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Cyclical Fluctuations in Strike Activity

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Abstract

This paper uses a unique data set of contracts and strikes to address the old question of the relationship between the business cycle and strike activity. It also examines the factors that determine when strikes occur and proposes a new test of the recent private information models of strikes. The data set contains over 7000 contracts covering both manufacturing and non-manufacturing industries for the twelve year period 1970 to 1981. Contrary to earlier findings there is no simple correlation between fluctuations in the business cycle and either the number of strikes, strike incidence or strike duration. However, once specific industry effects are controlled for then strike incidence but not strike duration varies procyclically. As suggested by the Total Cost theory of strikes both demand conditions by industry and labor market conditions are important factors in determining strike activity. The level of demand by industry as proxied by the industry producer price index has a negative effect on strike incidence but a positive effect on strike duration. This opposite movement of strike incidence and strike duration which appears in this paper is not predicted by any of the theoretical models of strikes. Higher national unemployment reduces the probability of a strike, but it is regional unemployment and industry specific unemployment that have the greater negative effect on strike incidence.

The recent private information models of strikes suggest that an important determinant of strikes is a variable observable to the firm but unobservable to the union. In this paper I assume that the firm can predict future demand conditions better than the union. In this case the difference between actual realized future prices and the forecasts of those prices made today can be used as a proxy for this unobservable variable. This paper shows that neither the level nor the variance of this residual has any significant effect on strike activity. However, both the variance of past prices and the variance of past unemployment have a significant positive effect on strike incidence. This suggests that some form of uncertainty is an important determinant of strikes.

1. Introduction

Economists have been interested in strikes for many years¹, but until recently surprisingly little was known about them. Empirical studies suffered from the absence of a large-scale data set of labor contract expirations which included information on work stoppages. The purpose of this paper is to add to our knowledge by using a unique data set of contracts and strikes to document the extent of strike activity both by industry and over time. It also examines the factors that determine when strikes occur and addresses the old question of the relationship between the business cycle and strike activity. Some of the first estimates of the extent of strike activity from a large-scale micro data set were provided by Tracy (1986). The data used in this study improves considerably on those used by Tracy, both in terms of sample size and by the improved availability of strike information. It contains over 7000 contracts covering both manufacturing and non-manufacturing industries for the twelve year period 1970 to 1981.

In the two decades following the Second World War there were a number of studies that provided evidence of a positive correlation between the number of strikes and the business cycle (see for example, Jurkat and Jurkat (1949) , Rees (1952) , O'Brien (1965) and Weintraub (1966)). Since then it has generally been accepted that strike activity varies procyclically. In the first part of the research presented here, I test this proposition with these new data using the same statistical techniques used in earlier studies. This new data set has a number of advantages over the data used by Rees *et al* . Not only do we know the number of strikes but we also know the number of contract expirations, and hence, the strike probability. Information on strike lengths, a second important dimension of strike activity, is also available. The earlier work made no distinction between strikes that occur over the conditions of a new contract and strikes that occur for other reasons. In this study only strikes that occur at contract expirations are included. Contrary to earlier findings, no evidence is found for any raw correlation between business cycle conditions and either the aggregate number of strikes, the probability of a strike, or the average duration of strikes.

¹ See Hansen (1921) for one of the earliest studies of work stoppages.

Although no raw correlation is found between the business cycle and aggregate measures of strike activity, when using data aggregated by two-digit industry and month and controlling for industry effects, significant cyclical effects on strike activity reappear. A clear distinction arises between the effect of variables that proxy the level of demand in the industry and those that proxy the state of the labor market. The former group, which includes the industry relative producer price index and a profit index, has a significant counter-cyclical effect on strike incidence, while the latter group, including the unemployment rate and the layoff rate by industry, has a pro-cyclical effect on strike incidence. Contrary to the predictions of most theoretical strike models, while the industry price index has a negative effect on strike probability it has the opposite effect on strike duration.

Underlying most of the theoretical strike models is the idea that strike activity is related to the absence of information. This idea can be traced back as far as Hicks (1945), and has been formalized in a number of recent papers, including Crampton (1982), Morton (1983), Hayes (1984), Fudenberg, Levine and Ruud (1984), Kennan (1985) and Tracy (1984). I find strong evidence that uncertainty, as measured by both the variance of the industry producer price index and by the variance of the unemployment rate, increases the probability of a strike. The dispersion of the unemployment rate increases the length of strikes, but the dispersion of the industry producer price index has the opposite effect. The recent private information models of strikes suggest that strikes are used as an information revealing device during negotiations in which the firm possesses information not shared by the union. This paper suggests a new methodology for testing these models which uses the difference between future realized industry producer prices and their forecasted values at the time of the negotiations. There is no evidence that private information measured in this way affects strike activity.

Strike incidence is calculated from data on the number of strikes and the number of contract expirations. As both strikes and contract expirations are endogenous variables it is interesting to separate movements of strike incidence caused by movements in the number of strikes from those caused by movements in the number of contract expirations. Furthermore, many interesting questions can only be answered by examining strikes and contract expirations separately. For instance the overall social cost of strikes is more clearly related to the total number of strikes than to strike incidence. While the industry

producer price index affects strike probability via its affect on the number of strikes, the level and variance of unemployment affect the number and probability of strikes differently. Surprisingly, the statistical models explain more of the variation in the number of strikes than the variation in the strike probability.

The paper is organised as follows: Section 2 describes in detail the data used in this study. Section 3 describes the business cycle patterns of strike activity using the statistical techniques used by Rees. Multivariate regression techniques are used to further explore the effects of different cyclical variables on strike activity in Section 4. The effects on strike activity of the existence of uncertainty and private information are discussed in Section 5. Section 6 decomposes the movements of strike probability into movements in the number of strikes and movements in the number of contracts and Section 8 contains some concluding remarks.

2. A Description of the Data

2.1 The Micro data

When the earlier time-series studies of strike activity were written, the only strike data available consisted of the aggregate number of strikes per month.² A major problem with these data is that it is impossible to distinguish between changes in the level of strike activity caused by changes in the *opportunity* to strike afforded by contract expirations and those caused by changes in the *incidence* of strikes at contract expirations. Furthermore, the data obscured differences between industrial disputes occurring at contract expirations over the terms of the new contract and strikes occurring during the life of a contract over, say, grievances.

Tracy (1984) collected the first large micro data set of American labor contract expirations and strikes for manufacturing industries over the years 1973-1977.^{3 4} This study uses a considerably expanded and updated version of these data covering the twelve years 1970-1981. The breadth of the data set was increased some 40% by including contract information from non-manufacturing industries (except construction and mining). The quality of the strike data was also improved by using a new listing of strike data made available by the Bureau of National Affairs (B.N.A.).⁵

The Bargaining Calendar, published monthly by the Bureau of Labor Statistics (B.L.S.), reports all major contracts covering 1000 workers or more which are due to expire each month. It also includes contracts which are scheduled to reopen -- these make up 3% of the contract expirations and are treated identically to other contract expirations.⁶ The data cover 7722 contracts for 2725 bargaining pairs and

² See, for example, Rees (1952) and later Ashenfelter and Johnson (1969).

³ An earlier micro data set was used by Farber (1978) but consisted of only 80 contracts for 10 bargaining pairs.

⁴ Cynthia Gramm simultaneously collected a micro data set similar to the contract data set used in this study. Her strike data, however, included only one of the three sources of strike data (the Industrial Relations Facts) that were available to us.

⁵ See Abowd (1986) for a full description of these data.

⁶ I suspect that contract reopeners are under-reported in the Bargaining Calendar. According to the BNA's Contract Clause Finder, scheduled contract reopeners account for about 13% of all contract expirations. Reopenings which are not explicitly scheduled in the preceding collective agreement are also missing from the Bargaining Calendar.

include the name of the firm, the union, the year and month of expiration, the number of workers in the bargaining unit, the location of the firm and whether the bargaining agreement covers a single plant, a multi-plant firm or more than one firm. To aid the matching of the strikes to the contracts, the exact day of the expiration was added when this was available.⁷

There are three main sources of strike data. Firstly, the Industrial Relations Facts, a weekly "in-house" publication of the BLS, records all strikes that either started or were continuing that week and that involved 1000 or more workers. Information on these strikes is collected from public sources including newspaper reports, union and trade journals, the Federal Mediation and Conciliation Service and State boards of mediation and arbitration. Secondly, the BNA provided a listing of strikes based also on newspaper reports and other public sources.⁸ A second listing of strikes was provided by the B.L.S. Some of the information on this listing is not available from public sources but was provided by the firm or the union involved in the strikes. For reasons of confidentiality, the names of the firms and the unions were removed from all of the strikes listed. Fortunately, detailed information such as the state in which the strike occurred, the number of workers involved, the 3-digit SIC industry code and dates of the beginning and end of the strike enabled a matching of these strikes to the other strike sources and to the contract expirations.⁹ These three sources of data were then merged to form a complete listing of strikes. As all of these listings were constructed from similar sources, it should be expected that there are many strikes reported in all three listings. Of the strikes that were merged to the contract expirations, 46% were listed in all three sources, 5% were listed only in the Industrial Relations Facts, 10% were listed only by the BNA and 9% were listed only in the second, censored BLS listing.

When merging the strikes to the contract expirations a careful attempt was made to not erroneously include strikes which were not directly the result of the contract negotiations that occur when a contract expires (referred to below as contract strikes). Other strikes, including grievance, sympathy and jurisdictional strikes, are excluded. Strikes over local issues in a national agreement are also excluded.

⁷There were two sources, a listing of all contracts on file at the BLS and a magnetic tape of contracts listed in the Current Wage Developments sent to me by the BLS.

⁸ From the Work Stoppage Data Base created by Harriet Berlin.

⁹ The Current Wage Developments also lists strikes but these were all found to be listed by the BNA.

Both the BNA and the censored BLS listing included comments which were very helpful in distinguishing the cause of the strikes.¹⁰ As most of the literature does not distinguish between lockouts and strikes, the 8 lockouts were included in the sample.

A matching contract expiration was found for only 47% of the strikes that were explicitly labelled as contract strikes. There are a number of reasons why this problem could be expected to arise. Firstly, the strike data were restricted to those strikes which *affected* 1000 workers or more while the contract data were restricted to contracts *covering* 1000 workers or more. A strike over a contract covering less than 1000 workers could easily affect over 1000 workers if there is more than one bargaining unit within a firm.¹¹ Secondly, the Bargaining Calendar records only planned, rather than actual, contract expiration dates. If the contract is extended or reopened early, then the actual contract expiration could be considerably different from that recorded. Finally, by comparing a contract listing from the BNA, Collective Bargaining Negotiations and Contracts, and the contracts listed in the Current Wage Developments, it is, unfortunately, evident that there are contracts missing from the Bargaining Calendar. Many of these are missing from the early years of the sample, for example, airline and railway contracts were not reported until 1974, but there are also missing contracts within a panel history of some bargaining pairs. It would probably be fruitful to merge the contracts listed in Current Wage Developments and the BNA contract listing to the Bargaining Calendar to create a comprehensive contract listing, but this is beyond the scope of the research reported here.

Aside from the ability to calculate strike probabilities, a major advantage of this data set is the availability of strike duration data. Duration information was available for over 98% of the strikes in the merged contract-strikes data set. The duration of a strike was calculated as the number of calendar days from the beginning of the strike to the end of the strike. Strikes that lasted less than 24 hours were given a

¹⁰ If this data set is restricted to include only those strikes from the strike listing used by Gramm (1986) the strike incidence is 11.1% rather than the 13.25% she reports. One possible explanation is that since the Industrial Relations Facts provides no information on the cause of the strikes she may have included non-contract strikes in her sample.

¹¹ Conversely, there are strikes at contract expirations which involve a fraction of the workers in the bargaining unit which will have been missed.

duration of 1 day. In the four cases in which a strike started, stopped and then restarted, the duration was calculated as the total sum of days the workers were on strike.

Unfortunately, the date on which a strike ends is not an easily defined concept and this fact is reflected in the data. For 25% of the strikes reported in more than one of the three sources, the reported dates of the end of the strike differed by more than three days. On the other hand, it was very rare that the reported beginning date of the strike differed by more than one day. From studying individual strikes, there seem to be two major problems. Firstly, only 37% of the bargaining pairs in the sample (of strikes) consist of a single plant and a single union. The other "pairs" consist of multi-plant, multi-firm or multi-union (or a combination of the three) bargaining units. In these situations, it is frequently the case that, although the whole unit will go on strike together when the previous contract expires, each party to the agreement returns to work on a different date after specific local conditions are agreed upon. The second, related problem is that even in a single-plant, single-union bargaining unit not all workers decide to return to work at the same time. In response to this problem, the Industrial Relations Facts reports the end date of a strike as the day on which less than 1000 workers are still on strike. For the purpose of this study the earliest reported date of the end of the strike is used to calculate the strike length. Although this is clearly arbitrary, it can be justified by arguing that the date on which the first group of workers in a multiple party bargaining unit returns to work presumably marks the end of the dispute over the national agreement. This is consistent with the decision to exclude strikes over local issues in multi-establishment bargaining agreements.

The overall strike incidence in this sample was found to be 13.01%. In this study I restrict attention to 29 industries for which industry specific data are available. For these industries only, the estimated probability of a strike is 13.8%. Table 1 gives details of the data by industry. The column headed "strike incidence" gives the percentage of contract expirations at which a strike took place. The industries are listed in order of decreasing strike incidence. There is considerable variation across industries in the strike incidence, ranging from 35% in the rubber industry to 0% for the gas fuels extraction industry. Three measures of strike duration are reported: the average and median strike length conditional on a strike occurring and the average unconditional strike length. The unconditional strike duration is measured

including the absence of a strike as a zero day strike. This can be interpreted as a measure of expected strike length before it is known whether or not a strike occurred. The distribution of the conditional strike length is skewed to the right with a mode of one day, a median of 26 days and a mean of 43 days. The mean unconditional strike duration for all contracts is 6 days. The average conditional strike length also has a wide dispersion across industries with the shortest strikes occurring in the railway industry (2.5 days) and the longest in the paper industry (74 days). The correlation across two-digit S.I.C. industries between the strike probability and the conditional duration is only 0.28 (for the average) and 0.15 (for the median).

2.2 The Aggregated Data

To study the cyclical pattern of strike activity it would be preferable to use data on the level of demand for the output of each bargaining pair. Firm specific data on revenue, for example, are available on the COMPUSTAT Annual Industrial file. Not all firms are listed on the COMPUSTAT tapes, however, and no data are available on employers who bargain together in a trade association (30 % of the sample). The use of firm specific data would therefore restrict the sample considerably. In this study only industry-specific output variables are used and although this obscures interesting intra-industry variation in demand conditions it provides a useful preliminary description of the data. It is convenient to aggregate the data by month and 2-digit SIC industry.¹²

The 29 industries included in the contract sample are composed of 19 manufacturing industries and 10 non-manufacturing industries. As there are months in each industry in which no contracts expire, there are only 2177 observations rather than 4176 (29 x 144). Table 2 gives the number of contract expirations and the number of observations in the aggregated sample by industry. Although the number of observations in the grouped sample increases with the number of underlying contract expirations, it does not rise proportionately. Those industries which have many contract expirations are under-represented in the

¹² The analysis was also carried out disaggregating the broader two-digit industry categories such as food into three and four digit industries. The results were not significantly different from those reported here and are therefore omitted.

sample compared to those which have only a few contract expirations. For example, the food industry accounts for over 9% of the contract expirations but only 6.3% of the observations, while less than 1% of the contract expirations are classified in the miscellaneous products industry category but nearly 2% of the grouped observations are in this category. The number of observations also depends on whether the contract expirations within an industry are clustered in a few months of the year or spread evenly over the year. For example, in the railway industry there were 34 contract expirations over the sample period (0.6% of all contract expirations) but because they all occur in only 7 months the railway industry accounts for only 0.3% of the observations in the aggregated sample. As the number of individual observations can differ substantially from cell to cell, the equations were estimated using weighted least squares with the square root of the number of contract expirations as the weight.

Although strike incidence gives a measure of the probability of a strike occurring, the cost that the strike imposes on the firm is also an important dimension of strike activity. The ideal measure is the fraction of the rent from the bargaining match that is lost during a strike. Strike length is an obvious, although imperfect, proxy for this cost. Throughout the rest of the paper strike duration will refer to the mean strike length in each industry and month.

Table 3 gives the results of an analysis of variance on strike incidence and duration using the data aggregated by month and industry. Since the fraction of contract expirations that result in strikes is bounded between 0 and 1, the model may exhibit conditional heteroskedasticity. The standard errors of the industry and year effects in Table 3 are corrected using White's (1980) procedure.¹³ While Table 1 gives the overall strike incidence and mean conditional and unconditional duration, Table 3 (columns 1, 3, and 5) gives the average monthly strike incidence and duration by industry. Both the incidences and durations are similar in each table. Out of the 28 possible industry effects on strike probability presented in column 1, there are 8 that are significant at the 10% level. All the significantly positive industry effects occur in durable manufacturing industries with the exception of the large positive effect on strike incidence of a contract expiring in the rubber industry. Moreover, there are no significant positive industry effects on

¹³ In all of the results presented in this paper the standard errors are corrected for heteroskedasticity using White's (1980) procedure.

strike probability in the non-manufacturing industries. Column 2 of Table 3 reports the results of a regression of strike incidence on industry and year dummies. None of the industry effects change significantly when year dummies are included. There are significant year effects on strike incidence -- 7 out of the possible 11 year effects are significantly different from zero. Although there is a general decline in strikes incidence over the sample period, strike incidence peaked in 1970, 1974 and again in 1978. There was a particularly marked decline in strike incidence in the last three years of the sample.

The data on conditional strike duration are very noisy and there are few significant industry or year effects (see columns 3 and 4). Echoing the estimates for the micro data reported in Table 1, the longest strikes occur in the chemical, paper and gas and electricity industries, and the shortest in the railway industry, although all of the coefficients on the industry effects are smaller than twice their standard errors. Column 4 reports the results of a regression of conditional duration on industry and year dummies. There is no evidence of a decline in strike duration over the sample period, none of the year effects are significantly different from zero. While strike duration reaches its lowest level in 1980 which is a low strike incidence year, and peaks in 1978, a high strike incidence year, the (Spearman) rank-order correlation between the year dummies in column 2 and column 4 is only 0.08, indicating little correlation between year effects on strike incidence and year effects on strike duration.

Columns 5 and 6 of Table 3 report the results of regressing unconditional strike duration on industry dummies and industry and year dummies, respectively. To a considerable extent the results in columns 5 and 6 mirror the results of columns 1 and 3. The unconditional strike duration is highest in 1978 (controlling for industry effects) which was both a fairly high strike incidence year and the year with the longest strike duration. It is interesting that industry and year effects can explain a higher proportion of the variation in strike incidence and conditional strike duration than unconditional strike duration, which is just the product of strike incidence and conditional strike duration.

3. Business Cycle Patterns of Strike Activity

The first studies of the cyclical pattern of strike activity by Jurkat and Jurkat (1949), Rees (1952), O'Brien (1965) and Weintraub (1966), examined the conformity of cycles in the number of strikes to the business cycle. They found quite a strong conformity before 1939, but only a weak conformity for the post-war years. For comparison to this earlier work, I document the pattern of strikes over the business cycle for the period 1970-81 using the same statistical techniques used by Rees *et al.* While the earlier work could use only the aggregate number of strikes, I was also able to report figures for the strike incidence in addition to the number of strikes and the number of contracts. Figure 1 shows the number of strikes in the sample used in this study together with the number of strikes reported in the B.L.S. publication Work Stoppages which was the strike data used in the earlier studies. While Work Stoppages reports that 3220 strikes affecting more than 1000 workers occurred between 1970 and 1981, there are only 837 strikes in the sample used in this study. This is primarily because Work Stoppages includes strikes that do not occur over the terms of a new contract. I have also restricted the sample used in this study to cover 29 two-digit industries while Work Stoppages covers all industries. Although the number of strikes reported in Work Stoppages exhibits two peaks, in 1970 and 1977, which are not present in the sample used here (see Figure 1), the two series move closely together. Direct comparisons can thus be made between the results discussed below and the results of the earlier studies.

Table 4 reports the pattern of strikes, contracts and strike incidence over the business cycle. The business cycle and its turning points are defined by the U.S. Department of Commerce.¹⁴ Measured from peak to peak there are three full business cycles in the period 1970-81. The series on strikes, contract expirations and strike incidence were calculated by aggregating the micro-data by month. Each series was deseasonalized by adding the residual from a regression of the series on month dummies to the average of the series. Columns 1, 5 and 9 of Table 4 give the monthly average, of each of the variables for the three months centered around the trough, peak and following trough, respectively, of each business cycle.

¹⁴ Published in Business Conditions Digest by the U.S. Department of Commerce

Columns 2-4 and 6-8 give the monthly averages for the first, second and last third of the expansion and contraction, respectively.

There is little, if any, conformity to the business cycle of any of the three series. The number of strikes increases in only one of the three expansions (March 1975 to July 1980) and falls in only one of the three contractions (November 1973 to March 1975). Strike incidence does not show any more conformity to the business cycle than the series on the number of strikes. The last three rows of Table 4 give the monthly average of strikes, contracts and strike incidence over the three business cycles. Again there is no evidence of any conformity between the strike or contract series and the business cycle. Table 4 does illustrate well, however, the downward trend in both the number of strikes and the probability of a strike. During the 1970 contraction the average number of strikes per month was nearly 8 and the average strike incidence 19%, (see row 1 and 3), while during the expansion and peak between July 1980 and 1981 (see rows 10 and 12) the average number of strikes was only 3, and the average strike incidence was only 6%.

Figure 2 and Figure 3 illustrate the relationship between the annual unemployment rate and the annual strike incidence and conditional duration, respectively. Although the raw correlation is only -0.08 there is some evidence of a negative correlation between incidence and unemployment. The low unemployment years 1970, 1973 and 1978 are all high strike years. From Figure 2 there appears to be no clear relationship between strike duration and the rate of unemployment. The correlation coefficient is only +0.03.

In summary, unlike the earlier findings of Rees *et al*, there is very little correlation between the aggregate number of strikes or any of the other measures of aggregate strike activity and the business cycle.

4. The Effects of Cyclical Variables on Strike Activity : Some Regression Results

Kennan (1980) has argued that, while the reasons for ex post inefficient work stoppages are not clearly understood, given rationality, it is expected that strike activity will vary inversely with the total combined cost of the strike to the participants.¹⁵ With this in mind, I examine the separate components of the business cycle, dividing cyclical variables into those that would influence the cost of the strikes to the employer and those that influence the cost to the union. In this paper I focus on the level of demand for the industry's product as the major time-varying determinant of the cost of the strike to the firm, and the tightness of the labor market as the major determinant of the cost of the strike to the union. It may be cheaper for a firm to suffer a work stoppage when demand is slack and inventories are high. Not all previous authors have agreed with this assumption. For example, Vanderkamp (1970) has argued that the reduction in output resulting from a strikes produces a greater relative effect on profit at a business cycle trough than when profits are high. Also, a firm is more likely to lose customers in periods of slack demand when alternative sources of supply are plentiful. I assume that the level of unemployment increases costs to the union by lowering the alternative wage facing the striking workers and decreasing the probability that other members of the striker's family will be employed. An attempt is made to disentangle the labor market effects from the industry demand effects.

To study the cyclical behaviour of strikes three general indicators of aggregate demand were used : a composite index of four coincident indexes (CYCLE) , the national unemployment rate (UN), and a composite index of profitability (PROFIT). The cycle variable is constructed by the U.S. Department of Commerce from series on the number of employees on non-agricultural payrolls, industrial production , personal income and manufacturing sales. Although the unemployment rate leads the cycle index at peaks and lags at troughs, the two series are roughly coincident. The profit index is composed of after- tax

¹⁵ See also Reder and Neumann (1980).

corporate profits, the ratio of price to unit labor cost in non-farm business and an index of stock prices. It generally leads the business cycle index.¹⁶

To identify the effect of industry-specific profitability, a relative producer price index for each industry was used.¹⁷ This index was deflated by the economy wide producer price index but was not previously seasonally adjusted. In order to control for any separate effect the general level of prices may have on strike activity, the economy-wide producer price index also entered the regressions separately. Other measures of industry-specific demand such as sales or revenue were avoided to minimise the problem of determining the direction of causality between strike activity and the volume of industry sales or output. Although Gunderson and Melino (1985) showed that in the automobile industry a strike had a positive price effect, their results suggest that the effect on prices was much smaller than the effect on sales.

The results of an OLS regression of strike incidence and duration on these cyclical variables are reported in Tables 5 and 6, respectively. The regressions also include industry dummies, and separate dummies for the first two phases (August 1971 to December 1972) and the last two phases (January 1973 to April 1974) of the Nixon wage and price controls.¹⁸ Although there is little raw correlation between strike incidence and the business cycle, if we control for industry specific effects there is some evidence that strike incidence varies procyclically. The results in column 1 of Table 5 show a significantly negative coefficient on the national unemployment rate (measured monthly), while the results in column 2 show a significantly positive coefficient on the CYCLE index. In the third column, I include both the unemployment rate and separate year effects. The effect of the aggregate unemployment rate is again negative, although it is less accurately estimated than in column 1. The general level of profitability and the producer price index have a significant negative effect on strike incidence even though these series move procyclically. However, these effects vanish when year effects are added. In contrast to these aggregate

¹⁶ These series are published by the U.S. Dept. of Commerce in the Business Conditions Digest. They are seasonally adjusted.

¹⁷ Except for tobacco products, printing and publishing, public transportation, airlines, telephone communications, public utilities, restaurants, hotels & motels, entertainment and medical care for which the relevant component of the consumer price index was used. For all indexes 1976=100.

¹⁸ The wage and price freeze occurred between August 15 and November 14 of 1971 and was then replaced by Phase 2 which lasted through to January 11, 1973. Phase 3 started on January 11 and lasted until June 13, 1973. Phase 4 ended on April 30th, 1974.

business cycle effects on strike incidence, the results in Table 6 show no significant effects of either unemployment or CYCLE on the conditional duration of strikes. The results for unconditional strike duration in columns 4 and 6 of Table 6 show negative effects of unemployment and positive effects of the cyclical index, but the effects are rather imprecisely measured.

4.1 Industry Demand Effects

Industry demand is proxied in Tables 5 and 6 by the industry relative producer price index. This price index had a significant *negative* effect on strike probability and unconditional strike duration, even though for most industries it varies procyclically. The results in Table 5 suggest that a 10 percent increase in the relative industry producer price reduces the probability of a strike by approximately 1.2 percentage points. This effect is virtually the same whether unemployment or a cyclical index is used to measure aggregate business conditions, and is unaffected by the presence or absence of year effects. This effect is clearly not the result of the reverse effect of strike activity on the industry price level since the expected coefficient in this case is positive, rather than negative

However, there is convincing evidence that while strong demand conditions in an industry decrease the probability of a strike they increase the length of a strike when one occurs -- the industry price level has a significant *positive* effect on strike duration. The results in the first 3 columns of Table 6 suggest that a 10 percentage point increase in the relative industry producer price index increases the expected duration of a strike by 6 to 7 days. This opposite movement of strike incidence and duration is an important finding for future theoretical modeling of strikes. Existing strike models view the absence of a strike as just a strike of zero length, and factors which influence the probability of a strike influence the duration of a strike and in the same direction. Kennan (1984), analysing the hazard function for a set of conditional strike durations in American manufacturing industries, showed some evidence that strike duration moved countercyclically with respect to aggregate industrial production. In contrast, I find that

there are no general business cycle effects on duration but that duration varies procyclically with the industry price level.

Allowing the industry producer price effects to have different effects in durable good industries, non-durable good manufacturing industries and service industries confirms the result that strike incidence (and unconditional strike duration) are inversely related to the level of demand by industry. The first column in Table 7 shows that all three coefficients on the industry price variables are negative and roughly the same order of magnitude. An F-test cannot reject the hypothesis of equality between the coefficients in the three industry categories.¹⁹ The positive price effect on strike duration, on the other hand, seems to be a result of the positive effect of the price index on duration in the non-manufacturing industries. The effects of the relative industry producer price on strike duration in durable manufacturing industries are negative and poorly determined, while the effects in non-durable manufacturing industries are positive but insignificantly different from zero.

Decomposing the price effects into individual industry price effects provides further evidence of the negative effect of the industry producer price index on strike incidence (see Table 8). Although there are not enough degrees of freedom to estimate the equation with unrestricted industry dummies and industry-specific price coefficients, a dummy for whether or not the industry produced a durable good was included. Out of the 29 industry-specific price coefficients in the strike incidence regression, 25 are negative, and 10 of these have coefficients at least twice the size of their standard errors. Of the unconditional strike duration estimates, 24 are negative, 9 of which are significantly so. There is no consistent pattern to the coefficients in the conditional duration regression. Durable good industries experience more frequent and longer strikes than the other industries in the sample.

The results in tables 5, 6, 7 and 8 also present some evidence of the effects of the Nixon administration program of wage and price controls. The estimates suggest that the first two stages, when controls were more or less mandatory and widespread, were associated with a significantly lower strike incidence. When these controls were introduced there were fears that they would trigger an increase in strike

¹⁹ The probability value of the test statistic is 0.4.

activity as unions protested the controls.²⁰ These fears were completely unfounded, the first stages of the controls may have reduced strike incidence by over 5 percent. The effect of the first two stages of controls on strike length is poorly determined. The later stages of the controls when the controls were voluntary and specific to certain industries, apparently had little effect on either strike incidence or duration.

4.2 The Labor Market Effects

Although strike activity (incidence and duration) apparently varies procyclically with unemployment, it is unclear whether this is due to a labor market effect or from a general business cycle effect. In an attempt to capture this distinction, I ask whether the regional variation in strike activity can be explained by inter-regional variation in unemployment rates.

For the purposes of this section the data are aggregated not only by month and industry but also by region, yielding 4079 observations for 9 different regions. Table 9 shows the results of an analysis of variance on strike activity for these data. Although the variation across regions is less than the variation across industries there are still significant differences even after controlling for industry effects. The strike incidence in the East-South Central region is significantly larger than in the West-South Central region. Strikes are significantly longer in the Pacific region.

Table 10 shows the results of regressing strike activity firstly on national unemployment and then on both national and regional unemployment. There were 1432 contract expirations that covered bargaining units that were located in 2 or more regions. In these cases the regional unemployment was set to equal the national unemployment rate. The results are quite striking. When regional unemployment is omitted from the strike incidence regression the coefficient on national unemployment is significantly negative. However, three-quarters of this effect disappears when regional unemployment is added and the coefficient on national unemployment is no longer significant. Similarly, the negative effect of national unemployment on unconditional duration is solely the result of its correlation with regional unemployment.

²⁰ See Economic Report of the President January 1973.

The tightness of the labor market by industry is also relevant to the union's decision whether or not to strike, especially if the union represents skilled workers who are less mobile between industries. Two measures were used to proxy the "industry unemployment rate": (1) the number of layoffs per 100 workers employed in an industry²¹, and (2) the import penetration ratio. The latter is the ratio of imports to total domestic shipments, and provides a measure of the impact of international competition on the industry.²² Both these measures have a negative effect on strike incidence although the coefficient on the import penetration ratio is only just bigger than its standard error (see Table 11). Neither variable had any significant effect on strike duration.

As the industry labor market and its product market are so correlated, it is impossible to distinguish between labor market effects and product market effects. Even so, it is interesting that while an increase in layoffs or a rise in the import penetration ratio is usually associated with a decrease in demand, these variables have the opposite effect on strike activity to a rise in the industry price level.

²¹ The layoff data is available from the BLS LABSTAT labor turnover tapes.

²² These were drawn from Abowd (1986).

5. The Role of Information and Uncertainty

Any theoretical model of strikes must explain why strikes occur when they obviously reduce the rent to be divided between the bargaining pair. Why do the parties not agree earlier on the eventual settlement and avoid the costs of the strike? This problem was first discussed by Hicks (1946) who argued that strikes were mistakes due to "faulty negotiations" and that these mistakes could be avoided if there were adequate information. It has since been recognised that uncertainty in the absence of complete information may be the underlying reason for the occurrence of work stoppages.

In section 5.1, I describe the empirical relationship between strike activity and time-varying measures of the dispersion of industry-specific producer prices and aggregate unemployment. I then develop a test of the "protocol" model of Reder and Neumann (1980) based on the difference between the realized relative industry producer price index and the expectations of its value formed at some previous date. In section 5.2, I propose a test of the recent private information models of strike activity, again using the difference between realized and expected industry prices, but in this case it is a proxy for the firm's superior knowledge of the underlying profitability of the firm.

There is an important distinction between the determinants of strikes suggested in the first sub-section and the second sub-section. In the regressions in section 5.1 all independent variables are common knowledge to both the union and the firm at the time of the contract negotiations. In contrast, the forecasting residual used to proxy the firm's private information is, by definition, not public information at the time of the negotiations.

5.1 The Role of Public Information

The variance of the variables which are relevant to the bargaining procedure are some simple and obvious measures of the uncertainty facing the bargaining agents. Tables 12 and 13 show the results of regressing strike incidence and duration, respectively, on the variance of the industry relative producer price

index and the variance of the rate of (national) unemployment. The variance is taken over the three years before and including the current year.²³

The variance of the industry relative producer price index has a significant positive affect on strike incidence (see column 1 of Table 12). However, the variance of the industry producer price index has a significantly *negative* effect on strike duration. So it seems that both the level and dispersion of the industry producer price index have opposing effects on strike duration and strike incidence. The inclusion of a measure of price dispersion does not change the sign or size of the effect of the level of the industry producer price index. The importance of the dispersion of the industry producer price index seems to result from its cross-sectional variation. If the variance of industry prices is replaced by a measure of dispersion without cross-sectional variation (the average variance of industry prices calculated over all industries for each year) the significant effects of price dispersion disappear.²⁴

The variance of the national unemployment rate has a significant positive effect on both strike incidence and duration (see Table 12, column 2 and Table 13, columns 2 and 5). Controlling for the dispersion of unemployment also increases the absolute size of the unemployment effect. The coefficient on unemployment in the strike incidence regression (see column 2 in Table 12) remains negative but more than doubles in size. While unemployment in the previous regressions has no significant effect on strike duration, once I control for its dispersion, the coefficient becomes significantly negative.

Column 3 of Table 12 and columns 3 and 6 of Table 13 show the results of regressing strike activity on both the variance of unemployment and the variance of the industry relative producer price index. The inclusion of both measures of dispersion has little effect on any of the coefficients. The variance of the industry producer price index is much larger (nearly 1000 times) than the variance of the unemployment rate. To get an idea of the relative size of the effects of the two measures of dispersion, doubling the variance of the industry producer price index increases the strike incidence by about 0.4 percent and decreases strike duration by about 4 days while doubling the variance of the national unemployment rate increases strike incidence by about 2 percent and increases strike length by about 14 days.

²³ The variance taken over the past 5 years not including the current year yielded similar results.

²⁴ These results are not reported here but are available from the author.

There are a number of alternative models of the interaction between uncertainty and strike activity in the recent literature. Reder and Neumann (1980), for example, argue that since reaching an agreement is costly, bargainers develop a long-term implicit contract or "protocol" which specifies a contingent set of rules to guide negotiations. Specifying a protocol for all states of nature is costly, so it is unlikely to cover all states of nature. Lack of information and therefore strike activity will be greatest in those states not covered by the protocol. To formalize this suppose there are N possible states of nature indexed by j . $P(j)$ is the probability of state j , $M(j)$ is the total cost to both parties of agreement without a protocol, $N(j)$ is the total cost of agreement when state j is covered by a protocol and $D(j)$ is the cost of specifying a protocol for state j . Then in G states of nature there will be no protocol and hence more strike activity, where $j \in G$ if

$$P(j) \cdot M(j) < P(j) \cdot N(j) + D(j)$$

or,

$$M(j) - N(j) < D(j) / P(j).$$

If $D(j) / P(j)$ is fixed, then the model predicts that strike activity will be inversely related to $M(j) - N(j)$, the total cost of the strike. In this sense the model is another version of the total cost theory discussed in Section 4. Although it may be reasonable to assume that the cost of specifying a protocol for an additional state, $D(j)$, is fixed over different states of nature, we would expect that $P(j)$ varies with the state of nature. In this case strike activity will be concentrated in those situations that were thought of as low probability occurrences at the time the protocol was written. The information that is unavailable in this example is the ability to perfectly foresee all possible states of nature. For the purpose of examining whether or not this form of uncertainty is important, I assume that the industry price index is a sufficient statistic for the state of nature.²⁵ Furthermore, I assume that an econometrician can completely replicate in a forecasting equation the bargaining agents' prediction of this variable. Given these assumptions it is natural to use the absolute size of the difference between the actual price and the forecasted price as a proxy for the prior probability of the occurrence of a realized state of nature. The higher the absolute size of this residual, the lower the prior probability of that state occurring, and the higher the predicted probability of strikes.

²⁵ I could equally well have used the unemployment rate.

To find the unexpected changes in the industry price level three price forecasting equations were estimated for each industry and year forecasting 12, 18 and 36 months into the future. It is assumed that the forecasters have a limited memory of only six years and that they update their forecast each year.²⁶ The price forecasting equation estimated to forecast 12, 18 and 36 months in advance are:

12 month forecast

$$P_{it} = \beta_{0it} + \beta_1 P_{i,t-12} + \beta_2 P_{i,t-24} + \beta_3 P_{i,t-36} + \beta_4 PP_{t-12} + \beta_5 PROFIT_{t-12} + \beta_6 UN_{t-12} + \beta_7 CYCLE_{t-12} + \sum \partial_i M_i + e_{it} \quad t=1 \text{ to } 144$$

18 month forecast

$$P_{it} = \beta_{0it} + \beta_1 P_{i,t-18} + \beta_2 P_{i,t-24} + \beta_3 P_{i,t-30} + \beta_4 PP_{t-18} + \beta_5 PROFIT_{t-18} + \beta_6 UN_{t-18} + \beta_7 CYCLE_{t-18} + \sum \partial_i M_i + e_{it} \quad t=1 \text{ to } 144$$

36 month forecast

$$P_{it} = \beta_{0it} + \beta_1 P_{i,t-36} + \beta_2 P_{i,t-42} + \beta_3 P_{i,t-48} + \beta_4 PP_{t-36} + \beta_5 PROFIT_{t-36} + \beta_6 UN_{t-36} + \beta_7 CYCLE_{t-36} + \sum \partial_i M_i + e_{it} \quad t=1 \text{ to } 144$$

where M_i are monthly dummies to control for seasonal variation, P_{it} is the industry relative producer price index, PP_t is the producer price index, $PROFIT_t$ is the profit index, and UN_t is the national unemployment rate. The regressions were run for each industry in each year (29 x 12 regressions). The absolute size of the residual, $Res_{it,t-s} = P_{it} - P_{it}^f(I_{t-s})$ was calculated for $s=12, 18$ and 36 where P_{it} denotes the actual price in period t and $P_{it}^f(I_{t-s})$ refers to the price forecasted for period t using the information available in period $t-s$. The variance of this residual was also calculated as a proxy for the general level of uncertainty facing the forecaster.

According to the Reder and Neumann model, the difference between the level of demand at the time of the negotiations and the expected level of demand at the time that the protocol was developed should provide an index of the degree of strike activity. The absolute size of the difference between the price forecasted 18 months ago and the actual price has a positive effect on all three measures of strike activity, significantly so in the incidence and unconditional duration regressions. The price residuals estimated from the 12 month and 36 month regressions have no significant effects. The ability to forecast industry

²⁶ Although the data allows the forecaster to update every month this would require running 29 x 144 regressions for each of the three forecasts.

prices, proxied by the variance of the residuals, had no significant effect on strike activity in any of the regressions. Insofar as the size of the difference between current prices and those expected 18 months ago seem to increase strike activity there is some evidence in favor of the Reder and Neumann model.

5.2 The Role of Private Information

Ashenfelter and Johnson (1969) were among the first to implicitly discuss the role of asymmetrical information in bargaining. In their model the firm's management and the union leaders possess information not shared by the rank and file of the union. The rank and file hold expectations on the maximum wage change that the firm will grant, and it is assumed that these expectations are revised downwards during a strike. The union leader agrees to take strike action to avoid the politically damaging consequences of accepting a wage change much lower than that expected by the rank and file. The strike plays an important signalling role in convincing the rank and file of the intentions of the management. An oft-cited criticism of this model is that it does not allow rational economic behaviour by the rank and file of the union. Why should they consistently have incorrect expectations when they would be better off accepting the initial wage offer with no strike ?

It was the private information models of Crampton (1982), Morton (1983), Hayes (1984), Fudenberg, Levine and Ruud (1984), Kennan (1985) and Tracy (1984)²⁷ that first provided a fully consistent rationale for maximizing agents to use work stoppages during negotiations. In these models the firm possesses information on the state of nature that is not shared by the union. The strike is used by the union as an information revealing device and, as such, is an ex-ante efficient bargaining tool. These models therefore provide a consistent theoretical basis for the behaviour of the rank and file in the Ashenfelter and Johnson model. The union "leadership" who play a passive role in the Ashenfelter and Johnson model are ignored in the private information models.

In order for the strike to function effectively as a screening device, it is necessary that it impose a cost on the informed party which varies with the unobservable (to the uninformed party) state of nature.

²⁷ See Chapter 1 of my dissertation for a description and comparison of these models

Strikes occur more often, and for longer, when the value of the unobservable variable implies a low value of the rent. Intuitively, there is no incentive for the firm to pretend that the rent is high in the low-rent state and so pay a higher wage, thus there is no need to impose a penalty on the firm for declaring that the rent is high. An increase in the variance of the unobservable variable increases the uncertainty facing the bargainers and hence (in most of the models) increases strike activity.

A major contribution of the private information models is that they stress that it is the value and variance of a variable that is *unobservable* to one agent which is important in determining strikes. Clearly a fundamental problem in empirically testing these models is that since the important determining variable is unobservable to the union it is presumably unobservable to the economist. While it is tempting to argue that the firm may have superior information about the underlying profitability of the firm and proxy this with a measure of profit or sales, this would completely misinterpret the private information models. If data on profit are currently available in published form then it is difficult to believe that the union could not, fairly costlessly, find access to this information at the time of the contract negotiations and avoid the costly work stoppage.

The approach to this problem suggested in this paper is to assume that the unobservable variable enables the firm to forecast future demand (in particular, the price level) more precisely than the union. The obvious empirical counterpart is the ex post forecasting residual from a price forecasting equation, $Res_{i,t+s,t} = P_{i,t+s} - P_{i,t+s}(I_t)$. This is the difference between realized future prices and the prediction of these prices made today and *not* the difference between today's prices and those forecasted for today, which was used in the previous section to proxy the deviation of current conditions from their expected values at some time in the past when bargaining protocols were established. The residuals are, however, estimated from the same forecasting equations. It is important to indicate that this test of the private information models requires that the firm's private information at the time of the contract negotiation will eventually become publicly available. The realized price forecasting residual will correspond exactly to this unobservable determinant of strikes if, (1) the firm has perfect foresight of future prices and (2) the econometrician has the same forecasting ability as the union. If there is a difference between the firm's price forecast and the actual price, or a difference between the union's price forecast and the econometrician's

price forecast, then there will be measurement error which will bias the estimates in a strike regression toward zero. A similar methodology was used by Tracy (1984). In his work, the excess return in a CAPM securities equation was used as a proxy for the unobservable, though only the standard deviation and not the value of the residual itself was used in the econometric specification.

One objection to this methodology (see, for example, Kennan (1985)) is the following: Why are contracts not written which make the division of the rent contingent on the future relative price thereby avoiding the costly strikes involved in the information revealing process? In practice, few contracts are written contingent on firm or industry-specific future observable variables. The reasons for this fact are unclear but may be related to the cost of writing and enforcing complicated contingent contracts.

The private information models predict that strike activity should increase the more the actual price falls below the forecasted price and the greater the variance of this forecasting residual. From Table 16 and 17 we can see that there is little evidence that this is the case. None of the coefficients on the price residuals are significantly different from zero and only 5 out of the 9 coefficients are negative. The coefficient on the variance of the residual is only significantly different from zero in one of the regressions -- it is positive in the regression of the unconditional strike duration on the 36 month price forecasting residual. There is really no evidence at all that strike activity increases when the union is over-optimistic about future demand conditions, as this interpretation of the private information models would suggest.

It was surprising to find that the variance of the forecasting residual had little effect on strike activity given the work by Tracy (1984) who found significant positive effects of uncertainty on strike incidence in his work using stock market data. The variance of the actual industry relative producer prices is the sum of the variance of the forecasted prices and the variance of the residual from the forecasting regression.²⁸ While the dispersion of the actual prices had a significant effect on strike activity (see section 5.1), this evidence suggests that this effect is a result of the dispersion in the forecasting price and not the result of the dispersion in the forecasting residual.

²⁸ This decomposition is not exactly valid. While the variance of the actual price was taken over 3 years of data the forecast error is taken over 6 years of data.

While it is hoped that this evidence will help guide future econometric modeling of strike activity, it would be incorrect to consider these empirical results as a rigorous test of the private information models. Firstly, it may be incorrect to study strike activity at the 2-digit SIC industry level. For example, it is very plausible, and consistent with a private information story, that strikes occur at a time when the firm is suffering an unexpected fall in demand when the rest of the industry is doing well. This pattern would be completely obscured in the aggregate data. Secondly, the empirical tests of the private information models would be irrelevant if unexpected price movements do not capture the private information. Suppose strikes occur to infer information on the relative contribution to the overall rent of different bargaining units within a firm. In this case even firm specific price data could not capture the private information.

6. The Decomposition of the Movements in Strike Probability into the Separate Movements of Strikes and Contract Expirations

This paper has shown that cyclical variables significantly affect strike probabilities. As the number of contracts that expire is also endogenous it is interesting to ask whether the effect on the probability of a strike works through a change in the number of strikes or through a change in the number of contract expirations. Each regression from the previous analysis was repeated replacing strike incidence with the number of strikes and the number of contracts in turn. The coefficients were divided by the average number of strikes (or contracts) in a cell to find the proportionate effect of each variable. This was repeated for the coefficients from the strike incidence regressions reported in the previous sections.²⁹ It is then possible to decompose the effect on strike probability into the sum of an effect on the number of strikes and an effect on the number of contract expirations.³⁰ Some of the more interesting results are reported in Tables 18 through 20.

It is again useful to divide the variables into those that affect the product market and those that affect the labor market. Neither the industry price index nor the profit index have any significant effect on the number of contracts that expire in a given period. Likewise, the effect of the variance of industry producer prices on the strike probability is due solely to its effect on the number of strikes (see Table 20). Indeed the statistical model in Table 18 can explain the number of strikes a little better than it can explain the strike probability -- the R^2 is 0.154 for the number of strikes and 0.138 for the strike probability.

Although from Table 18 it seems that unemployment has no effect on contract expirations, this result is misleading. When regressed on both regional and national unemployment (see Table 19), both rates of unemployment have significant effects on the number of contract expirations and no effect on the number of strikes. Surprisingly, regional unemployment increases the number of contracts expiring while

²⁹ The strike probability is divided by the average weighted strike probability where the weight equals the square root of the number of contracts.

³⁰ As the proportionate effect is estimated from a linear regression the proportionate change in the strike probability need not exactly equal the difference between the proportionate change in the number of strikes and the proportionate change in the number of contract expirations.

national unemployment has the opposite effect.^{31 32} This divergence in the effect of different measures of unemployment explains why we saw no effect of national unemployment on contract expirations in Table 18 when regional unemployment was excluded. The variance of unemployment has a positive effect on the strike probability via its effect on the number of contracts.

Finally, while the results are not shown in Tables 18 through 20, it is interesting that the Nixon wage and price controls decreased both the number of strikes and the number of contracts in this data set. Mitchell (1975) has claimed that there is evidence that contract length became shorter during this period as the bargaining pair faced more uncertainty. The evidence from this sample suggests the opposite: bargaining pairs rescheduled contract expirations to a later date to avoid the controls.

³¹ The data used to construct Table 18 are aggregated by month and industry while the data used in Table 19 are aggregated by month, industry and region so direct comparison cannot be made. However, excluding regional unemployment and layoffs from the regression shown in Table 18 yields similar coefficients to those in Table 18.

³² While national unemployment has a positive effect on the number of contracts in Table 20, this effect disappears when we add regional unemployment to this model.

8. Conclusions

The major findings of this paper can be summarized as follows:

1. The overall strike incidence was found to be 13.8%, but there is great variation across industries. The largest strike incidence occurs in the rubber industry (35%) and the lowest in the gas fuels industry (0%). Strike incidence also varies considerably from year to year and there has been a general decline in the strike incidence over the period studied. Strike durations are skewed to the right, the modal strike length is 1 day, the median is 26 days, and the mean is 43 days. There were few significant industry or year effects on strike duration.
2. Contrary to the findings of Rees, there is no simple correlation between the fluctuations of strikes and the fluctuations of the business cycle. If we control for specific industry effects then strike incidence, but not duration, varies procyclically.
3. The level of demand in an industry, as measured by the industry relative producer price index, has a negative effect on strike incidence but a positive effect on strike duration. This divergence in the movements of incidence and duration is contrary to the predictions of existing theoretical strike models.
4. Higher unemployment reduces the probability of a strike, but it is regional unemployment and the unemployment in the industry that matters and not the national level of unemployment. Layoffs produce the same effect on strike activity as the industry price index although there is a negative correlation between the two series.
5. Although the variance of the industry producer price index and the variance of the unemployment rate both have a positive effect on strike activity, none of the more complicated measures of uncertainty and private information were important. Neither the difference between the price today and the price forecasted

for today at some previous date, nor the difference between the realized future price and the price forecasted at the time of the contract negotiations affected strike activity.

6. Cyclical indicators are able to predict the number of strikes at least as well as, if not better than, the incidence of strikes. The price index and the variance of the industry producer price index affect the probability of a strike via a change in the number of strikes. Changes in unemployment, both national and regional, and the variance of unemployment affect the strike probability by changing the number of contracts that expire.

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Table 1

Strike Incidences and Durations by Industry : Individual Contract Data 1970-81

	(1)	(2)	(3)	(4)	(5)	(6)
<u>Industry</u>	<u>Contracts</u>	<u>Strikes</u>	<u>Strike Incidence</u>	<u>Duration (days)</u>		
				<u>Cond. (av)</u>	<u>Cond (med)</u>	<u>Uncond.(av)</u>
Rubber & related products	96	34	0.35	42.3	28.5	15.0
Non-electrical machinery	459	131	0.29	45.0	28.0	12.9
Fabricated Metal Products	282	66	0.23	45.6	33.5	10.6
Transportation Equipment	518	117	0.23	48.2	30.0	10.9
Furniture & Fixtures	54	12	0.22	36.8	25.5	8.2
Public Transport.	99	20	0.20	28.4	14.0	5.7
Electrical machinery & Equipment	475	77	0.16	41.1	25.0	6.7
Hospitals	96	15	0.16	19.6	7.0	3.1
Iron & steel	414	59	0.14	37.7	23.5	5.4
Miscellaneous Products	53	7	0.13	26.1	20.0	3.5
Stone, clay & Glass	172	22	0.13	33.2	24.0	4.2
Lumber & wood	106	13	0.12	29.7	18.0	3.6
Food & Allied Products	568	63	0.11	42.5	18.5	4.3
Printing & Publishing	157	17	0.11	22.8	9.0	2.5
Tobacco Products	40	4	0.10	42.5	41.5	4.3
Chemicals & allied Products	305	30	0.10	61.6	45.0	6.1
Gas & Electricity	483	46	0.10	64.0	55.5	6.1
Telephone Communications	321	28	0.09	46.9	24.5	4.1
Entertainment Services	82	7	0.09	48.9	30.0	4.2
Paper & allied products	318	27	0.08	73.7	50.5	6.3
Petroleum products	121	8	0.07	43.4	35.5	2.9
Airlines	131	8	0.06	50.9	28.5	3.1
Railways	34	2	0.06	2.5	2.5	0.1
Hotels & Motels	90	5	0.06	17.0	18.0	0.9
Textiles products	107	5	0.05	26.0	28.0	1.2

Table 1

Strike Incidences and Durations by Industry : Individual Contract Data 1970-81

	(1)	(2)	(3)	(4)	(5)	(6)
Men & women's apparel	245	9	0.04	8.4	8.5	0.3
Hides & Leather	102	3	0.03	8.4	8.5	0.3
Restaurants	123	2	0.02	8.0	8.0	0.3
Extraction of gas fuels	8	0	0.00	.	.	0
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All industries	6059	837	0.138	43.4	26.0	5.9

(1) Number of contracts expiring 1970-1981.

(2) Number of strikes.

(3) Strikes as a proportion of contracts expiring.

(4) Average duration of strikes conditional on a strike occurring.

(5) Median duration of strikes conditional on a strike occurring.

(6) Average duration of strikes unconditional on a strike occurring.

Table 2

Number of Contracts and Observations in Sample by Industry

<u>Industry</u>	<u>No of Contracts</u>		<u>No. of Observations</u>	
	(1)	(2)	(3)	(4)
Extraction of gas fuels	8	0.1%	7	0.32%
Food & allied products	568	9.4%	138	6.3%
Tobacco	40	0.7%	22	1.0%
Textiles	107	1.8%	72	3.3%
Apparel	245	4.0%	83	3.8%
Lumber	106	1.8%	50	2.3%
Furniture	54	0.9%	50	2.3%
Paper	318	5.3%	104	4.8%
Printing & Publishing	157	2.6%	83	3.8%
Chemicals	305	5.0%	118	5.4%
Petroleum	121	2.0%	33	1.5%
Rubber	96	1.6%	39	1.8%
Leather	102	1.7%	67	3.1%
Stone, Clay & Glass	172	2.8%	79	3.6%
Iron & Steel	414	6.8%	98	4.5%
Fabricated Metals	282	4.7%	117	5.4%
Non-electrical Machinery	459	7.6%	124	5.6%
Electrical Machinery	475	7.5%	124	5.7%
Transportation Equipment	518	8.6%	135	6.2%
Miscellaneous Products	53	0.9%	41	1.9%
Railways	34	0.6%	7	0.3%
Public Transport	99	1.6%	62	2.8%
Airlines	131	2.2%	66	3.0%
Telephone	321	5.3%	85	3.9%
Gas & electricity	483	8.0%	120	5.5%
Restaurants	123	2.0%	80	3.7%

Table 2

Number of Contracts and Observations in Sample by Industry

Hotels & Motels	90	1.5%	59	2.7%
Hospitals	96	1.6%	61	2.8%
Entertainment	82	1.4%	53	2.4%

(1) Number of contracts

(2) Number of contracts as a percentage of all contracts

(3) Number of observations in sample aggregated by month and industry .

(4) Number of observations as a percentage of all observations in sample

Table 3

Analysis of Variance of Strike Probabilities and Durations : Monthly Data by Two-digit Industry

<u>Weighted Least Squares: Weight=Number of Contracts^a</u>						
	<u>Strike Probability</u>		<u>Cond. Duration</u>		<u>Uncond. Duration</u>	
	(1)	(2)	(3)	(4)	(5)	(6)
intercept	0.132 (0.046)	0.178 (0.050)	26.70 (28.90) ^b	27.23 (29.57)	3.45 (3.17)	6.06 (3.32)
<u>industry dummies:</u> ^c						
gas fuels	-0.132 (0.046)	-0.140 (0.047)	----- ^d	----- ^d	-3.45 (8.76)	-3.83 (8.71)
food	-0.021 (0.048)	-0.022 (0.049)	11.10 (29.53)	11.96 (29.40)	0.43 (3.32)	0.58 (3.30)
tobacco	-0.032 (0.064)	-0.025 (0.066)	15.74 (42.00)	15.75 (41.86)	0.80 (4.84)	1.43 (4.82)
textiles	-0.085 (0.050)	-0.087 (0.051)	-2.25 (39.94)	-0.58 (39.76)	-2.24 (3.88)	-2.22 (3.86)
apparel	-0.095 (0.048)	-0.104 (0.049)	-19.35 (34.62)	-15.90 (34.36)	-3.18 (3.50)	-3.43 (3.48)
lumber & wood	-0.009 (0.054)	0.002 (0.056)	-9.57 (31.42)	-6.08 (31.33)	0.19 (3.88)	-0.64 (3.87)
furniture	0.090 (0.071)	0.083 (0.072)	6.44 (37.84)	9.44 (37.61)	4.73 (4.46)	4.63 (4.44)
paper & allied products	-0.047 (0.049)	-0.049 (0.050)	38.53 (30.34)	36.93 (30.32)	2.84 (3.43)	2.88 (3.41)
printing & publishing	-0.023 (0.051)	-0.026 (0.051)	-8.48 (31.61)	-7.46 (31.54)	-0.99 (3.67)	-1.10 (3.65)
chemicals	-0.034 (0.049)	-0.036 (0.050)	44.14 (30.54)	44.78 (30.39)	2.61 (3.44)	2.66 (3.42)
petroleum	-0.066 (0.054)	-0.051 (0.054)	12.85 (31.61)	10.70 (31.47)	-0.58 (3.80)	-0.03 (3.79)

Table 3**Analysis of Variance of Strike Probabilities and Durations : Monthly Data by Two-digit Industry**

	(1)	(2)	(3)	(4)	(5)	(6)
rubber	0.222 (0.078)	0.208 (0.077)	11.99 (31.38)	14.01 (31.17)	11.55 (3.95)	11.37 (3.93)
leather goods	-0.103 (0.049)	-0.107 (0.050)	-9.03 (60.17)	-7.53 (59.79)	-2.93 (3.91)	-3.00 (3.89)
stone ,clay glass	-0.004 (0.055)	0.001 (0.055)	7.19 (31.83)	6.05 (31.75)	0.60 (3.63)	0.97 (3.61)
iron & steel	0.010 (0.051)	0.019 (0.051)	4.76 (29.53)	5.60 (29.51)	1.47 (3.37)	2.14 (3.37)
fabricated metal products	0.102 (0.053)	0.104 (0.054)	9.77 (29.87)	11.51 (29.73)	7.23 (3.46)	7.49 (3.44)
non-electrical machinery	0.153 (0.050)	0.155 (0.051)	17.62 (29.30)	19.44 (29.18)	9.40 (3.35)	9.66 (3.33)
electrical machinery	0.030 (0.052)	0.029 (0.052)	20.28 (29.53)	12.69 (29.38)	3.13 (3.34)	3.32 (3.33)
transportation equipment	0.094 (0.051)	0.096 (0.051)	27.05 (29.34)	28.18 (29.20)	7.42 (3.33)	7.60 (3.31)
miscellaneous	-----	-----	-----	-----	-----	-----
railroads	-0.073 (0.070)	-0.035 (0.069)	-24.20 (79.80)	-23.09 (70.26)	-3.31 (5.07)	-1.55 (5.07)
public transportation	0.070 (0.061)	0.063 (0.061)	2.72 (33.00)	2.31 (32.82)	2.27 (3.93)	2.06 (3.91)
airlines	-0.071 (0.051)	-0.057 (0.052)	23.28 (34.86)	17.30 (34.85)	-0.35 (3.76)	0.08 (3.74)
telephone	-0.045 (0.048)	-0.039 (0.050)	4.65 (29.66)	10.83 (29.63)	0.35 (3.42)	0.85 (3.42)
gas & electricity	-0.037 (0.047)	-0.034 (0.048)	36.29 (29.60)	38.79 (29.48)	2.53 (3.34)	2.65 (3.32)

Table 3

Analysis of Variance of Strike Probabilities and Durations : Monthly Data by Two-digit Industry

	(1)	(2)	(3)	(4)	(5)	(6)
restaurants	-0.116 (0.047)	-0.117 (0.048)	-19.70 (45.04)	-14.88 (45.23)	-3.32 (3.79)	-3.25 (3.77)
hotels & motels	-0.077 (0.051)	-0.073 (0.052)	-12.03 (42.00)	-5.06 (41.85)	-2.51 (4.00)	-2.22 (3.97)
entertainment services	-0.047 (0.054)	-0.045 (0.056)	18.30 (36.84)	20.02 (33.35)	0.72 (4.07)	1.02 (4.05)
hospitals	0.024 (0.059)	0.024 (0.059)	-6.72 (33.52)	-4.27 (36.62)	-0.39 (3.95)	-0.27 (3.93)
<u>Year dummies:</u>						
1970	--	--	--	--	--	--
1971	---	-0.048 (0.026)	--	8.26 (8.27)	-	-2.52 (1.43)
1972	---	-0.062 (0.026)	--	-7.39 (10.52)	--	-4.19 (1.62)
1973	---	-0.022 (0.028)	--	-4.60 (9.28)	--	-2.76 (1.53)
1974	---	-0.003 (0.026)	--	-10.55 (8.20)	--	-2.04 (1.42)
1975	----	-0.046 (0.026)	--	7.26 (10.06)	--	-1.35 (1.56)
1976	---	-0.024 (0.029)	--	-8.76 (8.94)	--	-3.09 (1.48)
1977	--	-0.070 (0.025)	--	7.57 (8.39)	--	-3.68 (1.41)
1978	---	-0.014 (0.029)	--	15.63 (10.06)	--	1.15 (1.65)
1979	---	-0.046 (0.029)	--	9.05 (9.95)	---	-2.28 (1.53)
1980	---	-0.111 (0.025)	--	-13.76 (9.32)	--	-5.90 (1.47)

Table 3

Analysis of Variance of Strike Probabilities and Durations : Monthly Data by Two-digit Industry

	(1)	(2)	(3)	(4)	(5)	(6)
1981	---	-0.118 (0.024)	--	-3.83 (11.89)	--	-5.81 (1.58)
Degrees of freedom	2148	2137	566	555	2148	2137
F ratio	9.91	8.93	2.07	2.10	5.45	4.97
R ²	0.114	0.140	0.090	0.126	0.066	0.083

(1), (3) and (5) No year dummies.

(2), (4) and (6) Year dummies included.

a. Weights=number of contracts in an industry-month cell.

b. Standard errors in parentheses . These are corrected for heteroskedasticity using White's (1980) procedure.

c. The omitted industry is miscellaneous manufacturing industries.

d. No strikes in sample.

Figure 1

NUMBER OF STRIKES IN SAMPLE AND ALL STRIKES BY YEAR

A : All strikes reported in Work Stoppages

S : Strikes in the sample used in this study

Dates of Reference Cycle			1	2	3	4	5	6	7	8	9	
Trough	Peak	Trough	Trough	---Expansion---			Peak	---Contraction---			Trough	
Dec 69	Nov 70											Strikes ^a
												Contracts ^b
												Strike Prob. ^c
Nov 70	Nov 73	March 75	7.6	8.2	3.6	6.0	6.2	10.7	13.3	8.1	3.5	Strikes
			43.1	55.2	30.8	37.6	39.1	52.4	65.5	50.7	40.2	Contracts
			0.19	0.16	0.11	0.15	0.17	0.21	0.21	0.18	0.10	Strike Prob.
March 75	Jan 80	July 80	3.5	5.7	6.4	5.1	4.9	4.3	-0.9 ^d	5.5	4.9	Strikes
			40.2	39.6	49.7	34.3	42.1	44.2	35.5	46.9	64.3	Contracts
			0.10	0.14	0.14	0.16	0.11	0.10	0.02	0.12	0.09	Strike Prob.
July 80	July 81		4.9	3.0	3.2	3.0	0.5					Strikes
			64.3	42.7	42.8	39.2	18.0					Contracts
			0.09	0.06	0.05	0.09	0.07					Strike Prob.
Average			5.3	5.6	4.4	4.7	3.9	7.4	6.7	7.1	5.3	Strikes
			49.2	45.8	41.1	37.0	33.1	43.6	45.9	44.2	49.2	Contracts
			0.14	0.16	0.13	0.12	0.10	0.09	0.14	0.13	0.14	Strike Prob.

Source : Dates of Business Cycle : Business Conditions Digest U.S. Department of Commerce

Strikes, Contracts and Strike Probabilities see Text Section 3

Table 4

Reference Cycle Pattern of Strikes, Contracts and Strike Probabilities

<u>Column</u>	<u>Description</u>
1	Monthly average for three months centered on trough.
2-4	Monthly average for first third, second third and last third of expansion.
5	Monthly average for three months centered on peak.
6-8	Monthly average for first third, second third and last third of contraction.
9	Monthly average for three months centered on trough

Notes

- a. Average number of strikes per month. Source: deseasonalized montly data on the number of strikes
- b. Average number of contracts per month.Source: deseasonalized monthly data on the number of contracts
- c. Average strike probability per month. Source: deseasonalized monthly data on strike incidence.
- d. The negative number of strikes occurs because the series is deseasonalized. There were only two strikes in April of 1980 which is usually a high strike month.

Figure 2

STRIKE INCIDENCE AND UNEMPLOYMENT BY YEAR

Figure 3

STRIKE DURATION AND UNEMPLOYMENT BY YEAR

Table 5

The Effect of Cyclical Variables on Strike Incidence

Weighted Least Squares Weight=number of contracts_{it}

	<u>Strike Incidence (S_{it})</u> ^b		
	(1)	(2)	(3)
Intercept	0.716 (0.141) ^c	0.394 (0.181)	0.359 (0.365)
time trend (t)	0.001 (0.001)	0.000 (0.001)	-0.004 (0.003)
Industry Price Index (P_{it}) ^d	-0.118 (0.038)	-0.117 (0.038)	-0.115 (0.039)
Producer Price Index (PP_t) ^d	-0.003 (0.001)	-0.002 (0.001)	0.002 (0.003)
Unemployment (Un_t) ^d	-0.012 (0.006)	-----	-0.021 (0.014)
Cycle Index ($Cycle_t$) ^d	-----	0.003 (0.001)	-----
Profit Index ($Profit_t$) ^d	-0.002 (0.001)	-0.002 (0.001)	-0.001 (0.003)
1st. stage of Nixon controls (nix1)	-0.050 (0.019)	-0.051 (0.019)	-0.071 (0.039)
2nd stage of Nixon controls (nix2)	-0.013 (0.020)	-0.015 (0.020)	0.003 (0.042)
<i>Industry Dummies</i> ^e	(included)	(included)	(included)
<i>year dummies:</i>			
1970	----	----	----
1971	----	----	0.017 (0.042)
1972	----	----	0.102 (0.063)
1973	----	----	0.064 (0.082)
1974	----	----	0.100 (0.087)
1975	----	----	0.150 (0.102)

Table 5

The Effect of Cyclical Variables on Strike Incidence

1976	----	---	0.192 (0.120)
1977	-----	----	0.164 (0.140)
1978	----	----	0.219 (0.159)
1979	----	----	0.186 (0.177)
1980	----	----	0.150 (0.196)
1981	----	----	0.168 (0.219)
Degrees of Freedom	2141	2141	2130
F ratio	9.83	9.85	7.89
R ²	0.138	0.139	0.146

(1) Unemployment included.

(2) Cycle included.

(3) Unemployment and year dummies included.

a. Weights=number of contracts in an industry-month cell.

b. Strikes as a proportion of contract expirations.

c. Standard errors in parentheses. These are corrected for heteroskedasticity using White's (1980) procedure.

d. Industry Price Index: 1976=1.00. Producer Price Index, Cycle index and Profit Index: 1976=100. Unemployment: %.

e. Industry dummies not reported

Table 6

The Effect of Cyclical Variables on Strike Duration

Weighted Least Squares Weight=number of contracts

	<u>Cond. Duration</u> ^a		<u>Uncond Duration</u> ^a			
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-70.509 (63.460) ^b	-72.921 (80.210)	102.229 (177.398)	21.787 (9.488)	9.072 (11.702)	20.458 (25.255)
time trend (t)	0.055 (0.290)	0.047 (0.343)	0.627 (1.195)	0.068 (0.045)	0.022 (0.052)	-0.154 (0.173)
Industry price index (P_{it}) ^c	69.918 (20.997)	70.295 (21.023)	64.044 (21.517)	-3.303 (2.972)	-3.249 (2.971)	-3.413 (3.014)
Producer Price Index (PP_t) ^c	-0.108 (0.375)	-0.107 (0.380)	-2.354 (1.516)	-0.122 (-0.055)	-0.106 (0.056)	-0.131 (0.215)
Unemployment (Un_t) ^c	-0.436 (2.273)	-----	5.768 (7.111)	-0.511 (0.345)	-----	-0.105 (0.974)
Cycle Index ($cycle_t$) ^c	-----	0.007 (0.485)	-----	-----	0.104 (0.073)	-----
Profit Index ($profit_t$)	0.349 (0.471)	0.338 (0.472)	-0.404 (1.177)	-0.036 (0.078)	-0.036 (0.078)	-0.011 (0.184)
1st. stage of Nixon controls	-8.261 (9.149)	-8.034 (9.172)	69.748 (37.840)	-3.333 (1.354)	-3.356 (1.357)	-0.664 (4.391)
2nd. stage of Nixon controls	- 1.251 (7.000)	-0.703 (7.133)	7.177 (13.210)	-1.464 (1.371)	-1.500 (1.158)	0.852 (2.409)
Industry Dummies ^d	(included)	(included)	(included)	(included)	(included)	(included)
Year dummies:						
1970	----	----	----	----	----	----
1971	----	----	1.008 (14.795)	----	----	-0.299 (2.375)
1972	----	----	-78.869 (41.759)	----	----	0.903 (5.225)
1973	----	----	7.451 (33.368)	----	----	3.493 (5.045)
1974	----	----	23.452 (37.993)	----	----	8.286 (5.593)
1975	----	----	41.437 (47.393)	----	----	12.515 (6.645)

Table 6

The Effect of Cyclical Variables on Strike Duration

1976	----	----	33.831 (54.613)	----	-----	13.352 (7.741)
1977	----	----	45.953 (62.993)	-----	-----	15.446 (8.975)
1978	----	----	87.683 (71.664)	-----	-----	22.991 (10.225)
1979	----	-----	110.308 (81.125)	-----	-----	23.153 (11.501)
1980	----	-----	115.465 (92.011)	-----	-----	23.902 (12.890)
1981	----	-----	150.239 (103.845)	-----	-----	27.867 (14.506)
Degrees of freedom	559	559	548	2141	2141	2130
F ratio	2.16	2.16	2.29	5.08	5.08	4.40
R ²	0.116	0.116	0.158	0.077	0.077	0.087

(1), (4) Unemployment included.

(2), (5) Cycle included.

(3), (6) Unemployment and year dummies included.

a. Duration in days.

b. Standard deviations in parentheses. These are corrected for heteroskedasticity using White's (1980) procedure.

c. Industry price index: 1976=1.00. Producer price index, profit index, and cycle index: 1976=100. Unemployment: %.

d. Industry dummies not reported

Table 7

The Effect of Industry Specific Prices on Strike Activity

Weighted Least Squares Weight=number of contracts

	<u>Strike incidence</u> (S_{it}) ^a	<u>Cond. duration</u> ^b	<u>Uncond duration</u> (UD_{it}) ^b
Intercept	0.822 (0.192) ^c	-7.438 (67.674)	29.842 (11.330)
time trend (t)	0.001 (0.001)	-0.052 (0.289)	0.068 (0.045)
Industry price index * Durable good	-0.228 (0.137)	-15.134 (37.828)	-11.273 (6.948)
Industry price index * Non-durable man. good	-0.063 (0.046)	34.066 (40.645)	-2.623 (4.401)
Industry price index * Non-durable nonman. good	-0.127 (0.051)	131.700 (28.197)	-0.541 (4.500)
Producer price index (PP_t) ^d	-0.003 (0.001)	-0.003 (0.373)	-0.125 (0.055)
Unemployment (Un_t) ^d	-0.012 (0.006)	-0.348 (2.253)	-0.524 (0.346)
Profit Index ($Profit_t$) ^d	-0.002 (0.001)	0.587 (0.476)	-0.028 (0.079)
1st phase of Nixon Controls (Nix1)	-0.050 (0.019)	-9.196 (9.101)	-3.351 (1.354)
2nd phase of Nixon Controls (Nix2)	-0.017 (0.020)	-3.470 (7.009)	-1.698 (1.156)
<i>Industry dummies</i> ^e	(included)	(included)	(included)
Degrees of freedom	2139	557	2139
F value	9.33	2.41	4.85
R ²	0.139	0.135	0.077
F test of equality between coefficients on price indexes	0.918 (0.399) ^f	5.866 (0.003)	0.921 (0.398)

a. Strikes as a proportion of contract expirations.

b. Duration in days

c. Standard errors in parentheses. The standard errors are corrected for heteroskedasticity using White's (1980) procedure.

d. Producer price index, profit index 1976=100, industry prices 1976=1.00.

e. Coefficients on industry dummies not reported.

f. Probability value.

Table 8

The Effect of Industry Specific Prices on Strike Activity

Weighted Least Squares Weight=number of contracts

	<u>Strike incidence^a</u>	<u>Cond. duration^b</u>	<u>Uncond duration^b</u>
	(1)	(2)	(3)
Intercept	0.641 (0.132) ^c	-104.884 (59.114)	19.870 (9.065)
time trend (t)	0.002 (0.001)	0.006 (0.290)	0.068 (0.045)
Producer price index (PP _t) ^d	-0.003 (0.001)	-0.085 (0.373)	-0.125 (0.055)
Unemployment (Un _t) ^d	-0.013 (0.006)	-0.481 (2.261)	-0.554 (0.345)
Profit Index (Profit _t) ^d	-0.002 (0.001)	0.565 (0.477)	-0.028 (0.079)
1st stage of Nixon Controls (Nix1)	-0.049 (0.019)	-7.896 (9.123)	-3.267 (1.355)
2nd stage of Nixon Controls (Nix2)	-0.016 (-0.020)	-3.153 (7.040)	-1.623 (1.156)
Durability dummy	0.238 (0.143)	119.427 (43.259)	14.326 (7.589)
<i>Industry Price interactions :</i>			
gas fuels * P _{it} ^d	-0.192 (0.052)	----- ^e	-5.907 (9.035)
food * P _{it}	-0.077 (0.043)	101.344 (24.994)	-1.608 (3.503)
tobacco * P _{it}	-0.084 (0.059)	92.438 (35.056)	-1.151 (4.662)
textiles * P _{it}	-0.135 (0.042)	85.297 (35.498)	-4.129 (3.884)
apparel * P _{it}	-0.143 (0.038)	61.627 (27.161)	-4.988 (3.394)
lumber & wood * P _{it}	-0.269 (0.136)	-36.729 (38.348)	-14.496 (6.924)

Table 8

The Effect of Industry Specific Prices on Strike Activity

	(1)	(2)	(3)
furniture * P_{it}	-0.201 (0.146)	-23.233 (43.890)	-11.636 (7.460)
paper & allied products * P_{it}	-0.104 (0.044)	128.145 (26.321)	0.766 (3.673)
printing & publishing * P_{it}	-0.078 (0.045)	77.064 (26.584)	-3.160 (3.813)
chemicals * P_{it}	-0.098 (0.044)	148.148 (28.965)	0.577 (3.914)
petroleum * P_{it}	-0.096 (0.034)	98.596 (25.934)	-1.884 (3.460)
rubber * P_{it}	0.152 (0.071)	96.301 (26.128)	8.734 (3.972)
leather goods * P_{it}	-0.147 (0.039)	74.384 (53.499)	-4.648 (3.701)
stone, clay, glass * P_{it}	-0.289 (0.141)	-23.794 (40.013)	-15.354 (7.193)
iron & steel * P_{it}	-0.288 (0.143)	-28.248 (40.450)	-15.238 (7.308)
fabricated metal products * P_{it}	-0.189 (0.144)	-20.768 (39.461)	-9.033 (7.272)
non-electrical machinery * P_{it}	-0.142 (0.145)	-13.111 (39.845)	-7.059 (7.359)
electrical machinery * P_{it}	-0.257 (0.133)	-19.297 (37.831)	-12.851 (6.965)
transportation equipment * P_{it}	-0.192 (0.141)	-4.437 (37.812)	-8.745 (6.993)
miscellaneous * P_{it}	-0.273 (0.138)	-29.265 (45.806)	-15.145 (7.294)
railroads * P_{it}	0.096 (0.062)	70.078 (71.000)	-3.940 (4.871)
public transportation * P_{it}	0.009 (0.053)	91.563 (28.229)	0.248 (3.877)
airlines * P_{it}	0.096 (0.038)	111.955 (31.089)	-1.472 (3.554)

Table 8

The Effect of Industry Specific Prices on Strike Activity

	(1)	(2)	(3)
telephone * P_{it}	-0.100 (0.043)	97.693 (23.891)	-1.666 (3.347)
gas & electricity * P_{it}	-0.084 (0.039)	120.716 (23.963)	0.585 (3.357)
restaurants * P_{it}	2.127 (0.040)	69.529 (40.567)	-5.142 (3.826)
hotels & motel * P_{it}	-0.110 (0.041)	67.815 (34.038)	-3.719 (3.712)
entertainment services * P_{it}	-0.101 (0.044)	115.781 (34.743)	-1.397 (3.945)
hospitals * P_{it}	-0.024 (0.052)	81.806 (28.902)	-2.124 (3.946)
Degrees of freedom	2140	558	2140
F value	9.60	2.25	4.99
R ²	0.139	0.124	0.077
F- test of equality between coefficients on price terms	5.082 (0.0001) ^f	2.431 (0.0001) ^f	3.415 (0.0001) ^f

a. Strikes as a proportion of contract expirations.

b. Duration in days.

c. Standard errors in parentheses. The standard errors are corrected for heteroskedasticity using White's (1980) procedure.

d. Producer price index, profit index 1976=100, industry prices 1976=1.00

e. No strikes in sample.

f. Probability value.

Table 9

Regional Effects on Strike Activity Controlling for Industry Effects

Weighted Least Squares Weight=number of contracts ^a

	<u>Strike Incidence</u>	<u>Cond. Duration</u>	<u>Uncond Duration</u>
intercept	0.146 (0.048)	26.973 (21.433)	3.263 (3.384)
<i>Regional Dummies :</i>			
New England	-0.019 (0.025)	0.653 (9.004)	0.269 (1.592)
Middle Atlantic	-0.013 (0.016)	-3.940 (5.343)	-0.028 (1.050)
East North Central	-0.022 (0.017)	5.076 (4.809)	0.203 (1.028)
West North Central	0.027 (0.029)	12.600 (9.017)	3.907 (1.694)
South Atlantic	-0.032 (0.020)	-0.870 (9.239)	-1.260 (1.435)
East South Central	0.056 (0.030)	4.319 (9.546)	2.931 (1.802)
West South Central	-0.049 (0.026)	18.938 (12.224)	0.135 (1.784)
Mountain Region	0.017 (0.040)	-10.502 (16.645)	-0.634 (2.682)
Pacific	-0.019 (0.018)	13.178 (6.783)	1.106 (1.226)
<i>Industry Dummies ^c</i>	(included)	(included)	(included)
Degrees of freedom	4041	694	4041
F value	8.11	2.31	4.17
R ²	0.069	0.107	0.037

a. weight=number of contracts in an industry-month-region cell.

b. Standard Errors in parentheses. Standard errors are corrected for heteroskedasticity using White's (1980) procedure.

c. Not reported.

New England: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut

Middle Atlantic: New York, New Jersey, Pennsylvania

East North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin

West North Central: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas

South Atlantic: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida

East South Central: Kentucky, Tennessee, Alabama, Mississippi

West South Central: Arkansas, Louisiana, Oklahoma, Texas

Mountain: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada

Pacific: Washington, Oregon, California, Alaska, Hawaii

Table 10

The Effect of Regional Unemployment on Strike Activity

Weighted Least Squares: Weight=number of contracts^a

	<u>Strike Incidence</u>		<u>Cond Duration</u>		<u>Uncond Duration</u>	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.716 (0.151) ^b	0.713 (0.151)	-56.860 (57.55)	-57.116 (57.60)	22.022 (9.849)	21.867 (9.846)
time trend (t)	0.001 (0.001)	0.001 (0.001)	-0.027 (0.263)	-0.023 (0.263)	0.073 (0.046)	0.073 (0.046)
Producer Price Index (PP _t)	-0.003 (0.001)	-0.003 (0.001)	0.070 (0.345)	0.072 (0.345)	-0.127 (0.057)	-0.126 (0.057)
Industry Price Index (P _{it})	-0.118 (0.037)	-0.120 (0.037)	84.060 (20.04)	84.213 (20.06)	-3.122 (3.085)	-3.242 (3.085)
National Unemployment (Un _t)	-0.012 (0.005)	-0.003 (0.007)	0.830 (1.999)	1.304 (2.634)	-0.491 (0.358)	0.066 (0.459)
Regional Unemployment _t	-----	-0.009 (0.004)	-----	-0.499 (1.804)	-----	-0.584 (0.302)
Profit _t	-0.002 (0.001)	-0.002 (0.001)	-0.154 (0.432)	-0.150 (0.433)	-0.041 (0.081)	-0.035 (0.081)
1st phase of Nixon Controls	-0.050 (0.019)	-0.050 (0.019)	-6.276 (8.247)	-6.329 (8.255)	-3.255 (1.405)	-3.245 (1.405)
2nd phase of Nixon Controls	0.013 (0.019)	0.011 (0.019)	1.450 (6.109)	1.588 (6.134)	-1.385 (1.180)	-1.295 (1.181)
Industry dummies ^c	(included)	(included)	(included)	(included)	(included)	(included)
Degrees of Freedom	4043	4042	696	695	4043	4042
F value	9.83	9.69	2.72	2.65	4.70	4.68
R ²	0.078	0.079	0.118	0.118	0.039	0.040

a. Weights=number of contracts in an industry-month-region cell.

b. Standard errors in parentheses. These are corrected for heteroskedasticity using White's (1980) procedure.

c. Not reported.

Table 11

The Effect of Industry Layoffs on Strike Activity ^aWeighted Least Squares: Weight=number of contracts^b

	<u>Strike Incidence</u>		<u>Cond Duration</u>		<u>Uncond Duration</u>	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.740 (0.173) ^c	0.827 (0.202)	39.348 (61.58)	-9.984 (74.195)	27.943 (12.002)	25.738 (13.728)
time trend	0.001 (0.001)	0.002 (0.001)	0.215 (0.288)	0.138 (0.285)	0.085 (0.057)	0.096 (0.057)
Producer Price Index (PP _t)	-0.001 (0.001)	-0.002 (0.001)	-0.280 (0.378)	-0.154 (0.206)	-0.146 (0.070)	-0.087 (0.038)
Industry Price Index (P _{it})	-0.090 (0.052)	-0.101 (0.053)	11.627 (26.61)	18.069 (26.650)	-6.071 (4.106)	-4.098 (3.624)
National Unemployment (Un _t)	-0.004 (0.008)	-0.008 (0.008)	-0.791 (2.800)	-0.423 (2.773)	-0.288 (0.564)	-0.348 (0.552)
Regional Unemployment	-0.009 (0.005)	-0.009 (0.005)	-0.013 (1.894)	-0.194 (1.898)	-0.492 (0.359)	-0.483 (0.359)
Industry Layoffs	-0.015 (0.007)	-----	0.346 (1.981)	-----	-0.243 (0.465)	-----
Import Penetration Ratio	-----	-0.582 (0.507)	-----	252.842 (214.518)	-----	-2.683 (34.530)
Profit	-0.003 (0.001)	-0.002 (0.001)	-0.066 (0.477)	-0.009 (0.485)	-0.031 (0.098)	-0.033 (0.100)
1st phase of Nixon Controls (Nix1)	-0.062 (0.024)	-0.062 (0.024)	-6.698 (8.608)	-8.123 (8.670)	-3.938 (1.661)	-3.987 (1.666)
2nd phase of Nixon Controls (Nix2)	-0.019 (0.020)	-0.018 (0.020)	-7.510 (6.423)	-7.873 (6.393)	-2.51 (1.38)	-2.414 (1.381)
Industry Dummies ^d	(included)	(included)	(included)	(included)	(included)	(included)
Degrees of Freedom	3094	3094	582	582	3094	3094
F value	9.97	9.84	1.75	1.80	5.00	4.96
R ²	0.080	0.079	0.075	0.077	0.042	0.042

a. Manufacturing industries only.

b. Weight=number of contracts in a month-industry-region cell.

c. Standard errors in parentheses. These are corrected for heteroskedasticity using White's (1980) procedure.

d. Not reported here.

Table 12

The Effect of the Variance of Prices and Unemployment on Strike Incidence

Weighted Least Squares: Weight=number of contracts^a

	<u>Strike Incidence</u>		
	(1)	(2)	(3)
Intercept	0.750 (0.147)	0.769 (0.147)	0.826 (0.151)
time trend	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)
Producer Price Index (PP _t)	-0.003 (0.001)	-0.003 (0.001)	-0.003 (0.001)
Industry Price Index (P _{it})	-0.167 (0.055)	-0.116 (0.045)	-0.169 (0.055)
Variance of Industry Prices ^c	6.23x 10 ⁻⁶ (3.61x10 ⁻⁶)	-----	6.27x10 ⁻⁶ (3.63x10 ⁻⁶)
National Unemployment (Un _t)	-0.012 (0.005)	-0.027 (0.009)	-0.026 (0.009)
Variance of Nat. Un. ^d	-----	2.64x 10 ⁻² (1.37x10 ⁻²)	2.48 X 10 ⁻² (1.38 x 10 ⁻²)
Profit	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)
1st phase of Nixon Controls (Nix1)	-0.050 (0.021)	-0.037 (0.022)	-0.038 (0.022)
2nd phase of Nixon Controls (Nix2)	-0.017 (0.017)	-0.012 (0.017)	-0.016 (0.017)
Industry Dummies ^e	(included)	(included)	(included)
Degrees of Freedom	2141	2141	2140
F value	9.87	9.67	9.50
R ²	0.139	0.140	0.141

a. Weight=number of contracts in a month-industry cell.

b. Standard errors in parentheses. These are corrected for heteroskedasticity using White's (1980) procedure.

c. Variance of industry prices calculated for years t, t-1 and t-2

d. Variance of national unemployment calculated for years t, t-1 and t-2

e. Not reported here.

Table 13

The Effect of the Variance of Prices and Unemployment on Strike Duration

Weighted Least Squares: Weight=number of contracts^a

	<u>Cond. Duration</u>			<u>Uncond Duration</u>		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-92.903 (64.263) ^b	-35.865 (64.263)	-58.395 (64.976)	22.576 (9.659)	25.855 (9.654)	27.093 (9.892)
time trend	0.018 (0.290)	0.268 (0.298)	0.233 (0.297)	0.070 (0.045)	0.092 (0.046)	0.092 (0.046)
Producer Price Index (PP _t)	0.016 (0.379)	-0.122 (0.372)	0.006 (0.376)	-0.127 (0.056)	-0.123 (0.055)	-0.127 (0.056)
Industry Price Index (P _{it})	94.519 (24.260)	70.232 (20.869)	95.607 (24.107)	-4.542 (3.581)	-3.144 (2.971)	-4.318 (3.602)
Variance of Industry Prices ^c	-6.42x10 ⁻³ (3.20x10 ⁻³)	-----	-6.62x10 ⁻³ (3.18x10 ⁻³)	1.58x10 ⁻⁴ (2.37x10 ⁻⁴)	-----	1.37x10 ⁻⁴ (2.38x10 ⁻⁴)
National Unemployment (Un _t)	-0.282 (2.269)	-10.254 (4.158)	-10.256 (4.145)	-0.523 (0.345)	-1.633 (0.610)	-1.623 (0.611)
Variance of Nat. Un. ^d	-----	16.855 (5.992)	17.130 (5.976)	-----	2.006 (0.900)	1.972 (0.902)
Profit	0.211 (0.475)	0.340 (0.468)	0.197 (0.472)	-0.033 (0.078)	-0.040 (0.078)	-0.037 (0.078)
1st phase of Nixon Controls (Nix1)	-8.104 (9.125)	-0.153 (9.539)	0.141 (9.512)	-3.336 (1.354)	-2.360 (1.421)	-2.391 (1.422)
2nd phase of Nixon Controls (Nix2)	1.186 (7.086)	-1.322 (6.958)	1.190 (7.041)	-1.568 (1.148)	-1.373 (1.137)	-1.464 (1.148)
Industry Dummies ^e	(included)	(included)	(included)	(included)	(included)	(included)
Degrees of Freedom	558	558	557	2141	2141	2140
F value	2.23	2.35	2.42	5.09	5.09	4.96
R ²	0.123	0.129	0.135	0.077	0.079	0.079

a. Weight=number of contracts in a month-industry cell.

b. Standard errors in parentheses. These are corrected for heteroskedasticity using White's (1980) procedure.

c. Variance of industry prices calculated for years t, t-1 and t-2

d. Variance of national unemployment calculated for years t, t-1 and t-2

e. Not reported here

Table 14

The Effect of Unexpected Price Changes on Strike Incidence ^{a b}

Weighted Least Squares Weight=number of contracts

	<u>Strike Incidence</u> S_{it}		
	(1)	(2)	(3)
Industry Price Index	-0.113 (0.052)	-0.112 (0.053)	-0.106 (0.055)
<u>12 month Forecasts</u>			
Absolute size of price residuals ^d	0.006 (0.025) ^c	----	----
Variance of Residuals in Forecasting Equation	1.313 (1.148)	----	----
<u>18 month Forecasts</u>			
Absolute size of price residuals ^e	-----	0.030 (0.013)	----
Variance of Residuals in Forecasting Equation	-----	0.319 (0.973)	----
<u>36 month Forecasts</u>			
Absolute size of price residuals ^f	-----	-----	0.004 (0.019)
Variance of Residuals in Forecasting Equation	-----	-----	-0.176 (0.975)
Degrees of freedom	2101	2101	1907
R ²	0.132	0.137	0.130

Notes:

a. Monthly data by two digit Industry

b. Regressions also include intercept, producer price index, national unemployment, profit index, dummies for the first and second stage of the Nixon price and wage controls and industry dummies.

c. Standard errors in parentheses. Corrected for heteroskedasticity using White's (1980) procedure.

d. Residual $Res_{t,t-12} = P_{it} - P_{it}^f(I_{t-12})$.e. Residual $Res_{t,t-18} = P_{it} - P_{it}^f(I_{t-18})$.f. Residual $Res_{t,t-36} = P_{it} - P_{it}^f(I_{t-36})$.

Table 15

The Effect of Unexpected Price Changes on Strike Duration^{a b}

Weighted Least Squares Weight=number of contracts

	<u>Cond. Duration</u>			<u>Uncond Duration</u>		
	(1)	(2)	(3)	(4)	(5)	(6)
Industry Price Index	34.338 (23.352)	36.216 (25.748)	34.113 (26.132)	-2.138 (3.281)	-2.403 (3.242)	-2.406 (3.262)
<u>12 month Forecasts</u>						
Absolute size of price residuals ^d	-7.606 (12.902) ^c	----	----	-0.574 (1.655)	----	----
Variance of Residuals in Forecasting Equation	-471.986 (453.395)	----	----	-17.144 (74.204)	----	----
<u>18 month Forecasts</u>						
Absolute size of price residuals ^e	-----	3.366 (4.114)	----	----	2.785 (0.879)	----
Variance of Residuals in Forecasting Equation	-----	-265.739 (431.005)	----	----	-35.045 (61.912)	----
<u>36 month Forecasts</u>						
Absolute size of price residuals ^f	-----	-----	-2.381 (8.149)	----	----	0.504 (1.234)
Variance of Residuals in Forecasting Equation	-----	-----	134.754 (388.694)	----	-----	-0.769 (0.360)
Degrees of freedom	511	511	493	2101	2101	1907
R ²	0.156	0.132	0.136	0.077	0.084	0.074

Notes:

a. Monthly data by two digit industry

b. Regressions also include intercept, producer price index, national unemployment, profit index, dummies for the first and second stage of the Nixon price and wage controls and industry dummies.

c. Standard errors in parentheses. Corrected for heteroskedasticity using White's (1980) procedure.

d. Residual $Res_{t,t-12} = P_{it} - P_{it}^f(I_{t-12})$.e. Residual $Res_{t,t-18} = P_{it} - P_{it}^f(I_{t-18})$.f. Residual $Res_{t,t-36} = P_{it} - P_{it}^f(I_{t-36})$.

Table 16

The Effect of Errors in Price Forecasting on Strike Incidence ^{a b}

Weighted Least Squares Weight=number of contracts

	<u>Strike Incidence</u> S_{it}		
	(1)	(2)	(3)
Industry Price Index	-0.104 (0.052)	-0.102 (0.054)	-0.104 (0.052)
<u>12 month Forecasts</u>			
Value of price residuals ^d	0.004 (0.020) ^c	----	----
Variance of Residuals in Forecasting Equation	0.455 (1.240)	----	----
<u>18 month Forecasts</u>			
Value of price residuals ^e	-----	0.014 (0.010)	----
Variance of Residuals in Forecasting Equation	-----	-0.091 (0.913)	----
<u>36 month Forecasts</u>			
Value of price residuals ^f	-----	-----	0.004 (0.021)
Variance of Residuals in Forecasting Equation	-----	-----	0.455 (1.240)
Degrees of freedom	2101	2101	1907
R^2	0.132	0.135	0.132

Notes:

a. Monthly data by two digit industry

b. Regressions also include intercept, producer price index, national unemployment, profit index, dummies for the first and second stage of the Nixon price and wage controls and industry dummies.

c. Standard errors in parentheses. Corrected for heteroskedasticity using White's (1980) procedure.

d. Residual $Res_{t+12,t} = P_{it+12} - P_{it+12}^f(I_t)$.e. Residual $Res_{t+18,t} = P_{it+18} - P_{it+18}^f(I_t)$.f. Residual $Res_{t+36,t} = P_{it+36} - P_{it+36}^f(I_t)$.

Table 17

The Effect of Errors in Price Forecasting on Strike Duration^{a b}

Weighted Least Squares Weight=number of contracts

	<u>Cond. Duration</u>			<u>Uncond Duration</u>		
	(1)	(2)	(3)	(4)	(5)	(6)
Industry Price Index	35.459 (23.921)	48.679 (26.417)	16.999 (32.336)	-2.729 (3.448)	-2.111 (3.599)	-8.925 (4.496)
<u>12 month Forecasts</u>						
Value of price residuals ^d	6.554 (8.491) ^c	----	----	-1.570 (1.356)	----	----
Variance of Residuals in Forecasting Equation	-208.271 (521.944)	----	----	-0.345 (82.017)	----	----
<u>18 month Forecasts</u>						
Value of price residuals ^e	-----	-5.406 (3.107)	----	----	-0.201 (0.688)	----
Variance of Residuals in Forecasting Equation	-----	-801.776 (365.735)	----	----	-52.147 (61.015)	----
<u>36 month Forecasts</u>						
Value of price residuals ^f	-----	-----	-10.204 (6.698)	----	----	-1.441 (1.118)
Variance of Residuals in Forecasting Equation	-----	-----	96.399 (391.745)	----	-----	96.153 (57.426)
Degrees of freedom	511	511	493	2101	2101	1907
R ²	0.155	0.142	0.140	0.076	0.084	0.074

Notes:

a. Monthly data by two digit industry

b. Regressions also include intercept, producer price index, national unemployment, profit index, dummies for the first and second stage of the Nixon price and wage controls and industry dummies.

c. Standard errors in parentheses. Corrected for heteroskedasticity using White's (1980) procedure.

d. Residual $Res_{t+12, t} = P_{it+12} - P_{it+12}^f(I_t)$.e. Residual $Res_{t+18, t} = P_{it+18} - P_{it+18}^f(I_t)$.f. Residual $Res_{t+24, t} = P_{it+24} - P_{it+24}^f(I_t)$.

Table 18

**Decomposition of the Cyclical Pattern of Strike Probabilities into the Separate Effects on the
Number of Strikes and the Number of Contracts**

	(1)	(2)	(3)
	<u>Proportionate change in Strike Prob.</u>	<u>Proportionate change in No. of Strikes</u>	<u>Proportionate change in No. of Contracts</u>
Time trend	0.011 ^a (0.005) ^d	0.009 ^b (0.006)	-0.001 ^c (0.004)
Industry Price Index	-0.852 (0.328)	-0.872 (0.400)	0.076 (0.236)
Producer Price Index	-0.019 (0.006)	-0.018 (0.007)	0.000 (0.004)
Unemployment	-0.087 (0.038)	-0.103 (0.045)	-0.001 (0.027)
Profit Index	-0.016 (0.009)	-0.019 (0.011)	-0.001 (0.007)
Degrees of freedom	2141	2141	2141
R ²	0.138	0.154	0.108

a . Regression coefficients from Table 5 divided by the weighted average of strike probabilities (0.138142)

b. Regression coefficients from a regression of the number of strikes on the above independent variables with a dummy for the first and second phase of the Nixon price and wage controls and industry dummies. The coefficients are divided by the average number of strikes in a month-industry cell (0.38447405).

c. Regression coefficients from a regression of the number of contract expirations on the above independent variables with a dummy for the first and second phase of the Nixon price and wage controls and industry dummies. The coefficients are divided by the average number of contracts in a month-industry cell (2.78318787).

d. Standard errors in parentheses.

Table 19

**Decomposition of the Effects of Regional and Industry Unemployment on Strike Probabilities
into the Separate Effects on the Number of Strikes and the Number of Contracts**

	(1)	(2)	(3)
	<u>Proportionate change in Strike Prob.</u>	<u>Proportionate change in No. of Strikes</u>	<u>Proportionate change in No. of Contracts</u>
Time trend	0.010 ^a (0.005) ^d	0.009 ^b (0.006)	0.000 ^c (0.002)
Industry Price Index	-0.585 (0.004)	-0.542 (0.004)	0.081 (0.001)
Producer Price Index	-0.010 (0.337)	-0.010 (0.375)	-0.000 (0.128)
National Unemployment	-0.024 (0.054)	-0.069 (0.059)	-0.049 (0.020)
Regional Unemployment	-0.060 (0.007)	-0.018 (0.037)	0.044 (0.013)
Industry Layoffs	-0.096 (0.045)	-0.088 (0.052)	0.008 (0.018)
Profit Index	-0.016 (0.010)	-0.017 (0.011)	-0.000 (0.004)
Degrees of freedom	3094	3094	3094
R ²	0.080	0.072	0.042

a . Regression coefficients from Table 12 col 1 divided by the weighted average of strike probabilities (0.153)

b. Regression coefficients from a regression of the number of strikes on the above independent variables with a dummy for the first and second phase of the Nixon price and wage controls and industry dummies. The coefficients are divided by the average number of strikes in a month-industry cell (0.225).

c. Regression coefficients from a regression of the number of contract expirations on the above independent variables with a dummy for the first and second phase of the Nixon price and wage controls and industry dummies. The coefficients are divided by the average number of contracts in a month-industry cell (1.471).

d. Standard errors in parentheses.

Table 20

**Decomposition of the Effects of Uncertainty on Strike Probabilities into the Separate Effects
on the Number of Strikes and the Number of Contracts**

	(1)	(2)	(3)	(4)	(5)	(6)
	<u>Prob.</u>	<u>Strikes</u>	<u>Contracts</u>	<u>Prob.</u>	<u>Strikes</u>	<u>Contracts</u>
Time trend	0.011 ^a (0.005) ^d	0.010 ^b (0.010)	-0.001 ^c (0.035)	0.013 ^a (0.005) ^d	0.009 ^b (0.006)	-0.004 ^c (0.004)
Industry Price Index	-1.266 (0.397)	-1.261 (0.487)	0.019 (0.290)	-0.837 (0.328)	-0.883 (0.401)	0.042 (0.235)
Variance of Industry Prices	4.48x10 ⁻⁵ (2.62x10 ⁻⁵)	5.51x10 ⁻⁵ (3.66x10 ⁻⁵)	0.74x10 ⁻⁵ (2.19x10 ⁻⁵)	----	----	----
Producer Price Index	-0.020 (0.006)	-0.020 (0.008)	0.000 (0.004)	-0.019 (0.006)	-0.018 (0.007)	0.000 (0.004)
Unemployment	-0.090 (0.038)	-0.108 (0.005)	-0.001 (0.003)	-0.194 (0.067)	-0.056 (0.080)	0.146 (0.047)
Variance of Unemployment	----	----	----	0.191 (0.099)	-0.084 (0.118)	-0.261 (0.069)
Profit Index	-0.015 (0.009)	-0.018 (0.011)	-0.001 (0.007)	-0.017 (0.009)	-0.018 (0.011)	0.001 (0.007)
Degrees of freedom	2141	2141	2141	2141	2141	2141
R ²	0.140	0.155	0.108	0.140	0.154	0.113

a . Regression coefficients from Table 14 col 1 and 2 divided by the weighted average of strike probabilities (0.138)

b. Regression coefficients from a regression of the number of strikes on the above independent variables with a dummy for the first and second phase of the Nixon price and wage controls and industry dummies. The coefficients are divided by the average number of strikes in a month-industry cell (0.384).

c. Regression coefficients from a regression of the number of contract expirations on the above independent variables with a dummy for the first and second phase of the Nixon price and wage controls and industry dummies. The coefficients are divided by the average number of contracts in a month-industry cell (2.783).

d. Standard errors in parentheses.