Politics and rationality

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5. Wages, strikes, and power: An equilibrium analysis

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A pattern and an introduction

One of the central features of neocorporatist systems is "labor quiescence . . . infrequent strike activity and wage restraint" (Cameron, 1984: 170). In countries with corporatist forms of interest intermediation, strike rates have been extremely low by comparative international standards (Cameron, 1984; Hibbs, 1978). These low rates of strike activity were preceded by comparatively high rates, but precipitous and seemingly permanent declines occurred sometime shortly before or after World War II (Hibbs, 1978). Even the occasional outbursts of labor agitation have been short-lived and low by international standards.[1]

Low strike rates in corporatist systems have generally been accompanied by very low rates of unemployment. They have also been associated with relatively stable control of government by political parties sympathetic to the labor movement, high rates of unionization, and a centralized trade union structure that carries on highly institutionalized and relatively centralized bargaining with employers. The government provides a high "social wage" to workers via transfer payments. The "fear of the sack" (Kalecki, 1971) is less trenchant than in most other of the advanced industrial democracies.

In neocorporatist systems, therefore, very low strike rates are associated with

[1] Labor quiescence is an important part of the "virtuous circle" that characterizes economic performance in the corporatist countries: Political and institutional conditions foster labor quiescence, which, in turn, promotes improved economic performance, which, in turn, reinforces the favorable political and institutional conditions. A critical link in this chain is the low strike frequency and volume, for it creates a stable environment for investment behavior and economic growth. Without predictable and low strike rates, democratic corporatism would probably not work.

economic, political, institutional, and policy conditions that provide labor exceptional power resources it can bring to bear in bargaining with employers. This power is, however, rarely exercised in the form of strikes. How are these low strike rates to be explained?

One set of theories drawn from economics – which we discuss below as bargaining strength theories – hypothesizes a *positive* statistical association between the economic power of unions and/or the high wage expectations and militancy of workers and strikes. The theories capture the commonplace view that unions and workers are more inclined to strike when they feel relatively stronger and more secure. The kinds of variables adduced as indicators of labor strength, however, are those that are widespread in the corporatist systems. In its simple, linear form, therefore, this form of bargaining power theory of strikes cannot be correct.

Several types of alternative explanations have attributed the low strike rates precisely to the existence of very high levels of labor "power resources" derived not only from the economic position of workers but, critically, also from the labor movement's institutional and political power. Furthermore, these explanations often explicitly invoke a strategic view of unions as actors pursuing the (especially economic) interests of workers through both market and political activity in the most effective manner possible. Variables adduced in such explanations include the size of the welfare state, the presence of the political parties of the Left in government, the centralization, concentration, density, and "encompassment" of the union movement, the incorporation of union elites into state institutions, sustained full employment, and others.[2]

There is much merit in these power-based explanations. But there is a problem. We have multiple, sometimes inductive, sometimes deductive hypotheses proposing relationships between a dependent phenomenon and different independent variables that probably are related to each other, as well as to the phenomenon to be explained. What is needed is a theory of strikes that could include and order these variables and the various levels of analysis at which they move in a way which would be consistent with the empirical phenomena to be explained, and which would incorporate the strategic view of the actors that the bargaining power theories invoke.

As this suggests, we have rather specific goals for the theory we would like to develop. It should both identify the causal relationships between strikes and a variety of political and/or economically relevant real-world phenomena *and* specify the *mechanisms* that produce these relationships (Elster, 1983: part 1). In other words, what we are seeking is a theory of strikes that is empirically verifiable and has sustainable *microfoundations*.

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[2] These explanations are discussed more fully below. For various versions, see Cameron, 1984, Hibbs, 1978, Korpi and Shalev, 1980, Lange and Garrett, 1985, and Panitch, 1979. While these authors differ in their specific interpretations, they share the view that when labor is very strong in both the market and political arenas, militancy is likely to be comparatively low.

By microfoundations we mean that the theory should be consistent with fully rational and strategic behavior on the part of the individual and collective actors involved; should treat collective bargaining outcomes, including strikes, as the product of the strategic, and therefore interactive, behavior of the actors; and should recognize that uncertainty or incomplete information may be a crucial factor in explaining when strikes occur. In this framework, we treat the strategies of the actors in an equilibrium context in which each behaves in a fully rational manner, given the information available to her at the time she reaches her decisions. Strikes, therefore, result from the rational pursuit of self-interest. They are not "mistakes," a notion that, as we will see, has been prominent in some explanations of them.

For this theory to be empirically verifiable, its theoretical terms, no matter how abstract, should have empirical referents, its propositions should be subject to empirical test, its implications should be consistent with known empirical phenomena on a cross-national basis.[3] Furthermore, as the data from neocorporatist systems suggest, the effects of variables outside the immediate collective bargaining framework on how that bargaining is pursued, and its outcomes, should be recognized.[4]

In the pages that follow we develop a model that uses a game-theoretic framework to analyze the bargaining relationship between unions and employers when both are considered to be fully rational, strategic actors. In order to introduce contextual and empirically meaningful factors in our model we will make use of the concept of nested games (see Tsebelis, 1990). The actors, employers and unions, interact with a series of other actors (government, nonunionized workers) and are subject to the pressures of their environment (more or less competitive international markets, high or low inventories, unemployment, etc.). So the bargaining game is nested inside a series of other national and international games, which will influence the payoffs, and therefore the strategies of the two main actors. Because of the nested games concept, our model is sensitive to variations of the same kind of parameters that are included in the bargaining power approach. In view of the empirical accuracy of the bargaining power models, we consider this similarity to be an advantage of our model.

One important difference between bargaining power explanations and our

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[3] A good deal of the literature in economics seeking to explain strikes has been peculiarly applicable to the market-oriented industrial relations systems of the United States and Canada. Economists, therefore, have focused almost exclusively on the role of economic variables in explaining the strike decisions of unions. This is clearly unsatisfactory for other types of industrial relations systems (Cohn and Eaton, 1989; Shalev, 1980; Snyder, 1975).

[4] This formulation is intended to include strikes that are undertaken to improve wages and other monetary goals or goals that can be reinterpreted in monetary terms (e.g., hours of work), as well as in order to gain organizational recognition. It excludes, however, strikes that are undertaken for ends that no "reasonable" offer by the employer (perhaps in combination with the government) could satisfy (e.g., political goals such as government or regime overthrow; expropriation of the capitalist; reputation).

model should be underlined at the outset. For the former, changes in the environment have direct impact on the behavior of the actors. In our model, changes in the environment produce changes in the payoffs; these changes in turn produce changes in the strategies of the actors. However, what determines those changes in behavior are calculations of mutually optimal (equilibrium) strategies.

Thus, our model seeks to show why and how the economic, political, and institutional settings within which collective bargaining takes place affect the frequency of strikes through their impact on the actors' strategies. As we shall see shortly, existing theories either fail to provide an adequate theoretical account for the associations they discover between strikes and real-world phenomena, or do not provide theoretical models that adequately capture demonstrated empirical relationships and treat the actors in a consistently rational manner.

Power and information: A review of some literature

There are three primary theoretical approaches to the explanation of strikes in the current literature.[5] The first stresses the relative resources unions and employers can bring to bear as they bargain; we will refer to this as the *bargaining power* approach. The second focuses on the role of information in efficient (and possibly strike free) agreements; we will refer to it as the *information* approach. The third is the *game theory* approach. It stresses the interaction between bargaining parties in an equilibrium context but has not been systematically applied to the analysis of labor–capital relations with the possibility of strikes. All three provide useful insights into why strikes occur, but each has theoretical or empirical limitations. We discuss each of these in turn.

Bargaining power

The bargaining power approach as we are defining it includes all those theories that explain strikes as a function of the relative balance of resources (defined differently by different theories) that union and employer bring to the process through which they define the wage and other terms of the labor contract.[6] Such

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[5] We concentrate much of our attention on the relevant literature in economics. Especially for the bargaining power approach, however, there is an extensive relevant literature both in sociology and political science, such as that devoted to resource mobilization. Only a small part of this work is devoted to strikes. See, for instance, Shorter and Tilly, 1974; see also Tilly, 1978. We are entirely ignoring the "pluralistic industrialism" approach to strikes that represented the mainstream only ten years ago. Our reasons for doing so is that recent work such as that of Hibbs (1978) and Korpi and Shalev (1980) has shown that the arguments found in this literature concerning strikes cannot be sustained.

[6] In keeping with other discussions (Cousineau and Lacroix, 1986), we are including the strike theory of Ashenfelter and Johnson within the bargaining power approach. While their theory is more deductive, the logic of their empirical work is consistent with a bargaining power approach as we define it, although the range of relevant variables they consider is narrow and they focus on their impact on workers' wage expectations. For a critique along these lines, see Shalev (1980),

approaches do not consider the strategic interaction between the actors. They also often use relatively ad hoc or inductive hypotheses about how different states of the world – economic, political, social – affect the expectations or tactical opportunities of the bargaining adversaries. These hypotheses are then tested through time series regression analyses of aggregate strike frequency. The best of these models explain very high degrees of the variance in strike frequency.

Shalev makes an important distinction between two streams of theory, both of which fall within the bargaining power approach as we define it. First, some theories – predominantly in economics and which we refer to as "bargaining strength" theories – stress the role of economic variables and their effects on wage expectations and employers' willingness to pay. Strikes result from failures in bargaining due to demands of workers that exceed the willingness of employers to pay.

The *locus classicus* of this type of theory is that of Ashenfelter and Johnson (1969). In their model, workers pressure their leaders – who must be responsive for organizational reasons – for a wage increase that exceeds, and that the leaders understand to exceed, the level of wages which the employers are willing to offer. If the employer judges the costs of a strike less onerous than paying the union's demands, a strike is the result. But the strike leads to a gradual reduction of the minimum wage workers are willing to accept until it reaches the level at which the strike can be brought to a close. Thus, strikes are the result of a "misalignment" between what workers expect from a contract and what employers are willing to give.

Operationally, strikes are expected to be more frequent when unemployment levels are low, for this will tend to increase wage expectations and decrease the costs of a possible strike. Employer profitability and past changes in real wages also enter the model via workers' wage expectations or employers' willingness to pay higher demands.[7] Thus, strikes result from economic conditions that make labor more aggressive, leading it to make demands employers cannot accept. The role of strikes is to realign workers' demands. The power of labor matters, but only because it leads to demands that are economically excessive given the economic condition of employers.

The second stream of bargaining power explanations of strikes is seen primarily in sociology and political science.[8] It emphasizes a far broader range of

who, however, wishes to include under bargaining power theories only arguments that stress the importance of political and institutional factors among the power resources available to capital and labor and that place less emphasis in explaining strikes on wage expectations. As will become evident, our approach is in sympathy with Shalev's stress on power, broadly understood, and on the importance of the tactical situation, but we find his explanation theoretically weakly founded.

[7] At the end of their article, Ashenfelter and Johnson recognize the possible effects of changes in the institutional framework within which bargaining takes place. These play a role, however, via their impact on wage expectations or the unions' rate of concession.

[8] For prime examples, see Cameron, 1984, Hibbs, 1978, Korpi, 1983, 1978, and Korpi and Shalev, 1980.

variables that are argued to affect the "power resources" of labor and capital. In these theories, manifest conflict becomes more likely as the power resources of labor – which is assumed under capitalism always to be the structurally weaker party – increase (Korpi and Shalev, 1980). As the balance of power becomes more favorable, unions are expected to exploit the tactical advantages to improve their economic situation which this affords. Whether they do so with strikes, however, depends on the relative advantage of pursuing demands within the market or political arenas. Thus, labor strength both in the labor market and in politics is expected to be associated with low strike rates (Korpi and Shalev, 1980).[9]

Some of the factors that influence the distribution of power resources overlap with the explanatory variables used in the narrower bargaining strength models: low unemployment, for instance. But political and institutional conditions enter fully into the range of variables to be considered so that factors such as the stance of government toward unions and employers and toward strike action, the density of unionization, the capacity of the unions for collective action, and the repressive capacity of the government need to be incorporated. Equally as important from a theoretical standpoint, manifest conflict and strikes are explained as a manifestation of the "continuous struggle for influence and advantage" (Shalev, 1980: 154) between labor and capital. Rather than directing our attention to the alignment of wage expectations with employers' willingness to pay, it underlines the importance of examining "how aggregate economic and noneconomic forces at any given point in time affect the interest and opportunities of unions and employers for initiating open conflict" (Shalev, 1980: 154), and the relative advantages of doing so through struggle in the political institutions and/or the market.

The broader formulation seems the more satisfactory.[10] Aside from the specific critiques of the work of Ashenfelter and Johnson made by Shalev (1980) which we will not repeat here, it seems more theoretically reasonable to recognize that it is not only what workers expect or would like to get from wage negotiations but their ability to pursue those expectations that should be considered:

wage expectations should not occupy the *central* place in aggregate models of industrial conflict . . . the desire to inflict costs on an opponent is of little practical importance absent the ability to do so. (Shalev, 1980: 155)

This is all the more the case since wage expectations themselves are likely to be influenced by the perception of the balance of powers between workers and employers.

The power resources form of the bargaining power approach directs our atten-

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[9] Hibbs (1978) makes a similar argument, although based on somewhat different reasoning.

[10] A number of quantitative and more qualitative studies have demonstrated the power of such political and institutional variables in explaining variances in aggregate strike frequency, especially in contexts outside the United States (Hibbs, 1978; Korpi and Shalev, 1980; Shalev, 1980; Snyder, 1975).

tion to the importance of relative power and to a series of variables – political and institutional, and not just economic – that can be expected to influence the frequency of strikes via their impact on the relative power of the bargaining parties. Such variables should certainly be included in any model of strike behavior. The power resources approach to strikes, however, is not fully theoretically satisfactory.

The problem is rooted in what has been dubbed the "Hicks paradox" (Kennan, 1986). The paradox is a direct outgrowth of the theory of wage bargaining developed by John Hicks (1963). Hicks argued that the economic settlements arrived at through wage bargaining were entirely predictable. Using a simple deductive model relying exclusively on the economic considerations of the union and employer operating as a bilateral monopoly, he showed that settlements were the product of the interaction of the employer's desire to minimize the wage bill but willingness to make wage concessions in the face of a strike threat, and the union's desire to maximize some wage function and consequent resistance to wage concessions, counterbalanced by the costs of a strike. The intersection of the two curves expressing the union's and employer's trade-offs produces a determinate outcome on which the bargaining parties cannot mutually improve. The problem for an explanation of strikes is that, given any determinate solution, if the actors are rational and fully informed, strikes should never occur.

If they do, it must be "the result of faulty negotiation . . . adequate knowledge will always make a settlement [without a strike] possible" (Hicks, 1963: 147).[11] In turn, when labor and capital are considered rational, fully informed actors, it is not clear why their relative power, however measured, should affect the probability of strikes. The outcome reflective of the current balance of power resources should be attained without recourse to a strike,[12] which can only reduce joint net utility without altering relative payoffs. Thus, bargaining power theory, in all its variants, lacks microfoundations, despite its impressive macro-statistical results and the attractiveness of its conceptual orientation. It seems likely that political and institutional, and not just economic, variables affect the likelihood of strikes, but we do not have a satisfactory explanation of *why* and *how.*

Information theories, to which we now turn, operate at a level that could provide such microfoundations and thus address this question, but as we shall see, they both fail the test of empirical relevance and do not treat labor and capital as rational actors interacting with each other in pursuit of their interests.

11 Actually, Hicks proposed two basic explanations for strikes in light of his model: private information or reputation building (1963: 146–7). We will see that the former has assumed a prominent role in the attempt to overcome Hicks's Paradox. As we have already indicated, we will not discuss the latter.

12 Cousineau and Lacroix (1986: 377) make the same point when they write that if one assumes that "the parties involved in wage negotiations are informed about changes in the relative bargaining power . . . it would be reasonable to expect changes in relative bargaining power to be reflected in the terms of the wage agreements rather than in strikes."

Information models

Information models take the Hicks paradox as their starting point but seek to resolve it by loosening the perfect information assumption. They have principally argued either that strikes become more likely when the "informational environment" within which bargaining takes place becomes more uncertain or less tractable (e.g., Cousineau and Lacroix, 1986)[13]; or when one or both of the bargaining actors have private information to which the other actor does not have easy or immediate access (e.g., Hayes, 1984; Mauro, 1982).

While these theories are significantly dissimilar in many of their details,[14] they share some important features. First, all the theories within this approach seek to build up from microfoundations. Their hypotheses are derived from models of the expected behavior of individual bargaining agents, generally at the firm level. The issue, therefore, is the adequacy of these microfoundations both empirically: How well do they link to real-world variables? and theoretically: How well do they capture the processes they are trying to model?

Second, they all consider a relatively narrow range of variables in discussing the kinds of misinformation that lead to strikes. These approaches are relatively economistic in their interpretation of the variables that influence the bargaining positions and strategies of the actors. They focus on the collective bargaining dynamics internal to the firm (Cohn and Eaton, 1989). When they "recognize the role of bargaining power" (Cousineau and Lacroix, 1986: 377), only a relatively narrow range of economic variables is used, leaving political and institutional factors entirely aside.[15] Thus, they ignore uncertainty or incomplete information arising from the effects of changes in the political or institutional environment.[16] As we have already argued, this seems unsatisfactory.

[13] Cousineau and Lacroix (1986: 377) stress that "both the quantity and reliability of information needed to assess relative bargaining power do have significant value in predicting strike incidence."

[14] While all are basically deductive in their construction, for instance, Hayes (1984) relies exclusively on extensive formal modeling while most of the others construct models that are then given empirical referents and tested through regression techniques. Hayes's work (1984) stands out for its effort to explore the implications of asymmetric information for the logic of bargaining between capital and labor. Her analysis bears some similarities to the model we develop here, but there are significant differences, including the fact that in our model it is the employer, rather than the union, that is incompletely informed. This allows us to develop empirical referents for terms in our model that are both politically interesting and have correspondence with those employed in bargaining power analyses.

[15] The one exception here is the introduction of a dummy variable for Canadian wage control policies. Even these are interpreted in terms of their effects on the economic uncertainty in the bargaining environment (Cousineau and Lacroix, 1986: 383).

[16] It should be underlined that there is nothing inherent in these models that should restrict the range of variables they consider. It is unclear whether their restrictiveness is due to the narrowness of the authors' interpretations or to the fact that they work with data from settings in which there is little or no change in the political or institutional climate over the period of time considered. For a critique of the narrowness of these models, see Cohn and Eaton (1988).

Third, they share the view that strikes "result essentially from misjudgment in a world of imperfect information" (Cousineau and Lacroix, 1986: 385). This approach, then, directly addresses one of the principal critiques we previously raised about bargaining power theories by recognizing that the relative level or changes in the relative level of power resources cannot, if the actors are fully rational and informed, explain strikes.

For both theoretical and empirical reasons, uncertainty or lack of full information plays an important role in the explanation of strikes.[17] Yet, the information-based theories still fail fully to meet the requirements of a satisfactory theoretical treatment of strikes. In addition to their failure to incorporate the political and institutional environment and thus fully to capture the role of power, they also contain an underlying theoretical weakness.

These theories are all based on the idea that strikes are the result of misinformation. For instance, the employer's offer that triggers the strike reflects a misjudgment on her part of the offer that will gain the agreement of labor without a strike. The strike is the response to this "ill-informed" offer. "Since information is costly to obtain, correcting these misperceptions requires the use of resources. Strikes then become a method to transmit the information necessary to correct the parties' misperceptions about each other" (Mauro, 1982: 536). Strikes, therefore, are treated as mistakes, the results of misjudgments in the presence of incomplete information.

Such an explanation, however, is itself incomplete, for it fails to capture a critical distinction between a nonstrategic and strategic approach to the interactions between the players in bargaining. Strikes in the incomplete information models so far presented are "mistakes" in the sense that each actor would prefer that they did not occur and would act differently if confronted with the same situation again. They are not equilibrium outcomes produced by each actor undertaking appropriate strategic behavior, given the information available to her at the time she had to make her decision, decisions that the actor would necessarily repeat, and want to repeat, each time the situation itself was repeated despite the suboptimal outcomes that resulted.

This difference has a series of important theoretical consequences. First, in the information theories, imperfect information of the actors is treated solely as a source of error and suboptimal outcomes. In a more strategic understanding of the problem, however, the uncertainty or partial information of the adversary is not only a source of potential suboptimality; it can also become a resource in bargaining, a strategic opportunity better to advance one's interests. A clear example is the bluff in poker with a potentially good hand showing in one's face-up cards. In a more fully strategic and interactive framework, strikes would not be assumed to be the result of "faulty negotiation." In contrast to the implicit

[17] Cousineau and Lacroix provide evidence showing that economic variables reflecting instability in the informational environment of collective bargaining significantly explain interindustry differences in strike frequency "better than do interindustry differences in relative bargaining power or union militancy" (1986: 385).

assumption of information theories – the strike would not always be considered a way to communicate the truth.

A second limitation of how the actors and strikes are treated in the information theories is that they employ a restricted interpretation of the actors' rationality. In those theories, the actors do not behave strategically, in the sense that they try to maximize their interests, given what they can rationally expect the opponent to do, and vice versa. Instead, they react nonstrategically, seeking simply better to inform the adversary about their utilities and to gain information about the adversary's. There is no obvious reason, however, why this should be how rational actors would behave (Tsebelis, 1989). In fact, the implicit conception of the actors seems both naive and to contradict the notion of the rational maximizer that underlies the deductive logic of all these theories as well as theories of bargaining power.

We need, therefore, a more completely interactive way of modeling the actors' strategic behavior. This can be done by treating strikes as parts of an equilibrium strategy: calculated optimal courses of action on the part of all actors, given the information that they possess. Using this approach, we will be able to treat incomplete information as a resource and not just a limitation. We will also be able to incorporate fully the possibilities of strategic interaction between rational actors.

In addition, a strikes-as-equilibria approach will have an important additional advantage. It has the ability to answer conditional questions, leading to empirically testable predictions. If strikes are mistakes, it is difficult to specify the conditions that lead to these mistakes, and even more difficult to predict what would have happened if some of the parameters of the model were different. An equilibrium approach is designed precisely to answer such conditional questions – that is, to specify the conditions under which a certain behavior (in our case strikes) is the outcome of the interaction of rational agents. The advantages of an equilibrium approach to strikes, therefore, are considerable. Extensions of some contemporary developments in game theory allow us to pursue this approach.

Game-theoretic models

The third stream of literature relevant to the explanation of strikes is noncooperative game-theoretic models of bargaining. A first general remark concerning all these models is that, as in Hicks's argument, there is no possibility of strikes under complete information (if all players' payoffs are common knowledge), or, for that matter, of any kind of public disagreement between the bargaining players. The outcomes also are efficient: It is impossible to improve the situation of one player without making the other worse off. The reason is that only reasonable demands (justified by the payoffs of the player) are made, and so the demands are perfectly anticipated and met. The possibility of strikes or disagreements and inefficient outcomes arises only when one or both of the players do not know some of their opponents' payoffs. The situation then is resolved by trial

offers (which are sometimes turned down), or, in the case of labor–management negotiations, by strikes. These models, like our model, focus on the micro level, and treat trial offers (or by extension strikes) not as mistakes, but as part of the equilibrium strategies of the players.

However, while these models are very precise in the description of the institutional features of the bargaining game itself (who makes the offer, who knows what at each point in time, etc.), they remain extremely abstract in terms of contextual and empirically relevant factors that, as the empirical literature indicates, influence the outcomes of the bargaining game. Furthermore, most of these models speak about bargaining in general, or about the interaction between seller and buyer, and, therefore, do not include explicitly the possibility of strikes.

The archetypical models of noncooperative bargaining are two models by Rubinstein (1985a, 1982), the first with complete information, the second with one-sided incomplete information (one players knows only her own payoffs, while the other knows the payoffs of both). Rubinstein (1982) solved the problem of the division of one dollar between two players. He noted that any division of the dollar is a Nash equilibrium (i.e., that any unilateral deviation from the partition is either infeasible, or undesirable). Since there is an infinite number of equilibria in the "divide the dollar" game, Rubinstein tried to find a partition with some characteristics of stability. He considered that each player is impatient, and that this impatience would drive the process of bargaining to its final outcome. Each player makes an offer, which is either accepted or rejected by the opponent. If the offer is accepted, the game ends; if the offer is rejected, the other player makes a new offer that is in its turn either accepted (game ends) or rejected (game continues). Rubinstein modeled impatience by a discount factor: in each period of time, the dollar was shrinking by a different percentage for each player. He proved that under perfect information this process converges to perfect equilibrium. The first player makes a specific offer that is immediately accepted.[18]

We will briefly discuss only two other models that provide important ideas for our own model, which follows. Shaked and Sutton (1984) introduce the idea of an "outside option." Their model is a bargaining model with complete information, where one or the other player has the possibility, if she wants, to choose an "outside option." If one player chooses the outside option, then with some probability p the game ends, and prespecified payoffs are distributed to the players; with a probability $(1 - p)$ the bargaining continues, and a player makes an offer that gets accepted (game ends) or rejected (the game continues), another outside option becomes available, it is taken or not, and so on.

[18] In a second paper, Rubinstein (1985a) introduced incomplete information (one of his players did not know the discount factor of her opponent). In this case, the first player's offer was not always accepted, and the negotiations could continue for several rounds. Crampton (1983) and Sobel and Takahashi (1983) produced similar bargaining models with one-sided complete information, where only one player could make the offers. Fudenberg and Tirole (1983) introduced a model with two-sided uncertainty, but with a finite number (two) of rounds.

We will use the concept of an outside option to model strikes explicitly. In our model, labor will have the outside option of a strike. If the option is taken, the government intervenes in the negotiation process with probability p, and gives some payoffs to the players. Empirically, this does not require that the government actually dictate the terms of the agreement between capital and labor, but only that with probability p government will intervene and thereby assure an agreement that will be more, or less, favorable to labor. The agreement itself could still be reached between the bargainers for capital and labor. If the government does not step in to terminate the game, the negotiations continue.

A second model, that of Grossman and Perry (1986), is very similar to the one we subsequently present. Its major innovation over those already presented is that it not only presents a bargaining problem with infinite rounds but introduces the possibility of one-sided or asymmetric information. The situation is that of a seller and a buyer, where the buyer's valuation of the transaction object is unknown. Grossman and Perry's model presents all the desirable properties of a labor management negotiation game, except for two: (1) It does not include the possibility of strikes and the strategic alternatives generated by this option; (2) it includes only one-sided uncertainty.

As we will see, the model we propose resolves only the first of these problems. Labor and Capital negotiate over the division of the economic output through negotiations at the level of the factory, the branch, or the whole country. Strikes are possible and the actors, especially labor, therefore have expanded possibilities for strategic action. Furthermore, capital will be considered to have incomplete information about the strength of labor. To simplify the presentation, we rescale the output so that the negotiation is, in the model, for one dollar.

In order to facilitate understanding, we present the model in three stages. We first discuss a bargaining model with complete information, basically following Rubinstein (1982); in the second stage, we introduce an outside option (the strike); and finally, we solve the problem of bargaining when strikes are possible and information is incomplete.

A model of strikes with one-sided incomplete information

Stage 1. The Rubinstein model

The first player makes a proposal of how to split the dollar; if the offer is accepted, the game ends; if not, the other player makes an offer, which can be accepted or rejected; if the offer is accepted the game ends. Both players are impatient, which means that the dollar shrinks in the eyes of each one of them in each period of time by different amounts. Call d_C and d_L the time discount factors of Capital and Labor, respectively. It means that one dollar in period one is worth only d_C to Capital and only d_L to Labor in the next period.

These time discount factors drive the negotiation process to its conclusion. Capital is pressed because of the potential loss of profits with the passage of

time, so d_C of a firm can be conceptualized as such a potential due, for instance, to intense competition in the presence of high demand or the absence of inventories in the presence of the prospect of sales; in the case of national bargaining, d_C could represent the level of international competition: The more competitive international markets and the greater the possibility of lost sales if negotiation is prolonged, the more Capital is eager to conclude bargaining. Labor, on the other hand, is pressed to present concrete outcomes of the negotiation by its internal organizational structure. Leaders who do not produce desirable outcomes can face internal challenges and the possibility of their replacement or of organizational decay. That is why Labor has a time-discount factor.[19]

This conceptualization of time discount factors permits us to introduce other actors into the model according to the nested game framework. When Labor, for example, increases its organizational discipline, or solidifies its jurisdictional boundaries, or, in Hirschman's (1970) terms, there is a reduction of the potential for exit or voice without a commensurate increase in the other, its time discount factor increases and, therefore ceteris paribus, its share of the output (of the dollar) rises. Or, when Capital faces a more competitive economic environment, its discount factor decreases, it feels pressure to conclude an agreement more quickly, and consequently, is willing to give up more in order to finish sooner rather than later.

How would Capital and Labor divide the dollar between them under these conditions? Consider that they have arrived at an equilibrium, and this equilibrium gives x to capital and $(1 - x)$ to Labor. If Capital receives x at time t, it would not accept anything less than xd_C in time $(t - 1)$, therefore giving Labor at the most $1 - xd_C$. If Labor receives at the most $1 - xd_C$ at time $(t - 1)$ then it would get at the most $d_L (1 - xd_C)$ in time $(t - 2)$, therefore giving Capital at least $1 - d_L (1 - xd_C)$. One can repeat the same argument interchanging the words "at the most" and "at least," and would conclude that Capital receives exactly $1 - d_L (1 - xd_C)$ in time $(t - 2)$. However, since by assumption we are at equilibrium, what Capital receives at time t and what it receives at time $t - 2$ should be the same. This argument leads to the division of the dollar the following way:

Capital receives

$$x = (1 - d_L)/(1 - d_L d_C),$$
(1)

and Labor receives

$$1 - x = d_L(1 - d_C)/(1 - d_L d_C).$$
(2)

Several remarks are in order. First, the equilibrium is obtained in the first round: Capital makes an offer where it keeps x cents from the dollar, and gives $(1 - x)$ to Labor, and Labor accepts immediately, because it knows that it cannot do any better. Second, the structure of the game, and the alternating offers were crucial for the calculation of the equilibrium. Third, the player who moves first,

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[19] An alternative conceptualization is the level of control of the leadership over the organization. The higher this level, the less Labor leaders feel pressed rapidly to conclude negotiations.

in our case Capital, has an important advantage. Indeed, had Capital moved second, it would have received the share indicated by (1) multiplied by d_C, that is, a number less than (1).[20,21] Fourth, the player who is most impatient will give up more of her share in order to conclude the bargaining process sooner. It is easy to verify that $x_C(x_L)$ increases with $d_C(d_L)$, and decreases with $d_L(d_C)$. After these observations, we can proceed to step 2 of the model, and introduce the outside option.

Stage 2. Complete information and possibility of strikes

Before a player makes an offer, she can interrupt bargaining and choose an outside option. If she makes this choice, then the bargaining game stops, and each player receives, with probability p, a prespecified payoff of which both are aware; call these payoffs o_C for Capital and o_L for Labor. The bargaining continues with probability $(1 - p)$ and the player makes an offer. The opponent can accept, and the game ends; she can refuse, and choose the outside option; or she can make a new offer. If the outside option is chosen, then the game ends with probability p and the players receive o_C and o_L respectively. Otherwise, the bargaining continues.

How will the players bargain in the presence of an outside option? Appendix 1 calculates the equilibrium of this model. Here we will explain the logic of bargaining when such an outside option is possible. To simplify matters, we consider only the case where an outside option is available for Labor. That is, only Labor has the possibility of interrupting the negotiation for an outside option (strike). If a strike occurs, then the players receive the payoffs o_C and o_L respectively with probability p and they continue bargaining with probability $(1 - p)$.

Under these conditions, Labor will choose the outside option only if o_L is greater than the share it would receive according to (2). If it chose to take an outside option with value less than the share indicated by (2), Labor would run the risk (with probability p) of receiving less. So, although a strike is always an available outside option for Labor, it will be chosen only if its value is over a certain threshold. Knowing that, Capital will not be affected if the value of the outside option is less than (2) and the equilibrium will be described by (1) and (2). If, however, o_L is greater than (2), then Labor will always choose to strike when it is its turn. Knowing that, Capital has to make an offer that will be at least as attractive to Labor as the (discounted for impatience) combination of strike and possible counteroffer. Appendix 1 replicates the calculations of the Rubinstein model when an outside option is available to Labor.[22] Note that in every

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[20] This asymmetry between the two players can, however, be rectified by appropriate algebraic manipulations (see Sutton, 1986).

[21] Another property of this equilibrium is that it can be shown that if the two players have time discount factors that tend to 1, then they divide the dollar into two equal parts, which is a division with normatively pleasing properties. More precisely, Rubinstein (1982) has shown that his equilibrium converges to the Nash bargaining solution (see Luce and Raiffa, 1957).

[22] The calculations replicate Sutton, 1986. The reader should consult that paper for more details.

case, despite the fact that there is the possibility of infinite bargaining, the player's impatience, on the one hand, and complete information on the other, terminate the process in one period: The first offer is such that it is immediately accepted, and the game ends.

Here we can report the results, and introduce terminology that will be useful in the next and final step. We will call "Strong Labor" (SL) the Labor player with an outside option big enough to be taken whenever the opportunity arises. We will call "Weak Labor" (WL) the Labor player with an outside offer smaller than she would get out of the bargaining process (and who, therefore, never selects the outside offer). The outcomes will be reported in the following way: x is the equilibrium share of Capital, and it will be indexed by the order the two players take turns to make offers.[23] As we have already said, although the logic remains the same, the bargaining equilibrium is sensitive to who made the first offer.

$$x_{C,WL} = (1 - d_L)/(1 - d_L d_C), \tag{3}$$
$$x_{WL,C} = d_C(1 - d_L)/(1 - d_L d_C), \tag{4}$$
$$x_{C,SL} = (1 - po_L - (1 - p)d_L)/(1 - (1 - p)d_L d_C), \tag{5}$$
$$x_{SL,C} = d_C(1 - po_L - (1 - p)d_L)/(1 - (1 - p)d_L d_C). \tag{6}$$

Equation (3) indicates Capital's share when it starts first and plays against Weak Labor. Equation (4) indicates Capital's share when Weak Labor starts the negotiating process. Equation (5) indicates Capital's share when it starts the negotiation process against Strong Labor. And Equation (6) indicates Capital's share when it receives an offer from Strong Labor.

Note again the advantage of the player who moves first. Note also the fact that the game ends in time period 1, even in the case of Strong Labor, because, since Capital can anticipate a strike, it concedes a bigger part of the dollar.

Again, the conceptualization of strikes as outside options presents the opportunity to introduce the impact of outside actors into the model according to the theory of nested games. For example, the existence of militant workers outside the union facilitates strikes for Labor, and so raises the value of the outside option. Further, the existence of a Labor government increases the value of the outside option, because it makes government intervention to end a strike in favor of Labor more probable.

This second stage of the model is richer and more realistic than stage 1 because it introduces the possibility that unions can undertake strikes. However, strikes never result. If Labor is weak, it is not a real threat to strike; if it is strong, its strength is anticipated and Capital makes an offer that heads off a strike. Moreover, the value of the outside option does not figure in the solution of the bargaining game between Capital and Weak Labor. The reason is that under perfect information both players know that such an option will not be exercised, so they disregard it. Stage 3 will introduce incomplete information, and not only the possibility but also the occurrence of strikes. Moreover, as we will see, the

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[23] Labor will obviously receive the remainder of the dollar.

value of the outside option of Weak Labor enters in the solution, because it provides an opportunity for Weak Labor to bluff and pretend that it is Strong in order to extract more from Capital.

Stage 3. Bargaining with incomplete information

Consider now the case where Capital does not know the value of the outside option for Labor. That is, discount rates are common knowledge, and Labor knows the value of striking, but Capital knows the value of the outside option only as a probability. Labor has a probability w of being weak (value of outside option o_W) and $(1 - w)$ of being strong (value of outside option o_S). The model will examine in detail the case where o_W is less than the value indicated by (2) and o_S is more than (2). So Strong Labor would always strike, while Weak Labor would never strike. This is by far the most interesting case. In the final discussion we will examine several variations of the model, where some of the assumptions we will make here are relaxed.

The situation can be conceptualized as in Figure 5.1. Labor and Capital have to divide the dollar. Labor's share is measured from left to right, while Capital's share is the remainder and is measured from right to left. Strong Labor will strike a deal that is toward the right of the figure, while weak Labor will not be able to push the outcome very much to the right. According to our assumptions, o_W, the outside option of the Weak Labor, is less than it would obtain through negotiations $(1 - x_{C,WL})$. On the other hand, Strong Labor can obtain more $(1 - x_{C,SL})$ than Weak Labor through negotiations, and the value of its outside option o_S is even higher.

Appendix 2 presents the analytic solution of the problem. Here we will present only the logic of the model. Let us study the problem that each of the actors faces. Capital does not know whether it deals with Strong or Weak Labor. However, there is a probability w that Labor is Weak, and this probability is common knowledge. Capital knows that any offer that gives Labor less than $(1 - x_{C,WL})$ will be rejected by both Weak and Strong Labor, and so, because it is pressed for time, it will not make such offers. On the other hand, Capital knows that any offer that gives Labor more than what Strong Labor would get (that is, more than $(1 - x_{C,SL})$) would be accepted by both Weak and Strong Labor. Moreover, Capital knows that if it has to deal with Strong Labor, it will not be able to concede less than $(1 - x_{C,SL})$. In fact, if Capital's offer is any less than $(1 - x_{C,SL})$ Strong Labor will immediately go on strike. So Capital has to make an offer somewhere in between the two extremes, so that the offer will be accepted by both possible types of Labor, or at least by Weak Labor.

Strong Labor has easy choices. It knows that it can get $(1 - x_{C,SL})$, so it will accept nothing less. An offer will be accepted only if it grants this share; otherwise Strong Labor will go on strike.

Weak Labor faces a more complicated problem. If Capital knew that it was facing Weak Labor, it would give only $(1 - x_{C,WL})$. However, Capital does not

Labor

Capital

$$\vdash\!\dashv$$

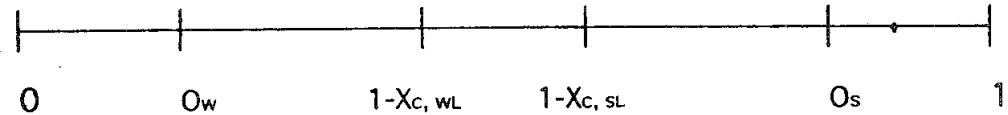| 0 | O_W | $1-X_{C,WL}$ | $1-X_{C,SL}$ | O_S | 1 |

Figure 5.1

know which opponent it is facing, so there is a possibility for Weak Labor to bluff, and behave as if it were strong: That is, if offered anything that is considered unacceptable, strike first and then make the same counteroffer that Strong Labor would make. One could imagine that Weak Labor could behave exactly as Strong Labor and strike always unless it is offered $(1 - x_{C,SL})$. However, there are costs from such a behavior. As we said, if the outside option is taken, then there is a probability p that the outcome for Weak Labor will be o_W – that is, less than it could get through negotiation under perfect information. So Weak Labor's bluffing capacity is limited. If the offer is big enough, it will be better off accepting it than bluffing and striking.

Knowing all that, Capital will be able to make an offer that will make bluffing from Weak Labor costly. In other words, Capital will be able to make an offer attractive enough to be immediately accepted by Weak Labor. So, finally, Capital will have the choice between making an offer

$$1 - x_{C,L} - \max[\{po_W + (1 - p)d_L(1 - d_C x_{C,SL})\}, (1 - x_{C,WL})], \qquad (7)$$

which will be accepted by Weak Labor and rejected by Strong Labor, or decide to give up, ignore the possibility that Labor is Weak and treat it as Strong, and therefore make the offer

$$1 - x_{C,SL} = 1 - ((1 - po_L - (1 - p)d_L)/(1 - (1 - p)d_L d_C)), \qquad (8)$$

which will be accepted immediately by Labor, whether Weak or Strong.

Equation (8) leads to the same partition of the dollar as Equation (5), the equilibrium when Capital is facing Strong Labor, and makes an offer first. The calculation of equation (7) is given in Appendix 2. The logic that leads to this equation is to dissuade Weak Labor from bluffing. Weak Labor might be tempted to bluff if the first quantity in the right hand of (7) is greater than the second. In this case, Weak Labor is willing to take the risk of a strike (which is likely to

have unfavorable results, (since o_W is by definition less than $(1 - x_{C,WL})$) in order to persuade Capital that it is Strong, and receive $(1 - x_{C,SL})$ in the next round. If the second quantity in the right-hand side of Equation (7) is greater than the first, then Weak Labor has no bluffing potential. If Weak Labor has no bluffing capacity and Capital wants to probe whether its opponent is strong or weak, it will make the offer $x_{C,WL}$. The willingness of Capital to test the strength of its opponent depends on the probability w that Labor is Weak, and its time discount factor d_C. The relation is the following: If

$$x_{C,SL} \geq wx_{C,L} + (1 - w)d_C x_{C,SL}, \tag{9}$$

Capital will choose to treat Labor as if it were Strong, instead of gambling that it is facing Strong Labor. Capital will have to wait one round, and then give the advantage of the first offer to Strong Labor.

Equation (9) should be read in the following way: If the probability that Labor is Strong is high, or if the time discount factor for Capital is low, that is, if Capital is pressed for time, it will give in immediately, and make a proposal acceptable by both Weak and Strong Labor. If, on the contrary, the time discount factor is high, or the probability of facing a Strong Union is low, or both, then Capital will pay the price to probe whether the opponent is Strong or Weak.

To recapitulate:

1. If Equation (9) holds, Capital will treat Labor as if it were Strong with probability 1. It will offer $(1 - x_{C,SL})$, and the offer will be accepted immediately. Equation (9) indicates that an immediately acceptable offer becomes more likely when the probability that Labor is Strong is high, and when Capital is pressed for time.

2. If (9) does not hold, Capital will make an offer that will be rejected by Strong Labor, which will immediately strike, and accepted by Weak Labor. There are two possibilities:

   a. If the second term on the right-hand side of (7) is greater than the first, then, Weak Labor has no bluffing capacity, so the offer will be $(1 - x_{C,WL})$. Weak Labor will accept immediately.

   b. Otherwise, Weak Labor has bluffing capacity, so it has to be bought by a higher offer. Capital will make the offer $(1 - x_{C,L})$ of Equation (7), which will be accepted immediately by Weak Labor.

In this model, strikes occur only when Strong Labor faces an offer that is less than $(1 - x_{C,SL})$. The reason that Capital may make such offers is not some miscalculation, but the fact that Capital's time discount factor is sufficiently high, or the probability that Labor is Strong sufficiently low, so that it is in the interest of Capital to probe the strength of its opponent. Note also that in this model, Weak Labor never strikes. Its bluffing potential is anticipated and neutralized by Capital.

These formal characteristics of the model prompt some more general observations that serve as preliminaries to an examination of the model's empirical relevance. First, the distributional impact of incomplete information should be

underlined. Because Capital is incompletely informed, it has to pay a price. Its offer has to prevent Weak Labor from pretending that it is strong; and if Capital's discount factor is low, or the probability of facing Strong Labor is high, it has to make an offer acceptable to Strong Labor, regardless of whether it is facing a Strong or a Weak opponent. No such implications about the distributional impacts of misinformation can be drawn from the information theory discussed earlier.

Second, because of incomplete information, Weak Labor is sometimes able to bluff and pretend it is Strong, and extract more concessions from Capital. Equation (7) is crucial in determining the bluffing potential of Weak Labor. If the first term in the right-hand side is greater than the second, Capital has to worry about the bluffs of Weak Labor. If Weak Labor can bluff, then the outside option can be used, and the solution of the game includes the value of this outside option. Note that in equilibrium Weak Labor never bluffs, because Capital makes a higher offer, in order exactly to prevent it from bluffing. But the absence of evidence of bluffing does not mean that the potential for bluffing, with its distributional consequences, does not exist. Both this potential and its distributional implications are entirely absent from information theories of strikes.

Third, the game does not necessarily end after the first offer, as was the case in the first two steps of the model. It is possible that Capital finds it more profitable to take the risk and probe the identity of its opponent. If it is facing a Weak opponent, the offer will be accepted; if the opponent is Strong, then a strike will result, and the bargaining game will end in the next round. Therefore, if Capital decides to probe, a strike results with probability $(1 - w)$. As we have already said, such a behavior is not a mistake, or a miscalculation, or the result of misinformation. It is the best course of action for each one of the actors, given the information that they possess.

Fourth, when a strike occurs, there is a resulting loss of welfare for both actors. In the models of perfect information the first offer is immediately accepted, so the two actors divide the whole dollar between them. In the model of incomplete information, there are three possible cases:

1. Capital makes an offer acceptable to both Weak and Strong Labor.
2. Capital makes an offer acceptable only to Weak Labor, and is actually facing Weak Labor.
3. Capital makes an offer acceptable only to Weak Labor, when it is actually facing Strong Labor.

Only in the first two cases do the players share the whole dollar. In the third case, there is a strike, which may end by government intervention which provides an outside option (with probability p), or by continuation of bargaining and loss to both actors because of their time preferences. So, in the third case, one way or the other, there is a loss of aggregate welfare. Again, this is the result of the best course of action that the players can take.

Fifth, it will be useful for our empirical examples to offer comments about the impact of variations of the six parameters of the model (d_L, d_C, o_S, o_W, p, and w)

on three characteristics of the outcome of the model: the share of Capital, the bluffing capacity of Weak Labor, and the first offer made by Capital. We remind the reader that Capital's first offer determines whether there will be a strike (with probability $(1 - w)$) or not.

- The bluffing potential of Weak Labor is directly related to Labor's discount factor (d_L), to the value of the outside options of both Strong and Weak Labor (o_S and o_W), and inversely related to the time discount factor of Capital (d_C), and the probability that the outside option will be introduced (p).
- When the bluffing potential of Weak Labor increases, the share of Capital shrinks, because it has to make an offer acceptable at least to Weak Labor. Moreover, when this potential becomes very high, it may be profitable for Capital to make an offer acceptable to both Weak and Strong Labor instead of probing.
- The share of Capital in general increases when its time discount factor (d_C) increases, and when the probability that Labor is Weak (w) increases, and decreases with increases in all of the other parameters of the model.
- Finally, whether Capital will make an offer acceptable just to Weak Labor (which results in a strike with probability $(1 - w)$) or to both Weak and Strong Labor, depends on how close the two offers are to each other, the time discount factor of Capital (d_C), and the probability (w) that Labor is Weak. Capital is more likely to make the offer that ends the game immediately than wait; the closer the two offers are to each other, the lower its discount factor (d_C), and the lower the probability that it faces Weak Labor (w).

Empirical applications

We began this essay with a discussion of the pattern of strike behavior in neocorporatist countries and with an assertion that an adequate theory of strikes should have both strong microfoundations and empirical relevance. The preceding section has developed a model of strikes that provides such microfoundations with assumptions that are relatively realistic, certainly more so than those found in the existing information theories. We turn now to a preliminary examination of the model's empirical relevance and ability to explain known phenomena related to strikes. Our discussion should allow us to show the power of the model as a source of explanations of a diverse set of phenomena that have had no unified and systematic analysis of microfoundations to date.

Empirical referents

To begin this discussion, it is worthwhile reviewing and elaborating on the empirical referents of the principal concepts employed in the model: the strength of Labor; the size of the outside option; and the strength of Capital.

1. The strength of Labor is treated as a function of two other variables: the size of the outside option and the degree of organizational control exercised by the union leadership over those for whom it bargains. We will discuss the factors that influence the size of the outside option separately.

The *degree of organizational control* is a function of the extent to which the union leaders with responsibility for contract negotiations feel secure from challenges from those for whom they negotiate and to whom they are putatively responsible and responsive. The greater such security, the less labor leaders discount the future, for the less they need to be concerned that failure to reach an early contract settlement will promote internal dissidence that might threaten their leadership, and the more they can feel assured of maintaining their leadership positions into the future regardless of how the negotiations proceed.[24]

Hirschman (1970) provides a useful scheme for analyzing the extent of such control. Factors such as the formal and informal rules of union elections (affecting the possibilities for "voice"); the extent of jurisdictional overlap and thus union competition for the same members (affecting the possibilities for exit); and whether bargaining units are open or closed shops affect relations of representation between leaders and rank and file. More generally, the degree of competition for jobs between unionized and nonunionized workers; and the degree of ideological, as contrasted to bread and butter, commitment to the union (affecting the likelihood of members exercising exit and/or voice) will all influence the degree of control.[25]

2. The size of the outside option is a function of the expected utility of a strike that is resolved through government intervention. It is the second factor to be considered in evaluating the strength of Labor. The size of the outside option is influenced by two parameters: the militancy of workers and the degree to which government is sympathetic to Labor and sensitive to the possibility that Labor might strike. The former affects the utility of the outside option because it indicates that government will have to impose a higher settlement in order to satisfy workers. The latter affects the probability that Labor will resort to the outside option: governments more sympathetic or sensitive to Labor will be more likely to intervene on Labor's behalf. It is the two *in combination* that determine the value of the outside option.

Empirically, the *militancy of workers* is likely to vary positively with the tightness of the labor market, as has been argued by bargaining power theorists. In addition, however, it should be underlined that the militancy of workers can

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[24] Following much of the industrial relations literature, we are here assuming that union leaders have a preference function that places organizational maintenance and their own survival in office before other possible preferences. For a review of this literature, see Farber, 1986.

[25] For an extensive application of the Hirschman framework to unions in the context of explanations of neocorporatist wage regulation, see Lange, 1984a. As this study indicates, there are ample empirical materials for analyzing the degree of centralized control with some accuracy. See also Golden (1991).

also be influenced by factors other than labor market conditions such as ideology, or government conditions that reduce their fear of repressive responses to strike actions or encourage them to believe that the likelihood that a strike will be successful has increased. Sabel (1981), for instance, discusses the role of changing worker consciousness in explaining the militancy of migrant workers during different phases of their migration and Hibbs's work (1976) suggests that the presence of Communist workers may increase the proclivity among workers to strike. The literature on social mobilization and political opportunity structures discusses the ways that changes in the political environment may affect people's willingness to undertake collective action (Tarrow, 1983; Tilly, 1978). We do not need to elaborate further on this argument here other than to stress its central implication. The model we have developed can accommodate a far wider range of sources of worker militancy, wider than that found in many of the other explanations discussed earlier.

The *sympathy or sensitivity of government to Labor* can be a function of a number of factors. The most obvious and oft-discussed one in the literature is the extent of historical linkage or electoral dependency on the labor movement of parties in government. This is the factor generally employed in the literature on neocorporatism that we discussed earlier. As Przeworski and Sprague (1986) point out, however, most governments of the Left face difficult trade-offs at the margin between appealing to their "core" labor supporters and to middle-class voters whose support may be necessary to improve the chances of electoral victory. Thus, the extent to which even a government dominated by a labor party is likely, ceteris paribus, to intervene on behalf of Labor, thereby increasing the value of the outside option, is likely to depend not just on the ideology of the party or its institutional links with the labor movement but also on the specific characteristics of the electoral and institutional conditions in which the party – which is assumed to want to win and hold office – finds itself.[26]

Even governments that are not dominated by labor parties and in which such parties are not even present, however, can, under certain conditions, increase the value of the outside option for Labor. This will be the case if the government is particularly sensitive to the possibility that Labor might strike, whether for electoral or other reasons. Examples might be fear of a major strike just before a national election, or situations in which a strike might have severe consequences for the national economy – and probably thereby for the government.[27]

[26] For a similar argument, see Hibbs (1976) and our subsequent comments. This is a classic example of how the nested character of the Labor–Capital game comes into play. The structure and payoffs of the interparty game affect the payoffs a labor or other party can get from a strategy of accommodating unions, which, in turn, affects the size of the outside option in the L–C game and thus the strategies of Capital and Labor and the likelihood of strikes.

[27] One implication of the role of government sensitivity to strikes in the determination of the value of the outside option is that the scale or *economic impact* of a potential strike may assume considerable importance in some situations. Thus, other things held constant, the outside option should have a higher value where the industrial relations system is centralized and Labor is perceived to be able successfully to undertake a national strike if it receives an unfavorable offer.

3. **The strength of Capital** is determined in our model by the degree to which employers discount the future. Where Capital discounts the future more heavily, it will be weaker than where it is willing to wait out even a lengthy negotiation with, and possible strike by, Labor. We have already indicated that Capital can be expected to be more impatient, the greater the potential loss of profits with the passage of time and/or lost production due to a strike. Conditions in which such would be the case include intense competition for markets that could not easily be recouped if lost, and a shortage of inventories to cover production losses from a strike. Where bargaining takes place on a national level, one would, ceteris paribus, expect Capital to discount the future more heavily and thus be weaker in relatively small, open economies.

Even this brief review of possible empirical referents and operationalization of the critical concepts employed in our model indicates the extent to which it can incorporate variables central to the power resources form of the bargaining power approach. In our case, however, these variables are brought into consideration via their impact on the payoffs associated with different courses of action in different situations. Their effects on behavior are mediated by the way they alter the payoffs to, and thus the mutually optimal (equilibrium) strategies of, the actors, rather than through a direct impact on the actors' behavior. Therefore, our model provides microfoundations for many of the empirical results of the power resources approach to strikes. It identifies which variables in the environment of Labor and Capital are likely *to affect* when negotiations break down and strikes occur, and when the outcomes of negotiations without strikes are likely to be more or less favorable to Labor, but also *why* and *how* these variables have the effects they do.

Empirical applications

It is also clear, however, that the model should enable us to explain known empirical phenomena and associations, and it is to this issue that we now turn. We focus on the pattern of extremely low strikes found in the neocorporatist systems described at the outset of this essay, although we believe the model can be substantially generalized.

The application of our model to the neocorporatist cases is relatively straightforward, although some interesting implications emerge. As discussed, the likelihood of strikes declines as the probability that Labor is strong $(1 - w)$ increases and Capital discounts the future heavily (d_C is low). Labor's strength, in turn, is a function of its degree of internal discipline and of the value of its outside option. In the neocorporatist systems, all of these variables militate against strikes and they do so in a highly stable manner given the political and economic characteristics of the countries.

As is by now well known, labor unions in Sweden, Norway, and Austria have been highly centralized and concentrated, enjoy a relative monopoly of representation, and their leaders have enjoyed considerable legitimacy and job security.

The unions have also been able to convince their members to allow the leadership considerable leeway in bargaining with employers (Lange, 1984).[28]

The outside option can also generally be expected to have a very high value in these countries. On the one hand, a number of conditions favor high degrees of potential militancy on the part of workers. Among these are the generally tight labor market conditions, the very strong social wage and other programs which "decommodify" labor, and the extremely high rates of unionization. On the other hand, governments in these countries, generally dominated by parties of the Left, have been highly favorable to labor or sensitive to the potential costs of a strike. Capital in these countries has been highly sensitive to the costs of strikes. Operating in a relatively small, open economy, and thus highly vulnerable to fluctuations in international trade, it has generally had much to gain from concluding rapid and peaceful agreements with labor.

Taken together, these conditions reflect a relatively more favorable balance of power resources to Labor in these countries than elsewhere among the advanced industrial democracies. It is also noteworthy that these conditions have held over long periods of time. There is, therefore, little possibility for misunderstanding on the part of the actors of the strategic situation which they face: The probability that Labor is strong is quite high and is relatively stably so. Our model also allows us to explain why these power resources translate into extremely low strike rates. Put simply, given the combination of a very high probability that Labor is strong and Capital's structurally induced impatience, there is little reason for Capital to do other than make an offer to Labor that the latter should accept. Strikes should be extremely rare by international standards, and they are.

Contrast some of the implications of the explanation of the low strike rates in corporatist countries that our model provides with those offered elsewhere. First, in seeking to explain the low strike rates in neocorporatist countries, both Korpi and Shalev (1980) and Hibbs (1978) argue that the labor-supportive policies of Left governments in social democratic countries induce unions to shift their strategic focus from the labor market to politics and state policies. This account accords with the historical development of strike rates in these countries and treats labor as rationally pursuing its interests. It is not clear, however why labor should not maximize its gains through the use of its power in *both* the market and political arenas.

Hibbs (1978: 17), moreover, assumes that, if Labor were seeking to maximize its return from the market, it would strike more often and thereby improve its share. Thus, low strike rates must be the product of restraint on market aggressiveness (which may, or may not, be the product of rational calculation) by Labor. This excludes *by assumption* the possibility that Labor is doing as well as it can do, given the strategic context in which it is operating, and the offer it

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[28] It should also be noted that over time the success of the leadership in gaining benefits for members works to create a culture within the union supportive of a considerable degree of leadership autonomy.

receives from Capital (also behaving rationally and also doing as well as it can do).[29] Yet this is precisely what our model suggests is the case.

A similar critique applies to the argument that labor parties act to discourage worker militancy (Hibbs, 1976: 1051). This could be the case for electoral reasons (labor wants to attract middle-class voters), the argument Hibbs tests, or because labor leaders are unwilling to use their power to pursue class interests to the fullest (Panitch, 1979). Again, however, both arguments assume that Labor would rationally have an interest in being more aggressive in the labor market but holds back because of political sympathies and/or pressures, or an absence of class will. As we have seen, this need not be the case. Labor's strength may be anticipated in Capital's offer, making a strike unnecessary, and in fact counterproductive.

But what evidence can be offered that labor is strategically optimizing? Here we offer only some suggestive indications that await subsequent detailed examination. First, Lange (1984a) addressed the relationship of union responsiveness to members in corporatist and noncorporatist systems. The null hypothesis was that the unions would have to be less responsive in corporatist systems if they were, in fact, keeping wages below the levels that workers, given their interests and market strength, could expect to get. The results, however, showed no relationship between corporatism and less responsive internal trade union structures. This suggests either that workers in these corporatist countries are peculiarly docile or, as our model would suggest, that the workers' and unions' strength is largely anticipated in capital's contract offers.

Second, an implication of our model is that the *outcome* of wage bargaining, as measured by Labor's share, should be superior in systems – like the neocorporatist ones – where the probability Labor is strong is high, the value of the outside option high, and Capital discounts the future heavily. This pattern should occur, not due to strikes, but as the result of the size of the initial offers that Capital makes, given the strategic situation that it faces.

Cameron (1984) provides some relevant data. In exploring the relationship between labor quiescence and a series of economic performance indicators, he finds that labor quiescence was very mildly and positively associated with a "higher proportion of domestic factor income received by employees" and with increases in labor's share from the mid-1960s to the early-1980s. The relationships are weak, however, and he concludes that

quiescence does not appear to produce any marked diminution of labor's share of income (contrary to what critics of wage restraint and 'corporatist collaboration' might suggest).

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[29] An interesting problem arises here. What economic outcome for workers are the unions trying to maximize: the wage share resulting from the immediate contract or wages over time? Alvarez, Garrett, and Lange (1991), Lange (1984b), and Lange and Garrett (1985) have argued that conditions in the neocorporatist countries make such a choice of preferences possible and have suggested that choosing the former is likely to reduce the latter. Wallerstein and Przeworski (1988: 20) provide strong support for the argument that centralization of unions maximizes the aggregate welfare of union members.

And, conversely, militancy does not appear to produce any marked improvement in labor's share of income (as such critics might imply) (173).

It was also the case that there is a strong association between low strikes and higher social wage payments: "in short, labor was compensated – to some degree at least – for its quiescence" (173).

What these results suggest is that labor received an overall package superior to that found in systems with a greater number of strikes, but that the benefits did not arrive solely through wage bargaining – where the results were no worse, but also no better – but through some combination of market bargaining and government action. This raises an interesting implication we have not, so far, been able to examine more closely: that the strategic situation represented in the corporatist cases can involve relatively complex mixes of employer offers and government actions to produce the level of overall compensation and income and other security sufficient to gain labor's acceptance without a strike. Note, however, that even if this is the case, the absence of strikes in these countries is not the result of labor's unwillingness to pursue what it would be rational for it to seek, or of a shift in the locus of conflict, but rather of its pursuit of an equilibrium strategy, given the strategic context in which it is operating.

Conclusions

This essay has presented a model of wage bargaining between Capital and Labor that could provide microfoundations for frequently observed associations between political, institutional, and economic conditions affecting the power resources of labor relative to capital and the frequency of strikes. The problem addressed has been the extremely low strike rate in neocorporatist countries for which plausible macro explanations have been offered and empirically supported, but for which the microfoundations were weak.

In developing our model, we have sought to assure that we would capture the insights of the existing work on strikes while integrating these into a systematic, concise, and empirically relevant framework. From the literature using the bargaining power approach, we have wholeheartedly adopted the stress on relative power resources of labor and capital but have noted both the absence of microfoundations and the related inability to explain how the balance of power resources, by itself, could explain strikes. From the neoclassical economic literature on bargaining we have adopted the basic insight that strikes should be understood as the outcome of incomplete information but also pointed to the empirical and theoretical narrowness of the bargaining models employed and to the failure fully to incorporate the strategic rationality of the actors.

The model we have developed has relatively few parameters and each of these has accessible empirical referents that accord with those identified in much of the power resources literature. It is based on the fundamental assumptions that actors are fully rational, that their strategies are interactive, and that the outcomes of bargaining, including strikes, represent equilibria, which reflect the best the

actors could do, given the situation they faced, and the strategic options of their opponent. In addition, the model incorporates incomplete information in the form of Capital's uncertainty whether Labor is strong or weak.

The critical theoretical consequences of adopting an equilibrium perspective for the analysis of strikes should be underlined. It certainly shows that strikes need not result from "mistaken" behavior. But perhaps even more important, it demonstrates that the absence of strikes by itself can tell us nothing about the power of labor alone, and, by implication, the power of labor alone can tell us nothing about the probability of strikes. We are critical, in other words, of any theory that forecasts outcomes based solely on changes in any parameter affecting one player alone. Such explanations are incomplete, for they fail to incorporate the possible reactions to the changed situation of the opponent who must also be treated as rational and strategic.

Our model was sufficiently complex to account for real-world situations, and sufficiently simple to make the logic of these situations intelligible. In particular the modeling was focused not on abstract problems, but on concrete questions having to do with specific political contexts and political institutions. For example, some one-sided information models assume that Capital is the unknown actor, and focus on the conditions prevailing in the market that are unknown to Labor who tries to understand them by observing Capital's behavior (Mauro, 1982). In our model, by assuming that Labor was the unknown actor, we were led to focus on politically important questions of labor organization, and the relationship between labor and government. Moreover, the theory of nested games enabled us to study how factors such as organization, market conditions, or government policies will affect the outcome of bargaining between Capital and Labor.

Using the model, we were able to explain a number of phenomena related to the pattern of Capital–Labor relationships in the neocorporatist countries. Our results here should be treated as preliminary. There are other phenomena that could be examined in these countries and the model should certainly be extended to the explanation of strikes and strike patterns more broadly.

There are also extensions of the model that would increase further its realism. One of the most interesting of these would be to improve on the way capital's uncertainty is modeled. In our model, we incorporated the assumption that the probabilities of Weak and Strong Labor could take on only two values. It is more likely, however, that capital is more accurately modeled as having a probability distribution of labor's possible strengths. If this was incorporated into our model, we believe it would increase the number of possible periods over which bargaining could proceed. In our current model, the bargaining process can end either in one or in two periods. If, however, the state of Labor strength is defined over a probability distribution, it is conceivable that the game would continue for more than two rounds. Again, this would add further realism to the model.[30]

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[30] In fact, Grossman and Perry (1986) have investigated such a model with multiple rounds of negotiations.

The model presented here allows us to bridge the gap between two approaches, which have been too often either mutually ignored or hostilely confronted: that which stresses power and conflict and that which seeks to model political and social actors as rational and the outcomes of their interactions as reflective of equilibria. To the extent this exercise is successful, it should improve our ability to analyze politically relevant phenomena and to enrich and expand the study of comparative politics without losing what makes the field so interesting.

Appendix 1: Bargaining with outside option (strike) and perfect information

Notation

- Call x the share of Capital; x is indexed by the two players, with the player making the offer first.
- Call d_L and d_C the time discount factor of Labor and Capital, respectively
- Call o_S and o_W the outside option of Strong and Weak Labor respectively. Note that o_S is greater than the bargaining share, while o_W is less. As a result, o_S is always taken by Strong Labor and appears in the formulas, while o_W is never taken and never appears.

Case 1. Capital + Weak Labor; Capital moves first (Table A1.1). Assume that Capital at time 2 receives at least $x_{C,WL}$. This share is equal to $d_C x_{C,WL}$ at the previous time period. So, Weak Labor can receive at most $1 - d_C x_{C,WL}$ at time 1. Therefore, in the previous time period, Weak Labor can receive at most $d_L (1 - d_C x_{C,WL})$, which leaves at least $1 - d_L (1 - d_C x_{C,WL})$ for Capital.

The same argument can be made by interchanging the terms "at least" and "at most." So, Capital at equilibrium receives exactly $x_{C,WL}$. To calculate $x_{C,WL}$, we equate Capital's share at time 2 with time 0, and solve $x_{C,WL}$:

$$x_{C,WL} = 1 - d_L(1 - d_C x_{C,WL}) \Rightarrow x_{C,WL} = (1 - d_L)/(1 - d_L d_C)$$

[*Note:* In the next case, the table is presented, but the repetition of the argument is left to the reader.]

Case 2. Capital + Strong Labor; Capital moves first (Table A1.2). In equilibrium the initial offer of Capital should be equal with the offer after one round of negotiation. Solving for $x_{C,SL}$ gives

$$x_{C,SL} = (1 - po_S - (1 - p)d_L)/(1 - (1 - p)d_L d_C)$$

[*Note:* Capital and Strong Labor could have such attractive outside options that they are tempted to make unacceptable offers to each other, waiting for the government to intervene. In this case, the expected value for Labor will be

$$po_S + pd_L(po_S) + p^2 d_L^2 (po_S) + \cdots = po_S/(1 - pd_L) = O_S$$

and

$$po_C + pd_C(po_C) + p^2 d_{C2}(po_c) + \cdots po_C/(1 - pd_C) = O_C$$

In order to eliminate this implausible possibility, we assume

$$O_S + O_C < 1$$

Table A1.1

Time			$C \geq$ (at least)	$WL \leq$ (at most)
0	C	offer	$1 - d_L (1 - d_C x_{C,WL})$	
		accept		$d_L (1 - d_C x_{C,WL})$
1	WL	offer		$1 - d_C x_{C,WL}$
		accept	$d_C x_{C,WL}$	
2	C	offer	$x_{C,WL}$	
		accept		$1 - x_{C,WL}$

Table A1.2

		C	SL
C	offer	$1 - (po_S + (1 - p)d_L (1 - d_C x_{CSL}))$	
	accept		$(po_S + (1 - p)d_L (1 - d_C x_{CSL}))$ (strike)
SL	offer		$1 - d_C x_{C,SL}$
	accept	$d_C x_{C,SL}$	
C	offer	$x_{C,SL}$	
	accept		$1 - x_{C,SL}$

Moreover, we assume that $o_C < x_{C,SL}$ (otherwise Capital would choose to have a lock out before making its next offer).]

Appendix 2: Bargaining with outside option (strike) and incomplete information

Notation: In addition to the notation of Appendix 1, there is probability w that Labor is Weak and $(1 - w)$ that it is Strong.

The solution concept applied here is that of sequential equilibrium (Kreps and Wilson, 1982). Application of this concept requires that strategies are optimal responses to each other for the remainder of the game (subgame perfection) given the players' beliefs; and beliefs are updated along the equilibrium path by Bayes's rule. This concept is not restrictive enough (leads to too many equilibria), because how a player updates his beliefs off the equilibrium path is not specified. We will assume optimistic conjectures (Rubinstein, 1985a); that is, anytime Capital sees Labor making a choice off the equilibrium path, it infers that it is confronting Weak Labor. This restriction leads to a unique outcome.

Lemma 1. *Any offer greater or equal to* $1 - x_{C,SL}$ *is immediately accepted by Labor.*

Proof: See Case 2 in Appendix 1.

Lemma 2. *Any offer less than* $1 - x_{C,WL}$ *is rejected by Labor.*

Proof: See Case 1 in Appendix 1.

Lemma 3. *Strong Labor rejects any offer less than* $1 - x_{C,SL}$, *strikes and makes a counteroffer of* $1 - d_C x_{C,SL}$ *which is accepted.*

Proof: See Case 2 in Appendix 1.

Lemma 4. *If Weak Labor rejects an offer, it strikes first, and makes the counteroffer* $1 - d_C x_{C,SL}$.

Proof: The offer will be at least $1 - x_{C,WL}$ by Lemma 2. If Weak Labor rejects and reacts differently than Strong Labor (either does not strike first, or does not counteroffer $x_{SL,C}$ afterward). Capital identifies the opponent as Weak with probability 1. Consequently it will never offer more than $1 - x_{C,WL}$. However, several rounds have gone and the share is accordingly discounted.

Lemma 5. *An offer that is rejected by both Strong and Weak Labor is a dominated strategy for Capital.*

Proof: If both Strong and Weak Labor reject, Capital gains no information, and when it is its turn to make an offer, it finds itself in the initial situation while the dollar has been discounted by d_C^2.

Lemma 6. *There are only two undominated equilibrium strategies for Capital:*

1. Make the offer $1 - x_{C,SL}$ (pooling equilibrium)

2. Make an offer $1 - x_{C,L}$ which is acceptable by Weak Labor but not by Strong Labor (separating equilibrium).

Proof: (1) An offer more than $1 - x_{C,SL}$ is dominated because $1 - x_{C,SL}$ is accepted by Labor (Lemma 1). (2) An offer in the $((1 - x_{C,L}), (1 - x_{C,SL}))$ interval is dominated by $(1 - x_{C,L})$. Indeed, both these offers are accepted by Weak Labor and rejected by Strong Labor. (3) Any offer in the $[0, 1 - x_{C,L})$ interval is rejected by both Weak and Strong Labor (Lemma 5).

Theorem 1. *The value of* $x_{C,L}$ *is given by*

$$x_{C,L} = \max((po_W + (1 - p)d_L (1 - d_C x_{C,SL})), (1 - x_{C,WL}))$$

Proof:

	C	WL
C	$1 - po_W - (1 - p)d_L (1 - d_C x_{C,SL})$	
L		$d - d_C x_{C,SL}$
C	$x_{C,SL}$	

From this table it follows that the share of Weak Labor is

$$po_W + (1 - p)d_L(1 - d_C x_{C,SL}).$$

The rest of the theorem follows from Lemmas 2 and 5.

Theorem 2. *Capital offers* $1 - x_{C,SL}$ *if* $wx_{C,L} + (1 - w)d_C x_{C,SL} < x_{C,SL}$ *(pooling);* $1 - x_{C,L}$ *otherwise (separating)*

Proof: Capital has the option of making an offer $(1 - x_{C,SL})$ that will be accepted immediately; or an offer $(1 - x_{C,L})$ that will be accepted by Weak Labor (that is, with probability w), and rejected, followed by a strike and a counteroffer by Strong Labor (with probability $(1 - w)$). Capital chooses the expected utility maximizing option.

[*Note:* The belief of Capital is that Labor is strong with probability $(1 - w)$ in the beginning of the game; if Capital makes a separating equilibrium offer it immediately infers with probability 1 what type of Labor it faces. Off equilibrium beliefs act as a deterrent here so that no player deviates from his equilibrium strategy. Alternative off equilibrium belief formation would lead to less intuitive equilibria. For example, if Capital has pessimistic beliefs (inferred from any off equilibrium path move that the opponent is Strong Labor), then Weak Labor will have an incentive to deviate all the time, and therefore, the only equilibrium would be the pooling one.]

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