# Strikes

*Abstract*

An economic strike is a suspension of production while workers and their employer argue about how to divide the surplus from their relationship. Modern economic theories of strikes assume that at least one side has private information about the surplus, viewing the lost production as a cost of extracting information. Empirically, strikes are quite rare. There is evidence that strike incidence is high at the peak of the business cycle, but strike duration seems to fall when the economy is strong. Strike activity is evidently influenced by the legislative environment, and particularly by legislation restricting the use of replacement workers.

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The value of an employee's labor is generally greater than the wage paid by the employer: that is after all the point of the employment relationship. This gives rise to a surplus to be divided between the worker and the employer. A strike is a suspension of production while the two sides argue about how this surplus is to be divided.

Under ideal competitive conditions, the employment surplus is negligible: each employer competes with many other employers, who bid up the wage until it matches the value of the employee's labor, and each worker competes with many other workers who bid down the wage until it matches the value of the worker's alternative use of time. An employee who strikes for a higher wage is replaced by an equivalent worker who is willing to accept the competitive wage, and an employer who attempts to cut the wage is replaced by another employer who pays the competitive wage.

Thus strikes occur only in noncompetitive labor markets, where there is a surplus worth fighting about. Even then, it is not easy to explain why strikes happen. Indeed if one could explain both the occurrence of strikes and the terms of settlement, then strikes would be quite pointless, since the settlement could be reached without the waste associated with strikes. This is sometimes called the Hicks Paradox, since the theoretical difficulty of a complete theory of strikes was first articulated by Hicks (1932). As Hicks observed, "Any means which enables either side to appreciate better the position of the other will make settlement easier; adequate knowledge will always make a settlement possible."

Building on Hicks's observation, modern economic theories of strikes assume that at least one side has private information about the size of the surplus to be divided. The apparent waste

associated with a strike is then seen as a cost of obtaining information.

The main idea can be illustrated using a simple example. Consider a union negotiating a one-year labor contract with an employer who has private information about the market value of the product being produced. The union is not strong enough to maintain a strike indefinitely, but it can strike for a period of length s (measured in years). Moreover the union has the power to make offers that the employer must accept or reject. In the most favorable case, $v_H$ is the employer's demand price for labor (that is, the highest wage that the employer would pay), and in the worst case the demand price is $v_L$, where both are measured relative to the workers' supply price (which is thus normalized to zero). If these are in fact the only two possibilities, then it is easy to see that the union should demand either a low wage or a high wage, leaving either the low or high employer type indifferent between acceptance and rejection. A strike occurs when the low employer type rejects the high wage demand.

Thus strikes arise when the union is relatively confident that the employer can afford to pay a high wage, but this confidence is in fact misplaced. If p is the probability that the employer is in the high state, the union chooses between $v_L$ for sure, or a higher wage W with probability p. This higher wage leaves the high-state employer indifferent between acceptance, with profit $v_H - W$, or rejection, with profit $(1-s)(v_H - v_L)$, since rejection entails a strike of length s, followed by agreement at the low wage. Thus $W = v_L + s(v_H - v_L)$, and the union threatens a strike if $pW + (1-p)(1-s)v_L > v_L$, i.e. if

$$p > \frac{v_L}{v_H}$$

Thus the union's decision on whether to use the strike threat is influenced by two factors: (1) the probability p that the more favorable state is realized, and (2) the importance of private information, represented by the ratio $v_L/v_H$, or equivalently by the spread $v_H - v_L$ as a proportion of the opportunity cost $v_L$. Strengthening either of these factors can tip the balance in favor of the strike threat. Whether a strike actually happens depends on the realized state of demand. Thus an increase in p at some point triggers the use of the strike threat, but further increases in p reduce the probability that a strike will actually occur. The strength of the union, represented by

its ability to commit to a strike of length s, has no influence on whether a strike occurs, although it obviously affects the duration of a strike if it does occur, and the terms of settlement if there is no strike.

This simple model is analyzed in more detail in Kennan (1986). A much more extensive analysis, allowing for private information on both sides, is presented in Kennan and Wilson (1993), with applications to legal conflicts as well as labor negotiations. A general treatment of games with private information, with many bargaining examples, can be found in Myerson (1991).

Three main categories of private information bargaining models can be used to interpret data on labor market negotiations. First, the simple model discussed above is an example of a screening model, in which an uninformed bargainer makes offers that are acceptable only if the informed bargainer knows that the realized surplus is relatively large. More general versions of the screening model assume that once an offer has been rejected, another offer will be made after some specified length of time, since take-it-or-leave-it offers are generally not credible. This leads naturally to a theory of strike durations, in which the union makes a declining sequence of wage demands such that in more favorable demand states the employer finds it more profitable to accept an early offer rather than suffer a long strike, and conversely for an employer in a less favorable demand state. In signaling models (the second category), offers are made by bargainers who have private information; this leads to complications arising from a desire to remain "inscrutable," rather than make an offer that reveals valuable information. In attrition models (the third category), the parties fight "to the death" until one side concedes everything: no compromise is allowed.

In a series of papers, Cramton and Tracy (1992 ... 2003) have presented detailed analyses of collective bargaining negotiations in North America, using a model that includes both screening and signaling components. They emphasize that unions can (and very often do) apply pressure by refusing to sign a new contract after the old contract expires, while continuing to work under the terms of the old contract rather than launching a strike. It is assumed that the employer has private information about the size of the surplus, and that the union makes the first offer. If this offer is refused, the union either continues to work under the old contract, or calls a strike, depending on how optimistic the union is about the size of the surplus, relative to the opportunity cost of a strike, as represented by the wage under the old contract. An employer who refuses the

initial offer waits some time before making a counteroffer, and the wage settlement then gives each side half or the actual surplus (where the employer's delay is just enough to signal that the surplus is no bigger than it actually is).

**Empirical Analysis of Strike Activity**

There are many well-known examples of long and hard-fought strikes involving large numbers of workers. But strikes are in fact quite rare, by any measure. Many workers are not covered by collective bargaining agreements; relatively few wage negotiations involve strikes, and most strikes are fairly short. In Britain in 1926 (the year of the general strike) about 9 workdays per worker were lost due to strikes. In 1979, the loss due to strikes was a little more than one day per worker. These are the extreme cases. In the 79 years following 1926, the number of workdays lost in Britain was less than 2 hours per year per worker. In the U.S., idleness due to strikes never exceeded one half of one percent of total working days in any year during the period 1948-2005; the average loss was 0.1% per year. Similarly, in Canada over the period 1980-2005, the annual number of work days lost due to strikes never exceeded one day per worker; on average over this period lost worktime due to strikes was about one-third of a day per worker. Although the data are not readily available for a broad sample of developed countries, the pattern described above seems quite general: days lost due to strikes amount to only a fraction of a day per worker per annum, on average, exceeding one day only in a few exceptional years.

In recent years, the number of workdays lost due to strikes has fallen far below even these low levels. For example, in the U.S. since 1990, the average loss was about .016%, which is about 20 minutes per worker per annum. According to ILO data, similar declines have occurred quite generally in developed countries; even in Spain, which historically has had high rates of strike activity, the average loss since 1990 was about one-fifth of a day per worker per annum. If strikes are caused by private information about rents, as has been argued in the recent theoretical work described above, then a fall in the costs of acquiring information must lead to a decrease in strike activity. It is undeniable that information costs have fallen sharply as computers have improved, and it is tempting to conclude that this is the reason for the decline in strike activity.

## Cyclical Fluctuations

There is an extensive empirical literature analyzing the relationship between strike activity and business cycle fluctuations. The main conclusion from early work in this area is that strikes are more frequent when general economic conditions are good. Although this conclusion is supported by a considerable body of evidence, it is of limited interest because it lumps together strikes of all sorts, including many minor disputes that occur during the term of ongoing labor contracts. More recent work has attempted to determine whether economic conditions affect the incidence of contract strikes. This work largely relies on North American data, because unions in the U.S. and Canada generally negotiate contracts covering clearly defined periods of a few years, so that one can count the number of negotiations that might lead to a strike, and use this to measure strike incidence.

The empirical results on strike incidence are well summarized by Card (1990); some more recent findings are reviewed by Cramton and Tracy (2003). Surprisingly, the evidence indicates that strike incidence and duration move in opposite directions over the business cycle. Strike incidence is generally found to be procyclical, although the relationship between strikes and general economic conditions is not strong enough to dominate other sources of variation, so that a long time series is needed to establish the result. Although less work has been done on cyclical movements in strike duration, there is solid evidence that duration moves countercyclically. Some attempts have also been made to distinguish between the effects of cyclical fluctuations in product markets and in labor markets. There is no clear pattern in these results, and the theoretical significance of the distinction is also unclear. Indeed if the probability distribution governing the private information about the size of the surplus changes, changes in the incidence and duration of strikes are to be expected, but it should not matter whether the source of this change in the distribution is the product market or the labor market.

## Effects of Collective Bargaining Legislation

Strike activity is clearly affected to a large extent by laws governing the tactics available to workers and employers as they negotiate over the division of the employment surplus. This is a large subject in itself, which cannot be dealt with here; Cramton and Tracy (2003) give an overview of some of the main issues with respect to North American legislation. One topic worth considering briefly is the use of replacement workers.

The availability of replacement workers directly affects the employment surplus. For example, in the simple screening model described above, suppose that the existing workforce can be permanently replaced, at a cost C (including legal costs, and costs of providing security for the replacement workers). If $\rho < 1$ is the productivity of the replacements, relative to the incumbents, the condition governing the union's strike decision becomes

$$p > 1 - \frac{v_H - v_L}{v_H + \frac{C}{1-\rho}}$$

If the incumbent workers can be replaced without cost, the effect of ρ is merely to scale down the surplus, with no effect on strike incidence. But when C is positive, strike incidence falls. The reason for this is that as the cost of replacements increases, the surplus increases by the same amount in both states of demand, so the opportunity cost of a strike rises while the potential gain is unchanged. Thus if the use of permanent replacement workers is banned (or made more difficult), strike incidence falls.

In the case of temporary replacement workers (who are employed only while a strike is going on) the effects on strike incidence may be quite different: a ban on temporary replacements means that the union can obtain a larger share of the surplus in the favorable demand state, so the union makes a more aggressive demand, and strike incidence rises. Cramton and Tracy (2003) review the theoretical implications of banning temporary replacements, and also review the empirical relationship between differences in strike incidence and differences in labor laws. Much remains to be done in this area.

**References**


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