumption of parameter equivalence across contrasting industrial relations systems. More formally, the joint hypothesis that all coefficients are common across bargaining systems, i.e.,

\[
\beta_1 \Sigma \mu_i = \alpha_1 \Sigma \pi_i = \gamma_1 \Sigma \omega_i \\
\beta_j = \alpha_j = \gamma_j (j = 2, 3),
\]

may be evaluated by computing the following \( F \) ratio:

\[
F = \frac{[RSS(18) - RSS(19)]/r}{RSS(19)/T - K},
\]

where \( RSS \) denotes the residual sum of squares in the respective equations, \( r \) denotes the number of restrictions or constraints in (18), and \( T - K \) denotes the number of degrees of freedom of \( RSS \) (19).

Computation of this test statistic gives \( F(8,113) = 0.9 \), which is insignificant at any conventional level. Therefore, although the mean level of strike activity during the postwar period co-

\[ varies strongly with the degree of centralization in collective bargaining, estimation of the unconstrained model yields results which do not challenge the earlier assumption that the structural parameters governing the impact of real

\[ wages, unemployment, and profits (the latter being of little importance) are approximately equivalent across institutionally diverse systems of industrial relations.\]

The Money Illusion Hypothesis. In addition to the presumption of parameter equivalence, the analyses of previous sections also tacitly assumed that labor’s propensity to strike is influenced by changes in real wages as opposed to changes in money wages. Therefore before incorporating certain features of the political system into the strike volume model it is important to dispose of the so-called “money illusion” thesis. The money illusion hypothesis holds that since movements in real wages are less perceptible than changes in money wages, working-class attention focuses largely on the latter, and hence workers are deceived by increases in money wages alone. Knowles’s study of strikes in the United Kingdom, for example, concludes (albeit with considerable hesitancy):

"Arguments based on the level of real wages are relatively unimportant at the level of strikes, even though they may have some importance at the level of negotiation, since (a) a rise in real wages is less evident and 'tangible' than a rise in money wages, and (b) a fall in real wages, even where it is immediately apparent, is less likely than is a cut in money wages to be taken as a deliberate act of the employers . . . and therefore is less likely to meet with immediate resistance.”

\[ \text{Table 2. Strike Volumes in Ten Advanced Industrial Societies, 1950–1969} \]

<table>
<thead>
<tr>
<th>Estimation Results for Equation 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sum_{i=1}^{5} \Delta R_{i-1} )</td>
</tr>
<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td>(-49.3)</td>
</tr>
<tr>
<td>((-1.7))</td>
</tr>
</tbody>
</table>

*The \( t \)-statistics for the regression coefficient estimates are in parentheses. Constant terms vary by country and are omitted. Variables are defined in Table 1 and in the text.

Sources: See Table 1.
Although it has been true historically that decreases in money wages have been vigorously resisted by labor, recent quantitative studies of postwar industrial conflict in Canada, Great Britain and the United States indicate that movements in prices and money wages act essentially as "mirror-images" with regard to strike activity.\(^{35}\)

Since \(\Delta R = \Delta W - \Delta P\)\(^{36}\) where \(\Delta R, \Delta W\) and \(\Delta P\) denote the percentage rate of change of real wages, money wages and prices respectively—the money illusion hypothesis is tested simply by replacing \(\Sigma \Delta R_{t-i}\) with \(\Sigma \Delta W_{t-i}\) and \(\Sigma \Delta P_{t-i}\) in a revised version of (17c). Accordingly we estimate the model (which omits the nonsignificant \(\Delta C_t\) term)

\[
SV_t = \beta_0 + \beta_1 \sum_{i=1}^{5} \pi_i \Delta W_{t-i} + \beta_2 \sum_{i=1}^{5} \omega_i \Delta P_{t-i} + \beta_3 U_t + \epsilon_t.
\]

Confirmation of the hypothesis requires that movements in money wages have a greater effect on strike activity than movements in prices, that is, the (negative) sum of the lag coefficients for \(\Delta W_{t-i}\) should be significantly larger in absolute value than the corresponding (positive) sum of the \(\Delta P_{t-i}\) lag coefficients. Table 3 reveals that if anything, just the reverse is true.

The difference, however, is neither theoretically nor statistically important; the standard F-test of the null hypothesis,

\[
\beta_1 \Sigma \pi_i (\Delta W) = - \beta_2 \sum \omega_i (\Delta P),
\]

yields \(F(2,120) = .06\), which is insignificant at virtually any test level.

The evidence clearly demonstrates, then, that labor does not suffer from a money illusion, but, on the contrary, takes price changes as well as money wage changes fully into account in the use of the strike. This again suggests that strike activity is governed by a rational and rather sophisticated calculus.\(^{37}\)

** Strikes and the Political System.** Beyond the economic factors appearing in the previous models, certain characteristics of the political system are also commonly believed to influence the magnitude of industrial conflict. The most important are the relative status in the political system of labor-oriented parties on the non-Communist left, the presence of governments controlled outright by Labor or Socialist parties, and the extent of Communist party influence in the labor force.

It has often been noted in comparative studies of industrial conflict that where Labor and Socialist parties are serious contenders for political power, the use of the strike weapon is restrained. The argument that Labor parties act to discourage worker militancy is well summarized by Ross and Hartman: "Why is labor political action a deterrent to strikes? First, strikes are injurious to the political fortunes of the labor party. Middle-class votes must be attracted if the party is to be successful, but the middle-class voter is antagonized by strikes. . . Second, worker unrest is channeled off into the political sphere. Demands that would otherwise be made upon the employer are directed against the government instead."\(^{38}\)

There are numerous illustrations of this line of reasoning. For example, anticipating good prospects for a Labour Party victory in the British general elections of 1964, Harold Wilson urged railway union leaders in the spring of 1963 to prevent a

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\(^{35}\) It is worth noting here that Kramer found percentage changes in prices and per capita monetary income to act as "mirror images" in their effects on fluctuations in the partisan division of the vote for the U.S. House of Representatives during the 1896–1964 period. Kramer interpreted this, quite properly, as evidence of rational mass electoral behavior. See Gerald Kramer, "Short-Term Fluctuations in U.S. Voting Behavior, 1896–1964," *American Political Science Review*, 65 (March 1971), 131–143.

\(^{36}\) Actually the continuous time equality

\[
\frac{1}{W} \frac{dW}{dt} \quad \frac{1}{P} \frac{dP}{dt}
\]

is only approximated by the discrete time relation \(\Delta R = \Delta W - \Delta P\). However, for our purposes the difference is negligible.
scheduled work-stoppage because "such a strike would damage Labour severely in public eyes and jeopardize its position in the elections." The New York Times observed, "Fresh in every Labour politician's memory is the six-week London bus strike of 1958. The strike has been considered a major reason for Labour's overwhelming defeat by the Conservatives a year later."\(^3\)

How might this argument be incorporated into a formal model of strike activity? First, an index is needed that permits specification of a plausible incentive function governing the inclination of Labor or Socialist parties to deter strike activity on the part of their constituencies. It would then be possible to evaluate the success of Labor-Socialist parties in actually diminishing the volume of strikes by relating the incentive function to the variable \(SV_t\).

In terms of the theoretical argument briefly outlined above, the incentive of Labor-Socialist parties to discourage strikes in order to attract the middle-class votes deemed necessary for electoral success is likely to hinge on their competitive position in the party system. Following Przeworski and Sprague,\(^4\) two things are assumed with regard to party competition: (1) the goal of party competition is electoral victory, and victory is defined as becoming the largest party; and (2) the goal is perceived in terms of the outcome of the last election. Victory, then, may be as little as \(1/4\) of the vote in a multi-party system and greater than \(1/2\) the vote in a two-party system.

For simplicity, parties are classified in four political blocs or tendances: Communist, Non-Communist Labor-Socialist, Center, and Right. The competitive position of Labor-Socialist parties can now be defined as the difference or distance between their percentage vote share and that of the largest tendance in the system:

\[
(21) \quad LD_t = \max(V_{t-1}) - LV_{t-1},
\]

where: \(LD_t = \) Labor-Socialist \% vote share distance
\(LV_{t-1} = \) Labor-Socialist \% vote share in the preceding election
\(\max(V_{t-1}) = \) \% vote share of the largest tendance in the preceding election.

It seems reasonable to suppose that the incentive of Labor-Socialist parties to dampen industrial conflict in hopes of attracting (or retaining) the marginal middle-class votes necessary to achieve (or maintain) plurality status in the party system would depend nonlinearly on their vote share distance \(LD_t\). Figure 3 depicts a likely form for this relationship. It suggests that the incentive \(LI_t\) should be very large when Labor's distance from its principal rival(s) in the party system \(LD_t\) is small or nil but should quickly decline (asymptotically approaching zero) as the distance increases. In other words, Labor-Socialist party elites have substantial motivation to restrain working-class

\[\text{Figure 3. Theoretical Incentive Function}\]
militancy when electoral victory is very close at hand, but this incentive subsides rapidly with small increments in $LD_t$ (especially at the lower ranges) given the risk of unnecessarily antagonizing hard core supporters or losing them to more radical competitors on the left. The most appropriate formalization of the model depicted in Figure 3 is a slightly modified reciprocal function. Accordingly, the Labor-Socialist Incentive index is defined:

$$\text{(22)} \quad LIt = 1 \text{ if } LD_t \leq 1$$

$$\quad = LD^{-1} \text{ otherwise.}$$

Finally, the theory at hand seems best articulated by positing an inverse, linear relationship between the volume of strikes ($SV_t$) and the incentive index ($LIt$):

$$\text{(23)} \quad SV_t = f(LIt, \ldots) \text{ linear}$$

$$\partial SV_t / \partial LIt < 0.$$  

In conjunction with the decrease in strike activity ascribed to sharply competitive Labor-Socialist parties, an additional influence on working-class militancy is often attributed to the presence of Labor governments. It is argued that, other things being equal, workers, or at least union leaders, are much more reluctant to see a Labor or Socialist government embarrassed by severe strike activity than a Conservative one. Consequently, "if the labor party comes into power, the deterrent effect is even stronger. The trade union officials, having invested heavily in the party, are disinclined to do anything that would have the effect of sabotaging its program . . . and will show maximum restraint in the use of the strike."11

This hypothesis is evaluated straightforwardly by including in the model a Labor-Socialist Government dummy variable ($LG_t$) taking a value of unity when a Labor or Socialist party was in power and a value of zero otherwise. (Coalition governments were coded 1 only if Labor or Socialist parties had a plurality of key cabinet posts.) If workers as well as trade-union elites in fact respond to the partisan character of the government in the way that this argument suggests, strike activity should be lower during the tenure of Labor or Socialist administrations than it is during the tenure of Centrist or Rightist ones. Hence we have:

$$\text{(24)} \quad SV_t = f(LIt, LG_t, \ldots)$$

$$\partial SV_t / \partial LG_t < 0.$$  

The model or mini-model in (24) presumes that the effects of $LIt$ and $LG_t$ operate continuously in time. Perhaps it is more plausible to assume that these influences are activated only in election years. Unions, for example, might make a real effort to minimize industrial conflict during the crucial election year period but are far less likely to relinquish the strike during the entire tenure of a Labor or Socialist administration. Similarly, party officials may find it infeasible (if not unnecessary) to attempt to discourage strikes in nonelection years no matter how close they are to "victory." These qualifications suggest revising (24) such that

$$\text{(25)} \quad SV_t = f(LIt, E_t, LG_t, E_t, \ldots),$$

where $E_t$ is a dummy variable equal to unity in the year preceding an election and zero otherwise. The specification in (25) therefore constrains the effects of the Labor-Socialist Incentive index ($LIt$) and Labor-Socialist Governments ($LG_t$) to be zero in nonelection years.

Finally, the strike model should also incorporate a term representing Communist party influence in the labor force. Communist parties in most advanced industrial societies are of course no longer revolutionary in the traditional Marxist sense. Indeed the French and Italian parties and their union affiliates (by far the largest in Europe) have in recent years exhibited caution, if not moderation, in the use of the strike and related protest activities in order to avoid unnecessarily alienating less radical or militant segments of society.12 However, despite the significant tactical variations exhibited by Communist movements during the postwar period in confronting dynamic sociopolitical environments, it seems clear that in contrast to other major political actors in industrial societies of the West, Communist parties remain important agencies for the mobilization of discontent and the crystallization of labor-capital cleavages. Presuming that there is nearly always a certain reservoir of latent grievance or discontent which is not manifested in overt conflict unless mobilized and channeled by radical agencies on the left, it is anticipated that sizable Communist parties will have a systematic impact on strike activity beyond that attributable to the economic variables considered previously and opposite to that of Labor parties and Labor governments.

11 Ross and Hartman, Changing Patterns of Industrial Conflict, p. 69.

Using Communist party membership as a fraction of the civilian labor force \((CP_t)\) to index the relative extent of Communist organizational mobilization, the preceding discussion suggests the function

\[
SV_t = f(CP_t, \ldots)
\]

\[
\partial SV_t / \partial CP_t > 0.
\]

The precise form of (26) is unspecified; it is unlikely that a conventional linear formulation will adequately capture the response of strike activity to variations in Communist membership. In particular, a plausible argument can be made that Communist parties cannot effectively mobilize labor discontent and thereby influence industrial conflict appreciably unless membership size (relative to the total work force) reaches a certain "critical mass" or threshold. Increments in \(CP_t\) above the critical threshold might lead to substantial increases in industrial conflict until an upper bound or "grievance exhaustion" point is reached beyond which further growth in party size has little or no additional effect on strike activity. A nonlinear relationship of this sort is shown in Figure 4 and is given formally by the function

\[
SV_t = e^{a - \lambda / CP_t}.
\]

To recapitulate: Figure 4 and Equation (27) simply articulate the idea that beyond some initial threshold, strike activity moves rapidly upward with increases in Communist party size (the rate of response being greatest at the point of inflection \(\lambda / 2\)) but then levels off, asymptotically approaching an upper bound or grievance exhaustion level \(e^a\).

Combining the political hypotheses of this section with the most successful economic model developed previously yields the following equation for the volume of strikes:

\[
SV_t = \beta_0 + \beta_1 \sum_{i=1}^{5} \mu_i A R_{t-i} + \beta_2 U_t + \beta_3 L I_t * E_t + \beta_4 L G_t * E_t + e^{a - \lambda / CP_t} + \epsilon_t
\]

\[
\beta \sum \mu_i < 0, \beta_2 < 0, \beta_3 < 0, 0 < \beta_4 < 0,
\]

\[
\alpha > 0, \lambda > 0.
\]

Table 4 reports the estimation results for three versions of the basic model in (28). Clearly, both the Labor-Socialist Incentive index \((LI_t)\) and the Labor-Socialist Government dummy \((LG_t)\) exhibit negligible influence on strike activity. The estimated coefficients of these variables oscillate in sign across specifications and the \(t\)-statistics are insignificant at any conventional test level. Moreover, this is true whether the hypothesized (negative) effects are permitted to operate in all years (28a) or are restricted to election years only (28b).

Interpretation of the Labor government \((LG_t)\) result is straightforward: during the post-war period left-wing governments have been no more successful than center or right-wing governments in discouraging short-run upward...
movements in strike activity, notwithstanding the electoral ties of the former to the working-class.\textsuperscript{43} From the workers’ point of view, the correspondence of interests with Socialist party elites is simply less than perfect. As Ernest Bevin put it when leading the strikes of dock and tramway workers in Britain just after the first Labour government came into office in 1923: “There is work to do in the industrial field as well as in the political arena. While it is true that the two are to some extent part of the same effort, we must not lose sight of the fact that governments may come and governments may go, but the workers’ fight for betterment of conditions must go on all the time.”\textsuperscript{44} Subsequent Labour government leaders have been no more effective in deterring labor militancy and strikes than the first Labour Prime Minister Ramsay MacDonald.

The implication of the Incentive index \((LI_t)\) result, unlike that of the Labor government dummy variable outcome, is not unambiguous. For example, it is possible that the incentive function presented in Figure 3 and in Equation (22) is poorly specified, or that its definition in terms of vote share distances in (21) is too simple. However, alternatives to the incentive function developed in the text, elaborations of the basic specification in (24), and analyses permitting the coefficients to vary across subsets of countries produced results no better than those reported in Table 4.\textsuperscript{46} Thus, it is plausible that Labor-Socialist party attempts to discourage strike activity are indeed governed by a model akin to that outlined previously, but that

\begin{table}
<table>
<thead>
<tr>
<th>Equation</th>
<th>(\sum_{t=1}^{N} \Delta R_{it})</th>
<th>(U_i)</th>
<th>(LI_t)</th>
<th>(LG_t)</th>
<th>(\text{socCP}_t)</th>
<th>(LI_t^*E_t)</th>
<th>(LG_t^*E_t)</th>
<th>(R^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(28a)</td>
<td>(-58.6)</td>
<td>(-89.1)</td>
<td>(-62.1)</td>
<td>(81.9)</td>
<td>(0.08)</td>
<td>(27.1)</td>
<td>(0.58)</td>
<td></td>
</tr>
<tr>
<td>(28b)</td>
<td>(-60.1)</td>
<td>(-89.4)</td>
<td>(-4.9)</td>
<td>(0.08)</td>
<td>(16.9)</td>
<td>(-80.8)</td>
<td>(0.58)</td>
<td></td>
</tr>
<tr>
<td>(28c)</td>
<td>(-59.2)</td>
<td>(-89.3)</td>
<td>(-4.9)</td>
<td>(0.08)</td>
<td>(27.1)</td>
<td>(0.58)</td>
<td>(-0.6)</td>
<td></td>
</tr>
</tbody>
</table>

\textit{Sources:} Electoral data and Communist party membership data are primarily from U. S. Department of State, Bureau of Intelligence and Research, \textit{World Strength of Communist Party Organizations}, annual volumes 1950-1970. See Table 1 for the sources of other variables.

\textsuperscript{43} Several of these alternatives are worth mentioning. First, since the translation of electoral votes into legislative seats is by no means direct [see Douglas W. Rae, \textit{The Political Consequences of Electoral Laws} (New Haven: Yale University Press, revised edition, 1971), for an exhaustive analysis], the incentive function of Labor-Socialist Party elites in (22) was also defined in terms of seat shares as opposed to vote shares. Second, Equation (23) was revised to incorporate the capability as well as the motivation of party elites to discourage strike activity; where capability was measured in terms of the size of the Labor-Socialist political constituency (voters). Third, the Labor-Socialist vote share distance in (21), as well as the seat share variant described in the first point above, was modified to include (a) the vote or seat share of the U.S. Democratic party — following Greenstone’s argument [J. David Greenstone, \textit{Labor in American Politics} (New York: Alfred A. Knopf, 1969)] that American labor and the Democrats have become interpenetrated in a way that is at least partially equivalent to party-union alliances in much of Western Europe — and, (b) the vote or seat share of the French Communist Party (PCF) during the period of the left alliance. As noted in the text, none of these modifications led to empirical outcomes significantly different from those reported in Table 4.

\textsuperscript{46} The t-statistics for the regression coefficient estimates are in parentheses. Constant terms vary by country and are omitted. \(\Delta R\) and \(U_i\) are defined in Table 1. \(LI_t\) denotes the Labor-Socialist Party Incentive index and equals unity when \(LD_t\) is \(<1\) and \(LD_t-1\) otherwise; where \(LD_t = \max \text{ vote share minus the Labor-Socialist vote share.}\ L_t\) and \(E_t\) are Labor Socialist Government and Election year dummy variables, respectively. \(CP_t\) is Communist Party membership per 1000 civilian workers.

\textsuperscript{47} Similar conclusions with regard to Great Britain are reached by John E. T. Eldridge, \textit{Industrial Disputes: Essays in the Sociology of Industrial Relations} (London: Routledge & Kegan Paul, 1968); and Herbert A. Turner, \textit{The Trend of Strikes} (Leeds: Leeds University Press, 1963). It should be understood that the results associated with the political party terms apply only to nations experiencing oscillations in Labor-Socialist rule. The effects of long-term leftist rule on labor militancy (e.g., in Sweden, Norway and Denmark where the Left has governed almost continuously during the postwar period) are absorbed by the country-specific constant terms. The consequences of such long-standing political and institutional differences are discussed in great detail in my paper “Long-Run Trends in Strike Activity in Comparative Perspective.”

\textsuperscript{48} Cited in Kassalow, \textit{Trade Unions and Industrial Relations}, p. 50.
such attempts, on the whole, have been unsuccessful.

This apparent failure of party elites to reduce the use of the strike may stem less from the unresponsiveness or "irresponsibility" of top union leadership than from the fundamental radicalism and militancy of the rank-and-file. In Great Britain, where there is a close, organic relationship between trade union and Labour party elites, the vast majority of strikes during the last decade have been unsanctioned, "illegal" conflicts typically led by left-wing shop steward militants.16 Although the British case is probably the best documented, wildcat strikes, contract rejections and other manifestations of grass-roots rebelliousness have also become serious issues in Canada, the United States, and continental Europe.17 Strikes, then, not only are weapons in disputes with private capital, but can also serve as instruments of rank and file rebellion against union authority, and in some situations, state authority. Hence, the conclusions of Ross and Hartman's influential study that "labor political action, labor parties, and labor governments have helped pave the way toward renunciation of the strike," and that political action is "more in line with the middle-class orientation of workers in advanced industrial societies,"48 seem to be seriously at odds with the empirical data.

Although the results in Table 4 give no evidence in favor of arguments concerning the impact of Labor-Socialist parties and governments on short-run fluctuations in strike activity, they do substantiate the anticipated effect of Communist party influence in the labor force. The initial specification of a "critical mass"/"grievance exhaustion" model represented by the function $S_V = e^{a + bP_i}$, . . ., however, produced coefficient estimates that were statistically insignificant, unstable in sign, and unreasonable in magnitude. (A standard nonlinear algorithm in conjunction with reasonable initial parameter guesses was used.) An alternative, unbounded exponential function of the form $S_V = e^{a + bP_i}$, . . ., which preserves the idea that strike activity should increase (decrease) rapidly and nonlinearly with growth (decline) in Communist mobilization, proved to be far more successful in describing the relationship of industrial conflict to Communist membership over the range of variation observed in the latter variable in this body of data. The highly significant estimates49 for this revised exponential model (reported throughout Table 4) support the original proposition that sizable Communist parties are associated with levels of industrial conflict that cannot be attributed to such economic factors as changing rates of increase in real wages ($\sum \Delta R_{it}$) or fluctuations in the demand for labor ($U_i$).

Conclusions

The evidence developed in this study supports several tentative conclusions. Time plots of the volume of strikes presented in the first section indicate that arguments about the withering away of industrial conflict and related statements concerning the vitiation of labor militancy in advanced industrial societies are not compatible with the empirical data. There simply is no sign of a general downward movement in the aggregate volume of strikes during the 1950–1969 period. To push the implications of this a bit further and in a more general direction, the trends in strike activity tend to complement other streams of evidence contradicting macrosociological arguments about the "integration" of labor in advanced capitalist

4 J. F. B. Goodman, "Strikes in the United Kingdom: Recent Statistics and Trends," International Labour Review, 95 (May 1967), 465–481; and Michael Silver, "Recent British Strike Trends: A Factual Analysis," British Journal of Industrial Relations, 11 (March 1973), 66–104. The situation was reversed, however, after the passage of the Industrial Relations Act of 1971, which was bitterly resented by the British trade union establishment and which stimulated the normally moderate Trades Union Congress (the peak union organization) to join the shop stewards in pressing the militant position. Consequently, nearly 80 percent of the man-days lost in strike activity in the years after 1971 were due to "official" disputes. A detailed analysis is given by Gerald Dorfman, "An End to Producer Group Politics in Britain?: The Industrial Relations Act of 1971," paper delivered at The 1973 Annual Meeting of the American Political Science Association, New Orleans, Louisiana, September, 1973. The dynamics underlying differential responsiveness of union leadership and the rank-and-file to the wider political interests of Labor-Socialist parties is of course an important problem, which the simple models developed here cannot address with any authority.


4 Ross and Hartman, Changing Patterns of Industrial Conflict, p. 58.

5 The $t$-statistics in this nonlinear model should be interpreted with caution since strictly speaking they have meaning only in terms of the linearized equation at the solution point. There is no question, however, that the exponential form given in Table 4 outperforms all reasonable alternative functions.
societies and the *embourgeoisement* of workers in the face of unprecedented affluence.

Patterns in the fluctuation of industrial conflict also suggest that the working class exercises considerable sophistication in the use of the strike weapon. The pronounced inverse relationship between the volume of industrial conflict and the rate of unemployment demonstrates that on the whole strikes are timed to capitalize on the strategic advantages of a tight labor market. What Hobsbawm has called "the common sense of demanding concessions when conditions are favorable" indeed seems to prevail. Moreover, labor does not appear to be misled by a "money illusion." The empirical results clearly show that price changes are no less important than money wage changes in their effects on strike activity. Industrial conflict therefore responds to movements in real wages rather than money wages, which is further and rather persuasive evidence that rational behavior underlies observed strike fluctuations.

The real wage function that proved to be most successful empirically was a polynomial distributed lag in \( \sum_{i=1}^{5} \Delta R_{t-i} \) (graphed in Figure 5). The general form of this lag distribution was deduced from a formal specification of a "long-run" expectations variant of the basic expectation-achievement hypothesis, although the lag function does not depend in any essential way on this particular theoretical rationalization. Without becoming very firmly attached to the precise shape or exact coefficient values of this lag distribution, it can be said that labor militancy appears to be governed, in part, by a "memory" persisting several periods back through time, in the sense that a change in real wages affects strike activity over a number of subsequent years. More specifically, the estimates indicate that an equilibrium reduction of 1 per cent in the rate of change of real wages is associated with a strike volume increase on the order of 59 man-days lost per 1000 workers, which is distributed nonlinearly over about 5 periods.

Finally, the analyses in the last section of the paper reveal that Labor-Socialist party elites are, on the whole, unable to deter short-run

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Figure 5: Distribution of Real Wage Lag Coefficients (from Table 4, 28c)

51 Since the real wages variable is undoubtedly measured with significant error, one should not place great confidence in the exact values of the individual lag coefficients or in the lag distribution. This follows from the results of a recent paper by Grether and Maddala which shows that measurement error in an exogenous variable typically leads to the appearance of a longer lag distribution than is actually the case, but at the same time produces a better estimate of the total response. In the case at hand, this means the \( \beta_i \Sigma u_i = -59.2 \) in (28c) of Table 4 is probably a good estimate of the total response of \( SV_t \) to \( \Delta R_{t-i} \) (the total multiplier), although the lag distribution index \( i = 1 \ldots 5 \) may be too long. See David Grether and G. S. Maddala, "Errors in Variables and Serially Correlated Disturbances in Distributed Lag Models," *Econometrica*, 41 (March 1973), 255–262.

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increases in strike activity despite their strong incentive to do so (especially when the prospects of electoral victory are good) and notwithstanding their political ties to organized labor. Similarly, industrial conflict exhibits no consistent tendency to drop-off during the tenure of governments controlled by Labor or Socialist parties. The empirical evidence for the postwar period suggests, therefore, that left-wing parties and governments relying upon symbolic, electorally expedient appeals to political solidarity, which are not accompanied by tangible rewards to labor (wages, hours, fringe benefits and so on), have had little success in discouraging working-class militancy. In contrast, strike activity does appear to vary (non-linearly) with the relative size of Communist party membership. This lends support to the earlier proposition that Communist parties in advanced industrial societies remain important agencies for the mobilization of latent discontent and the crystallization of labor-capital cleavages.

Extensions of the simple single-equation strike models presented in this study have obvious implications for public policy. One of the most important problems confronting industrial nations during the postwar period is the trade-off that appears to exist between unemployment and the rate of wage-price inflation (the so-called Phillips curve). If labor militancy or strike activity in the current period influences wage movements in current and subsequent periods independently of market conditions, then this implies a lagged reciprocity between strikes and wage changes, and more important, means that strike activity affects, perhaps crucially, the unemployment-inflation dilemma. This seems clear enough intuitively, although conventional economic formulations of the problem rarely consider labor aggressiveness explicitly.52 In any case, an adequate treatment of the economic and political dimensions of these linkages would extend this paper far beyond its present length and requires empirical analyses not yet completed.