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Union strikes as coordination games

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Abstract

This paper models strike participation as a coordination problem under incomplete information. Using a global games framework, we analyze how workers decide whether to join a strike when they are uncertain about the firm's resistance to wage demands. We introduce coercive mechanisms—particularly punishment for non-participation—as selective incentives employed by unions to overcome free-riding. The model yields a unique equilibrium characterized by a cutoff strategy and allows for comparative statics on the role of punishment, participation costs, and uncertainty. We show that while punishment increases the likelihood of a successful strike, its marginal returns are decreasing, suggesting that unions may achieve greater impact by reducing uncertainty or subsidizing participation. The results shed light on how institutional tools shape collective action in large groups and contribute to the theoretical understanding of union dynamics and labor disputes.

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1 Introduction

Trade unions, like any large collective group, face inherent coordination challenges in achieving their objectives. Strikes, their most distinctive tool, also embody this coordination problem: their success depends on the collective action of workers who individually bear the cost of participation, despite the uncertainty of success. Even enthusiastic workers may hesitate to strike if they doubt the participation of others, given the risk of repression or lost income. The union's existence alone does not guarantee adherence, as the strike itself must overcome the same barriers of cooperation and collective mobilization that the union once faced to emerge.

From a theoretical standpoint, strikes aim to secure a collective benefit—be it a wage increase or improved work conditions—that is non-excludable among group members. In small or privileged groups, such benefits are easily attained, sometimes even through unilateral action. However, for intermediate groups, where individual actions still influence outcomes but collective provision is uncertain, multiple equilibria may arise. These equilibria reflect strategic interdependence: an individual's decision to cooperate hinges on beliefs about others' actions, as deviation can unravel cooperation. In large groups, however, this interdependence collapses. Each individual's marginal impact becomes negligible, and voluntary cooperation tends to fail without external intervention.

Positive incentives such as mutual aid or social events were historically important for union formation (Pelling, 1963), but today they play a minimal role in sustaining national unions or large-scale strikes. Instead, unions used to rely on coercive mechanisms such as compulsory membership and closed-shop agreements, which were designed to ensure that all workers joined the union. These practices have since been outlawed in many countries.[1] In several countries, however, compulsory contributions to unions are levied even on non-members, which creates incentives for affiliation and sustains a stronger union culture. In Brazil, for instance, this policy remained in place until the 2017 Labor Reform abolished mandatory union dues. With respect to strike participation, although formal sanctions such as fines, loss of benefits, or expulsions are illegal in most countries, unions may still resort to informal mechanisms, such as stigmatizing workers who refuse to participate.[2]

The central objective of this paper is to highlight that strikes can be understood as a coordination problem and can therefore be fruitfully analyzed through the framework of global games (Carlsson and van Damme, 1993; Morris and Shin, 2003). We provide a simple *workhorse model* of strike participation under incomplete information, which can serve as a baseline for future studies of collective action in labor disputes. We then demonstrate the usefulness of this model by analyzing how different instruments available to unions—particularly punishment for non-participation, but also reductions in participation costs or efforts to reduce uncertainty—affect workers' decisions to join a strike.

Formally, we develop a microfounded model in which workers face a binary decision—whether to join a strike—under incomplete information about the firm's resistance to wage demands. We introduce coercive instruments into a global games framework and characterize the unique equilibrium through a cutoff strategy. The model shows that the probability of strike success is increasing in the severity of union sanctions and decreas-

[1] An exception is Finland, where compulsory student union membership is still legalized.

[2] In Brazil, for example, there is even a derogatory term for workers who abstain from strikes and are perceived as siding with employers: *pelego*.

ing in the individual cost of participation. Additionally, we derive comparative statics showing that union efforts to reduce uncertainty or lower participation costs are more effective at sustaining collective action than increasing punitive measures, which exhibit diminishing marginal returns. These results highlight how strategic uncertainty interacts with institutional mechanisms to shape collective outcomes in labor disputes.

Our model contributes to the economic literature on strikes by framing participation as a coordination problem under incomplete information. It builds on game-theoretic approaches that interpret strikes as strategic responses to asymmetric information, as in Ashenfelter and Johnson (1969) and Hayes (1984), and applies a global games framework to endogenize participation decisions. It also relates to research on union preferences (Mauleon and Vannetelbosch, 2005; Mauleon et al., 2012; Moene, 1988), which are often heterogeneous and shaped by internal politics and agency problems (Booth, 1995). By modeling decisions at the individual level, we avoid the need to specify a union utility function. Finally, our approach expands the range of applications of global games in economics, which have been widely used to study currency attacks (Morris and Shin, 1998), bank runs (Goldstein and Pauzner, 2005), political revolutions (Edmond, 2013), and regime changes Aldama et al. (2019), by showing how the same logic can be applied to labor disputes and collective action problems in industrial relations.

We begin in Section 2 with a simple example that illustrates the coordination problem faced by workers in a strike. Section 3 develops the formal model, applying the global games framework to analyze the role of coercive instruments in sustaining collective action. Finally, Section 4 concludes with a discussion of the main results and their implications for the economics of labor and collective behavior.

2 A motivating example

Consider the case in which only two workers, both demanding a wage increase w, can simultaneously decide whether to go on strike. If a worker joins the strike, they incur a participation cost $g > 0$. When both workers decide to strike, the probability of success is $P_2 \in (0,1)$, which is higher than the probability of success when only one of them strikes ($P_2 > P_1$). The underlying assumption is that the likelihood of a successful strike increases with the number of participants. The players' payoffs are represented in the normal form game below:

		Worker 2	
		join	not join
Worker 1	join	$P_2w - g, P_2w - g$	$P_1w - g, P_1w$
	not join	$P_1, P_1w - g$	$0, 0$

There are four possible outcomes in this game, depending on the parameter values, two of which lead to a unique equilibrium and the other two to multiple equilibria:

(i) The first case arises when the cost of striking exceeds any potential return from a fully coordinated strike. This occurs when $P_2w < g$. In this scenario, all payoffs are negative, except in the quadrant corresponding to the (Not Join, Not Join) outcome, which becomes the unique Nash equilibrium.

(ii) The second case is the opposite of the first: the fully coordinated strike yields a payoff that outweighs both the cost of participation and the return from striking alone. This occurs when $P_2 w - g > P_1 w > g$, such that "Join" becomes a strictly dominant strategy for both players, and the unique Nash equilibrium is (Join, Join).

These two initial cases represent extreme scenarios and are unlikely to occur in practice. Our working hypothesis is that the strike is already underway, and workers must simply decide whether to join or not. However, the strike must be called in advance, and if such extreme cases were indeed expected, both the union and the firm could anticipate workers' choices and take them into account during collective bargaining—the former to strengthen the union's demands, and the latter to reinforce the firm's position. Such a situation, however, is rather unrealistic.

The remaining two cases are of greater relevance to our analysis, not only because they are more realistic in the context of a strike, but also because they allow us to explore the coordination interaction between the players.

(iii) When $P_1 w > P_2 w - g > g$, there are two equilibria: (Join, Not Join) and (Not Join, Join), resembling a "Battle of the Sexes" game. In this case, workers would be better off if the strike had some level of participation than if it failed entirely. However, each worker prefers that their colleague bears the cost of securing the benefits of the strike.

(iv) When $P_2 w > g > P_1 w$, the two equilibria are (Join, Join) and (Not Join, Not Join). The strike only yields positive returns if both workers participate; if one chooses not to strike, the best response for the other is also to abstain.

Although we are considering a small group (only two players), the third case already highlights the free-riding problem, in which all workers benefit from the strike but attempt to avoid the individual cost of participation. The relationship between workers' decisions and the cost of striking becomes even more prominent in global games involving many workers. In this simple motivating example, there is no cost associated with not participating. However, the union may exert control over the protest by targeting those who "break" the strike. In the model presented in the next section, we will see that the interaction between punishment from the firm and from the union will play a particularly relevant role in the worker's decision.

The fourth case is the one we are most interested in. In this scenario, the strike is worthwhile only when there is coordination among workers. Note that, if there is uncertainty about the other player's action, even a rational worker who perceives that joining the strike is Pareto-superior may choose the safer option of not joining. In this context, which equilibrium will the workers coordinate on? In other words, what are the conditions that ensure full participation in the strike?

We have seen that this simple game already reveals important strategic interactions faced by workers. The interplay between workers and the underlying parameters gives rise to different possible equilibria. However, the equilibrium indeterminacy stems from the very simplicity of the game, since the probabilities P_1 and P_2 encapsulate factors such as the firm's resistance capacity, the state of the economy, and other external conditions. In this simplified version, there is also no room for players' beliefs about their opponents. For this reason, adopting a global games framework will add greater realism to the worker's decision-making process and allow us to select a unique equilibrium.

3 Union strikes as Global Games

The objective of this section is to apply a standard global games model (Morris and Shin, 2003), drawing on the framework employed by Aldama et al. (2019), to capture the worker's decision in the face of a strike. Assume that collective bargaining between the union and employers in a given industry has failed, and a strike has been called. To ensure that a wage increase is economically feasible, we assume that firms in this sector face a slightly downward-sloping demand curve (Hayes, 1984).

We also assume that employers will resist the proposed wage increase w, and that their resistance capacity θ is private information. This variable may reflect all costs associated with halting production during the strike, such as customer losses, fixed costs, inventory depletion, among others.

Workers are aware that a strike has been called, but they do not know the true value of θ, and thus they are uncertain about the actual likelihood of the strike succeeding. Once θ is realized, each worker receives a signal x_i, which corresponds to the firm's true resistance capacity plus an idiosyncratic noise term ε_i, normally distributed with mean zero. Formally:

$$x_i = \theta + \varepsilon_i, \quad \varepsilon_i \sim \mathcal{N}(0, \sigma^2)$$

The assumption above can be justified as follows. Workers may have some notion of θ based on their day-to-day experience on the shop floor. The noise arises from the imperfect observation workers have regarding the firm's resistance capacity. The union may attempt to communicate its information about θ to the workers, but even the union itself does not have direct access to this parameter. Moreover, even a perfectly informed union would be unable to fully transmit this information to all workers. Although technological innovations have improved communication between unions and their members, attendance at union assemblies continues to play a decisive role, as these meetings are the venue where the most important issues—in particular the decision to call a strike—are debated and formally voted. In addition, assemblies remain a key moment of collective mobilization, serving as a focal point for affiliated workers.[3] Furthermore, the direct interests of union leaders may not perfectly align with those of the workers, as their incentives are also shaped by political and reputational concerns (Ashenfelter and Johnson, 1969).

The union is the sole representative of the workers in the sector. Whenever the strike is successful and a worker chooses not to participate, the union punishes the strikebreaker, imposing a cost k on them. This assumption is not particularly strong: if the strike fails, a large number of workers will typically not have participated, making the enforcement of punishment impractical. By contrast, when the strike is successful, the number of strikebreakers is relatively small, and punishment becomes both feasible and credible. We assume that the total mass of workers is 1. Once the strike is called, each worker must decide whether to join or not. Those who join the strike incur a cost g, which includes all associated burdens such as commuting, forgone wages, and any potential repression from employers.

The strike is deemed successful whenever the proportion of workers who joined the strike (τ) is greater than or equal to the employer's resistance level ($\tau \geq \theta$)[4]. Workers

[3] As historical evidence, Pelling (1963) reports that attendance rates at union assemblies were sometimes below 5%. To the best of our knowledge, no more recent systematic data on attendance exist, in contrast with the richer statistics available on strikes.

[4] To reduce the number of potential equilibria, we assume that in the case of equality, the strike is

who join the strike bear their participation cost and also face the risk of being punished by the firm if the strike fails. The workers' payoffs are defined as follows:

Table 1: Payoffs

	Success	**Failure**
Join	$w - g$	$-g$
Not Join	$w - k$	0

The game unfolds according to the following steps:

1. Nature draws values for θ and ε_i;
2. Each worker observes x_i, forms beliefs about the proportion of workers who will join the strike, and chooses whether to join or not;
3. The strike takes place, it either succeeds or fails, and payoffs are realized.

When the strike is successful, the wage increase is granted to all workers, since the firm does not differentiate wages among employees—this is the nature of collective wage gains (Olson, 1965). However, as mentioned above, a victorious union monitors those who free-ride on the collective action and imposes a penalty ($-k$) on those who did not cooperate with the group's objective.

In the short run, the wage increase does not necessarily lead to job losses, as firms have a fixed capital stock, and their production technology requires a certain combination of capital and labor. Nevertheless, workers are in a more precarious position in the medium and long run, when firms can adjust the levels of capital and labor. Thus, protecting one's job becomes important to the worker. This is the mechanism through which the union enforces the punishment k on strikebreakers. A victorious union is able to discriminate in the provision of labor protection to its members. In addition, any reputational losses or denial of union services can also be used as tools for implementing the punishment k.

We can now derive the expected payoff for a worker:

$$\begin{aligned}
\mathbb{E}(U_{\text{Join}}) &= \Pr(\text{success})(w - g) + (1 - \Pr(\text{success}))(-g) \\
&= \Pr(\text{success})w - g \\
\mathbb{E}(U_{\text{Not Join}}) &= \Pr(\text{success})(w - k) + (1 - \Pr(\text{success}))(0) \\
&= \Pr(\text{success})(w - k)
\end{aligned}$$

where Pr(success) denotes the probability that the strike succeeds, which will be determined endogenously in what follows.

3.1 Equilibrium and comparative statics

The standard approach in Global Games is to assume that workers follow a cutoff strategy and believe that their peers do the same. In this case, there exists a threshold signal x^*

successful. This assumption does not qualitatively affect the results.

such that any worker who observes a signal below this threshold ($x_i \leq x^*$) decides to join the strike. Formally, the strategy function can be written as:

$$s(x_i) = \begin{cases} \text{Join} & \text{if } x_i \leq x^* \\ \text{Not Join} & \text{if } x_i > x^*. \end{cases}$$

The equilibrium of a Global Game consists of the pair (x^*, θ^*), where θ^* represents the critical resistance capacity of the employers—the value at which firms are indifferent between conceding to the strike and continuing to resist. Recall that the strike succeeds when $\tau \geq \theta$; thus, the critical state corresponds to $\tau = \theta^*$. Moreover, since workers follow a cutoff strategy, the proportion τ of those who will join the strike is equal to the share of workers who observe $x_i \leq x^*$. That is, $\tau = \Pr(x_i \leq x^* \mid \theta) = \Pr(\theta + \varepsilon_i \leq x^* \mid \theta)$.

Using the information above, we can derive the first equilibrium condition. Since the distribution of the noise term is known, we have in equilibrium:

$$\Pr(\varepsilon_i \leq x^* - \theta^*) = \Phi\left(\frac{x^* - \theta^*}{\sigma}\right) = \tau = \theta^* \tag{3.1}$$

where Φ denotes the cumulative distribution function of the standard normal distribution. This expression links the strategic behavior of workers under incomplete information with the endogenous success threshold of the strike.

Before deriving the second condition, it is necessary to determine the probability of success of the strike, which occurs when the employers' resistance is below the critical threshold, that is, when $\theta \leq \theta^*$. Thus,

$$\Pr(\text{success}) = \Pr(\theta \leq \theta^*).$$

Moreover, from the signal structure $x_i = \theta + \varepsilon_i$, we can isolate θ and write:

$$\Pr(\theta \leq \theta^*) = \Pr(x^* - \varepsilon_i \leq \theta^*) = \Pr(\varepsilon_i \geq x^* - \theta^*) = 1 - \Phi\left(\frac{x^* - \theta^*}{\sigma}\right).$$

When should a worker join the strike? When the expected payoff from participating is greater than that of not participating. In the particular case of a worker who observes exactly the cutoff signal $x_i = x^*$, they must be indifferent between joining and not joining the strike. Therefore, equating expected utilities ($\mathbb{E}(U_{\text{Join}}) = \mathbb{E}(U_{\text{Not Join}})$) yields the second equilibrium condition:

$$\Pr(\theta \leq \theta^* \mid x^*)w - g = \Pr(\theta \leq \theta^* \mid x^*)(w - k).$$

Solving for the probability, we obtain $\Pr(\theta \leq \theta^* \mid x^*) = \frac{g}{k}$, such that the condition becomes

$$1 - \Phi\left(\frac{x^* - \theta^*}{\sigma}\right) = \frac{g}{k}. \tag{3.2}$$

Conditions (3.1) and (3.2) form a system whose solution yields the equilibrium pair

(x^*, θ^*). Solving the system, we obtain:

$$\theta^* = \frac{k-g}{k} \tag{3.3}$$

$$x^* = \frac{k-g}{k} + \sigma\Phi^{-1}\left(\frac{k-g}{k}\right). \tag{3.4}$$

The equilibrium characterization provides important insights into the determinants of workers' participation in strikes under strategic uncertainty. The critical resistance threshold $\theta^* = \frac{k-g}{k}$ plays a central role, as it also represents the probability that the strike will succeed: $\Pr(\text{success}) = \Pr(\theta \le \theta^*) = \theta^*$. This equivalence allows us to perform comparative statics directly on the likelihood of success. Specifically, a higher punishment k imposed by the union increases θ^*, making a successful strike more likely. Conversely, a higher cost of participation g reduces θ^*, lowering the chances of success.

The cutoff signal x^* also increases with σ, the standard deviation of the noise term. That is, greater uncertainty about the firm's resistance leads workers to be more cautious in joining the strike, requiring stronger private signals (i.e., lower observed x_i) to be willing to participate. This result captures a central feature of global games: even when coordination is beneficial, uncertainty and imperfect information can lead to underparticipation due to strategic concerns.

The equilibrium conditions derived in the model are notably independent of the wage increase w. This result stems from the collective nature of the wage gain: once the strike is assumed to be worthwhile ($w - g > 0$)—a reasonable assumption given that the strike has already been called—workers do not factor w into their decision-making. Since both participants and non-participants benefit equally if the strike succeeds, the choice reduces to comparing the individual costs involved: the cost of participating g, and the punishment k imposed by the union on those who abstain.

Although the union is not modeled as a strategic player, the equilibrium structure offers clear implications for union action. The union has several tools to influence the incentives of workers: it may reduce g by providing transportation, food, or financial compensation; it may increase k by restricting services or legal support to strikebreakers; and it may reduce uncertainty (σ) by improving information dissemination and assembly participation. Among these instruments, only the punishment k exhibits diminishing marginal returns with respect to the strike's success probability ($\partial^2\theta^*/\partial k^2 < 0$). In contrast, both g and σ have constant marginal effects. This suggests that, under resource constraints, a union would achieve greater effectiveness by investing in communication and support for strikers rather than escalating punitive measures. The difference in the effects of these instruments is a direct consequence of the assumption that punishment is only applied in the case of a successful strike.

4 Concluding remarks

This paper models strike participation as a coordination game under incomplete information, using the global games framework to capture how workers decide whether to join a strike when they are uncertain about the firm's resistance to wage demands. We introduce coercive instruments, particularly punishment for non-participation, and show how these mechanisms affect the unique equilibrium. The model demonstrates that strike success becomes more likely when punishments are stronger or when the individual cost of participation is lower. Additionally, we show that union efforts to reduce uncertainty—for example, through improved communication—can be more effective than punitive measures, which exhibit diminishing marginal returns. These results offer a microfounded explanation for how large groups overcome free-riding in labor conflicts.

A promising avenue for future research is to explicitly model the union as a strategic player. In our framework, coercive instruments such as punishment, strike support (e.g., transportation or financial assistance), and informational efforts are treated as parameters; however, a richer model could endogenize these choices. A union might optimally select the level of punishment, the extent of cost-reducing support, or the intensity of communication campaigns to maximize strike participation or success probability, subject to resource constraints and political pressures. This would introduce a second layer of strategic interaction—between the union and its members—and could be modeled either as a Stackelberg game or within a mechanism design framework. Such extensions would deepen our understanding of union behavior and help explain variation in strike outcomes across institutional settings.

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