Strikes and Bargaining: A Survey of the Recent Empirical Literature

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Although strikes have captured the attention of economists for many years, the microeconometric analysis of collective bargaining disputes is still in its infancy. Until recently, a major stumbling block was the absence of data on contract negotiations and strikes. Within the past decade, however, researchers have assembled a series of large-scale micro data sets that combine information on contract expirations, wage settlements, and work stoppages. There is now a significant body of work quantifying the relations between strike frequency and duration, wage settlements, product and labor market conditions, and other aspects of the bargaining environment.

This paper presents a selective survey of the new microeconometric literature on collective bargaining. Rather than provide a comprehensive catalogue of findings, I highlight some of the themes that have attracted the attention of empirical analysts, including the cyclical responsiveness of strike activity and the relation of wages to strike outcomes. As I hope to show, the data collection effort that underlies this recent work has paid off handsomely. In less than a decade, the breadth and depth of knowledge on collective bargaining and strikes has improved dramatically.

I. The Theoretical Background

Microeconometric studies of strikes and bargaining have been influenced by three sets of ideas: the model of Orley Ashenfelter and George Johnson (1969); the "joint-cost" hypothesis articulated by John Kennan (1980) and Melvyn Reder and George Neumann (1980); and the asymmetric information models developed by Beth Hayes (1984), Sanford Morton (1983), Joel Sobel and Ichiro Takahashi (1983), and Drew Fudenberg and Jean Tirole (1983). The importance of Ashenfelter and Johnson's paper is twofold. On the theoretical side, it focuses explicitly on the lack of information among union members. In this regard, it lays the groundwork for later one-sided asymmetric information models. On the empirical side, Ashenfelter-Johnson were the first to attempt a systematic regression analysis of strike data, and they provided a particularly durable hypothesis linking strike probabilities to previous real wage changes.

The joint-cost hypothesis states that, whatever the mechanism generating disputes, the probability of a strike and the expected duration of a work stoppage will be lower, the higher the *joint* cost of strike to the firm and its employees. This simple hypothesis provides an interesting perspective on the effects of the business cycle on strikes. Whereas improving cyclical conditions in the product market increase the joint costs of a strike, and thereby reduce strike propensities, improving cyclical conditions in the external labor market reduce the opportunity costs of a stoppage, and thereby increase dispute rates. Following this insight, many recent studies of strike activity have attempted to control for both firm-level product demand and local labor market conditions.

One-sided asymmetric information models combine elements of both the Ashenfelter-Johnson model and the joint-cost hypothesis. According to the usual formulation of these models, some component of profitability is unobservable to union members. A strike is viewed as a mechanism that allows workers to extract higher wages from more profitable employers (see Kennan, 1986). Ashenfelter and Johnson's downward-sloping concession schedule is deduced as a direct implication of incentive compatibility.

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In contrast to Ashenfelter-Johnson, however, the profitability information revealed by a strike is not otherwise observable. The implications of the joint-cost hypothesis survive, since increases in the joint costs of a strike reduce the likelihood that a strike mechanism is selected, and similarly reduce the probability and expected duration of a strike, given that a strike mechanism is selected.

II. Strike Incidence

A first-order fact about private sector bargaining in North America is that 10–15 percent of contract negotiations involving relatively large numbers of workers lead to a work stoppage. Two U.S. studies with broad industry coverage (Cynthia Gramm, 1987; Sheena McConnell, 1987) estimate the average probability of strikes among contract negotiations with 1000 or more workers at 13 percent. A Canadian study by Morley Gunderson et al. (1986), covering contract negotiations with 200 or more workers, estimates a similar 13 percent dispute rate. The incidence of strikes is slightly higher in manufacturing industries, and also varies substantially across narrowly defined manufacturing industries.

As one might expect from the earlier literature devoted to explaining the aggregate *number* of strikes in a year, there is considerable year-to-year variation in the average probability of disputes. Rates in both the United States and Canada ranged from 10 percent to as high as 35 percent in the decade of the 1970s. A traditional explanation for the time-series variation in strike activity is the state of the business cycle. Indeed, this is one of the most widely investigated hypotheses in the recent literature.

There is systematic evidence that higher unemployment reduces the likelihood of strikes. Perhaps the strongest evidence comes from the study by Susan Vroman (1989), that follows contract negotiations of 250 bargaining pairs over the period 1957–82. Her estimates indicate a 2–3 percentage point reduction in the probability of strikes for each 1 percentage point increase in the prime-age male unemployment rate. Similar estimates are reported by Gunderson et al. and myself (1990) using Canadian data, while somewhat smaller (but still negative and statistically significant) estimates emerge from the study by McConnell (1987). Although not strictly comparable, the estimates in Joseph Tracy (1986) suggest a slightly larger negative effect.

There is much less agreement across studies on the effect of industry-level demand conditions. Tracy (1986) measures demand by the deviation of industry employment from its trend. His estimates suggest that higher industry employment reduces the probability of strikes. John Abowd and Tracy's (1989) analysis of a very similar specification, however, suggests an effect of the *opposite* sign. McConnell (1987) regresses monthly industry-average strike probabilities on an index of the real industry selling price. Her results indicate that an increase in an industry's relative output price leads to a decrease in the probability of a strike. This contrasts to the findings for Canadian manufacturing industries in my paper (1990), which suggest a *positive* association between the industry value-added price index and the probability of disputes.

The conflicting evidence on the effects of industry-level demand suggests the need for caution in the interpretation of the more systematic effects of unemployment. The latter are often taken as evidence in favor of the joint-cost hypothesis, on the assumption that higher unemployment reduces the earnings opportunities of striking workers. But, the joint-cost hypothesis also predicts a relation between dispute rates and the state of firm or industry-specific product demand. An alternative hypothesis is that external labor market conditions affect the union's ability to withhold labor services. Existing bargaining models abstract from the threat of strike breakers and dissenters within the union. Nevertheless, union control over the supply of labor is limited. (See the recent paper by John Schnell and Gramm, 1989.) If the union's ability to maintain an effective picket line is reduced in a depressed labor market, one would expect a moderating effect of higher unemployment on dispute rates, apart from any effect via the joint cost of strikes.

An alternative explanation for the changing propensity to strike concerns recent wage and price movements. Ashenfelter-Johnson found that nominal wage and price increases in the previous 2 years affect the aggregate number of strikes in a quarter with equal and opposite elasticities. Several recent authors have confirmed the correlation between dispute rates and contract-level changes in real wages. Gunderson et al. find that strike probabilities are negatively associated with the change in real wage rates during the term of the expiring agreement. Vroman finds that strike probabilities are negatively related to the change in contract wages relative to the change in aggregate wages during the contract period. The results in my 1990 paper suggest a similar conclusion: a higher relative wage at the end of the expiring agreement reduces the probability of strikes.

Whether in relative or absolute terms, these estimates suggest that there is a systematic effect of the wage rate inherited from the previous contract. This finding is difficult to reconcile with existing one-shot bargaining models, and underscores the point that contract negotiations typically proceed in the shadow of an existing agreement. Recent work by Peter Crampton and Tracy (1989) extends the asymmetric information model to allow for continuing negotiations without a work stoppage under the terms of the old contract. Their initial results suggest that the level of real wages inherited from the previous contract governs the choice between a work stoppage and continued negotiations. Given the evidence, this is clearly a fruitful line of inquiry.

III. Strike Duration

The duration of work stoppages have been less studied than strike incidence, in part because of data limitations: even large samples of contract negotiations yield relatively few strikes; and the major source of contract data for Canada provides no information on strike length. The analysis of strike durations has been aided, however, by the availability of comprehensive lists of strikes for both the United States and Canada. Although these lists contain very little information on the associated contract negotiations, they provide a useful supplement to the available contract-based data sets.

Estimates of mean and median strike duration suggest that the typical work stoppage is short: mean durations of strikes in larger manufacturing contract negotiations range from 40 to 50 days in the United States and Canada; median durations range from 25 to 40 days. As a fraction of mean contract duration, these translate into losses of approximately 5 percent of working time, conditional on a strike, and 0.5 to 1.0 percent, conditional on a contract negotiation. Expected durations of strikes vary substantially across industries, and are positively associated with the probability of strikes (see my 1988 paper).

As with strike incidence, the time-series variation in strike duration has been traditionally explained by reference to the business cycle. And, as with strike incidence, the evidence on the cyclicality of strike durations is unclear. Following the insight of the joint cost hypothesis, Tracy (1986, 1987), McConnell (1987), and I (1990) attempt to isolate the separate effects of cyclical labor market conditions and cyclical product market conditions. Tracy's estimates show a strong negative effect of the state employment growth rate on the expected duration of disputes, but a negligible effect of the industry growth rate. Using much larger samples of strikes, McConnell and I both find weak negative effects of unemployment rates on durations, but relatively large and statistically significant positive effects of industry selling prices on expected strike durations.

This positive association seems to contradict the evidence in Kennan (1985) and Alan Harrison and Mark Stewart (1989) of a *negative* relation between strike durations and the index of industrial production. Harrison-Stewart report a roughly 14 percent increase in strike durations from peak to trough of the production index, while Kennan reports a 35 percent increase. The discrepancy may arise in part from the choice to measure demand with prices or quantities. It also may be related to the distinction between

aggregate and industry-specific demand. Neither Kennan nor Harrison-Stewart attempt to separate the effects of industry-specific demand conditions from those of the aggregate economy. In fact, Harrison-Stewart find a much weaker relation between strike durations and industry-specific output than economywide output.

One aspect of strike durations that has received some attention is the time profile of conditional settlement rates. Kennan (1980) initially proposed to evaluate the joint-cost hypothesis using evidence on the shape of the settlement hazard function over time. More recently, Kennan and Robert Wilson (1990) have proposed to test and compare alternative private information and war-of-attrition models of strikes using this same information. Any such test is complicated by the problem of distinguishing true duration dependence from the effects of unobserved heterogeneity. The evidence to date on the shape of the hazard function is mixed. Kennan (1985) finds that conditional settlement rates first decrease, then increase. By comparison, Harrison-Stewart and Gunderson and Angelo Melino (1988) estimate monotonically decreasing hazards.

IV. Strike and Wages

A key prediction of the Ashenfelter-Johnson model, and later one-sided asymmetric information models, is that negotiated wage outcomes and strike durations are negatively correlated. An early test of this prediction was conducted by Henry Farber (1978) in a highly structured analysis of some 150 contract negotiations. Farber's estimates suggest that the concession schedule is downward sloping, at a rate of about 6 percent per year.

The first attempt to relate wage settlements and strike outcomes using a broad cross-section of wage settlements is W. Craig Riddell's (1980) study, that uses Canadian contract data from 1953 to 1973. Contrary to the predictions of the Ashenfelter-Johnson model, Riddell found that strikes are associated with significantly *higher* wage increases. Robert Lacroix (1986) presents a similar specification that confirms the positive association between wage settlements and strike outcomes, controlling for expected inflation and the current unemployment rate. Lacroix points out, however, that the positive relation between wage increases and strike outcomes does not survive an unrestricted treatment of the year effects in the wage change equation. Apparently, the positive association of wages and strike probabilities is at the aggregate level, rather than at the individual contract level. In this regard it is interesting to note that industry average strike probabilities are also positively correlated with wage rates.

Two recent studies (by McConnell, 1989, and myself, 1990) set out to test the prediction of a negative relation between strikes and wages on U.S. and Canadian contract data. In contrast to earlier studies that model nominal wage changes, both McConnell and I model the expected average real wage rate during the term of a contract. The wage equations in both studies include unrestricted year effects and measures of comparison wages, unemployment rates, and industry demand. Despite these similarities, the two studies lead to different conclusions. Whereas McConnell finds a significantly negative association between strikes and real wages, my study found no significant relation.

One difference between the studies is their industry coverage: McConnell's data include manufacturing and nonmanufacturing contracts, whereas mine was restricted to manufacturing industries. Indeed, McConnell finds somewhat more negative effects of strikes on nonmanufacturing wage rates. The estimates in my study do suggest lower wage rates after very long strikes (150 days or more). For the vast majority of strikes, however, the Canadian data give no indication of a negative relation between strikes and wages. The difference between these two studies is a puzzling feature of the recent literature that needs to be resolved in order to facilitate further progress.

V. Conclusions

Although the microeconometric study of strikes and bargaining is still in its infancy, a number of substantive conclusions have

emerged. First, the probability and intensity of labor disputes vary systematically across industries. Second, changes in the likelihood of a strike for a given bargaining pair are related to observable economic conditions: higher unemployment and real wage gains during the previous agreement reduce the probability of strikes. Third, the average duration of disputes varies with the aggregate cycle. There are also a wide range of findings relating strike behavior to contract length, the seasonality of contract expirations, and uncertainty that have not been surveyed here. Nevertheless, many puzzles remain. The effects of firm-specific product demand on the probability and expected duration of strikes are unclear, as is the association between negotiated wage outcomes and strike activity. These issues will surely receive further attention in the next decade of research on the microeconometrics of strikes and bargaining.

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