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STRIKES IN EUROPE

*An Attempt at Implementing the Bargaining Theory Model
and Some Empirical Tests: France, Italy and the United Kingdom
1950 - 1980*

Alessandra Venturini
Department of Economics
Doctoral Thesis, December 1981

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INTRODUCTION

1. Defining the Research

This study is an attempt to analyze labor conflicts in France, Italy, and the United Kingdom since World War II. More precisely it will focalize on a particular expression of labor conflicts, namely, strikes, which are defined by Hicks[1] as an "abstension from work, usually planned, by a considerable number of workers." This definition includes two elements, the group factor and the organizational factor, that distinguish strikes from other forms of work conflicts such as lateness, registered or unregistered sickness, or absenteeism. In fact, these two elements are always present during a strike and contrast with the individuality and the individual willingness which are present in other forms of conflict usually grouped under the heading of "unorganized conflict".[2]

The motivations that led to choosing strikes as the area of study are interrelated: the constant manifestation of strike phenomena--even though their progress has been multicyclical--that has allowed the systematic gathering of statistics since 1880, and the importance of the phenomena because of their disruptive consequences both for the firm and for the industry and the economy as a whole.

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(1) J. Hicks (1959), pp. 146-7.

(2) The definition also includes the element "abstension from work" which allows strikes to be distinguished from other forms of conflict such as work to rule, production slow-down, sabotage, and stopping overtime, about which, nevertheless, there is no systematic statistical information.

The choice of countries fell on Italy, France, and Great Britain because they demonstrate similar developments of the basic indicators of conflict, that is, relative number of strikes, relative number of strikers, and relative number of mandays lost as Tables 1, 2, and 3 of the appendix show.(1)

The period of time under consideration had been limited to the past thirty years, the period in which the development of industrial relations and of the economic system allows comparison more easily and in which common events (conflicts in 1969, oil price increase of 1973, two-digit world-wide inflation) makes the study more interesting.

2. Critical Considerations of the Main Theories of "Industrial Conflict"

The principal theories of the industrial conflict will be briefly treated. Notwithstanding the variety of approaches and the numerous studies undertaken, these can be divided into four main lines of thought:

1. considering a strike as a protest originated by rapid social changes,
2. considering the strike within a process of institutionalization of the conflict,
3. considering the strike from an economic point of view(2) which attributes its significance to an element of bargaining process,
4. considering the strike from an organizational-political viewpoint which looks upon the strike

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(1) Cfr. Flora Tables 1, 2, 3.

(2) In my opinion, the term "economic" is inappropriate. The reason for this will be explained later.

as a form of collective action.[1]

According to the modernization approach, rapid social changes and, in particular, high rates of industrialization which stimulate large-scale migration and rapid urbanization, are the causes of social tension and psychic dislocation which in turn create protests of which the strike is just one form.[2] This theory, which foresees the absorption of the conflict in advanced industrial societies, better adapts itself to a lengthy study which includes also phases of pre-capitalist development.[3]

Since World War II, there has been rapid social change, for example, the phenomenon of an industrialization and concentration in northern Italy followed by a massive internal migration, but this rapid change can only partially explain the increase in industrial conflicts in the 1960's and not its

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(1) It is possible to take into consideration another theoretical approach called structural which analyzes the conflict as regards to the differentials of conflict. These are explained by the social structure of the community in which workers live and the technical structures of the work place. See C. Kerr and A. Siegel, 1954; J.M. Goldthorpe, 1968; and D. Lockwood, 1966 who creates a typology of workers which includes the traditional proletarians (highly strike prone, high degree of job involvement, and strong attachments to primary work groups), deferential workers (jobs that involve close contact with superiors and reinforce vertical rather than horizontal loyalties), and modern privatized workers (high wage, mass produced industries, new-town, home-centers, and consumption oriented life styles).

(2) E. Durkheim, 1951; N. Smelser, 1963.

(3) C. Kerr, F. Harbison, J. Dunlop, C. Meyers, 1960.

development.[1] In other words, this theory can explain some waves of conflict, or even an upwards shift of the function of strikes, but not the development of industrial conflicts in time.[2]

The second line of thought tries to interpret the strike process as phases of a process of <u>institutionalization of conflict</u> (D. Hibbs) in which a reduction of the industrial

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[1] It is important to remember two particular interpretations of this theory by H. Clegg (1970) and by A. Flander (1970) that view strikes as an escape valve and as a way of conveying structural change at the economic level and changes in the institutionalization of industrial relations.

[2] To this theoretical line of reasoning could perhaps be related the three hypotheses on the contemporaneousness of conflict at the end of the 1960's: the monetarist theory, which attributes the increase in conflicts to the increase in world prices; the theory of depressed salaries (D. Soskice, 1977) in which the moving factor is the wage reduction in respect to profits and the relative increase of salary differentials; and finally, the generational leap theory (E. Tarantelli, 1980) in which the increase in education and in diffusion of information gave way to a new labor-force, to whose social and participative demands the socio-political system (not only economic) was not able to give a satisfactory response, thereby creating frustrations leading to protest.

These three hypotheses are on the potentiality of conflict (M. Regini, 1980) or, to use terms more frequently used, on the "propensity," and not the "opportunity," to strike. In order to change these conflictual charges into manifestations of conflict, that is in strikes, it is necessary to use a theory that ties them to strikes themselves. It is necessary to remember the importance of the above-mentioned theories in explaining the contemporaneous of conflicts at the end of the sixties, and in indicating political-economic remedies to regulate the conflict potential. One could, perhaps, reach greater autonomy by developing a "threshold" theory of inflation, salary differentials, and changes in education that are able to provoke, as in the modernization theory, psychic dislocation and anomy capable of creating general social conflict.

conflict is seen as a result of a change in place of the distribution of revenues and, therefore, of the struggle about distribution which shifts from the economic arena (or market) to the political one. Thus, the strike, which is a characteristic instrument of the economic arena, leaves room for other forms of protest such as political demonstrations, general strikes, the vote, etc.[1] This approach focuses on industrial relations more than on strikes and, therefore, is not adapted to analyzing work conflicts.

The so-called economic theory analyzes strikes within the Bargaining Theory, which is a model of rational negotiation between Management and Trade Unions on the wage level. In this approach, strikes have the basic function of an "equilibrating mechanism to square up the union membership wage expectations with what the firm may be prepared to pay."[2] Explaining strikes then means to first estimate how much workers' expectations exceed what the firm may be prepared to pay at any given moment. Particularly, the more workers' expectations exceed the capacity of the firm to pay, the higher the probability of a strike. At the same time, the strength and willingness to negotiate of the two partners become the explicative variables of the conflict function in time. These two elements are influenced by variations in the economic cycle, of which the unemployment rate is taken as a proxy,[3] and by variations in the real wage.[4]

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(1) D. Hibbs, 1970.

(2) O. Ashenfelter and G. Johnson, 1969.

(3) A. Rees, 1952.

(4) O. Ashenfelter and G. Johnson, 1969; J. Pencavel, 1970.

The fourth approach stresses the necessity of the organizational factor in transforming everything considered potential conflicts into real conflicts, strikes. Shorter and Tilly,[(1)] the most important representatives of this approach, consider the industrial conflict as a form of collective action[(2)] taken to acquire power. Referring back to the concept of M. Olson[(3)] that individuals get together to pursue common goals is problematic and not inevitable, they emphasize that strikes take place because an organizational capacity for this type of action exists. They defend the independence and the priority of the organizational factor in the manifestation of conflict (the strike). Shorter and Tilly, expect the explicative variable of strike fluctuations is the mobilization (the organizational capacity for collective action) of the workers which is measured by the rate of unionization and is the main indicator of the probability of success of strikes. They also consider political variables (changes of government, election years) important because they indicate a greater vulnerability of government with respect to the collective demands of the union as expressed by strikes.

Snyder,[(4)] however, explains strike fluctuation by comparing and contrasting the economic and political-organizational approaches. However, he limited the use of the economic one to cases in which collective bargaining is definitely institutionalized, unionization is widespread and stable, and the workers (the union) as a legitimate interest group, are

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[(1)] R. Shorter and C. Tilly, 1974.

[(2)] By collective action is meant the application of united resources in order to reach a common objective.

[(3)] M. Olson, 1965.

[(4)] D. Snyder, 1975.

integrated into the political system. Testing the two models in France, Italy, and the U.S.A., he finds the economic model to be highly elucidative only in the U.S.A. from 1949 to 1970, when the above-mentioned conditions were met. In his opinion, the use of the economic model is secondary in respect to the political-organizational one, only when particular stable conditions exist for unionization, integration of the union, and institutionalization of its relationship to the political system. He concludes by considering the political-organizational model as being more generally applicable and more explicative than the economic model.

On the other hand, it is my impression that it is correct to point out the inadequacies of the so-called economic model which, in fact, is not able to explain sudden waves of conflict that originate with the big shocks the socio-political system undergoes. This is not meant to say that the explicative ability of the model is secondary, but to imply the necessity of trying to incorporate into the model some changes that have become an integral part of the very structure of the economic system. Often when speaking of economic models, one loses sight of their original purpose, such as, when the model was created, and what it was intended to explain. The economic model is a model of Bargaining Theory that attempts to explain only wage claims and therefore wage strikes within the bargaining system between Management and Trade Unions (Trade Union leadership and Trade Union rank and file, in the best of cases).[1] It originated in a particular period of history, the fifties, in a particular country, the U.S., in which strikes could be interpreted only as a wage claim. Even if they did not include all union conflicts, they represented

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[1] O. Ashenfelter and G. Johnson, 1969.

almost all of them. This misleading interpretation is borne out by the frequent tests of the model using data on global strikes and not only on pay-strikes. To lose sight of this coordinate by speaking generically of the economic model (I refer not only to Snyder but also to many others who have adopted this term) and to maintain that it is insignificant means to under-estimate the inappropriate context into which it has fallen and, above all, the insufficiency of economic theory on industrial conflict.

This lacuna becomes even greater when after 1968 and 1973, within a changed economic context, the loss of jobs and unemployment impend upon the workers' daily lives, and job security is a fundamental theme of European unions.[1]

3. The Line of Interpretation of the Research

The analysis will be focused on the third above-mentioned theoretical approach and will try to go beyond the specified limits of the Bargaining Theory model. In choosing a theoretical paradigm as a reference there is also a fundamental choice, which is not to be underestimated, that deals with the value and significance originally attributed to strikes.

The political-organizational paradigm clearly emphasizes the political significance of strikes and the role of unions as a legitimate interest group in the power struggle of the socio-political system.

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[1] Though in this context of contrasting the various theoretical approaches to the industrial conflict the negotiating character of the model to be used had been emphasized, in the following chapter on Bargaining Theory it will be necessary to emphasize its economic character as game theory, from which bargaining is derived, as is widely used in various disciplines.

Though not negating this significance, the economic paradigm attributes importance only to the job market (salary, work conditions, etc.) while at the same time not underestimating the fact that an increase in power and influence in the economic system has almost direct repercussions on the socio-political system. The so-called struggles for power happen, according to the bargaining paradigm, in the economic arena to then pass on to the political one (to paraphrase D. Hibbs) which, however, puts pressure on these struggles but, above all, is not a determining factor for them.

To choose the bargaining paradigm[1] implicitly means to underestimate the political connotations of strikes which, if the strikes are of a particular intensity at certain points (for example, the housing and social reform strikes in Italy and Great Britain in 1969-1970), can be assimilated into a component of the national socio-political system.

For this reason, the comparison between the results of the development of the Bargaining Theory paradigm will be rigorously maintained within national characteristic patterns of conflict and wherever useful, the most significant institutional differences and changes will be explained.

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[1] From now on the term "bargaining model" will be used, and not economic model.

CHAPTER ONE

The Bargaining Theory Approach

In this chapter, the theoretical paradigm of Bargaining Theory will be developed, from its origins in the Game Theory to more recent developments. Operational versions and econometric tests will be undertaken concluding with a series of criticisms on the approach.

1.1.1 The Origins of the Bargaining Theory

The first formulations of Bargaining Theory were developed from the application of the Game Theory[1] to negotiations between management and the union (or workers). Game Theory, based on a perfect understanding of the gains and losses the partners will have as a result of such decision, does not seem applicable to negotiation because the two parties have only imperfect information on gains received from a certain choice. One can suppose that such gains are partially risks and think of maximizing the mathematical expectation[2] (which is equal to defining a cardinal utility function).[3]

For example, Simon,[4] defines the utility function for labor and for management with respect to two parameters, w (wages) and x (working conditions). Between the two extremes of a

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[1] J. Von Neuman, O. Morgenstern, 1947.

[2] The mathematical expectation of the random variable X, is the average value weighted by the relative probabilities.

[3] For a systematic profile on the authors mentioned, see S. Troiani, 1979, pp. 13-25, and for a more detailed examinations, see the collection of essays by O.R. Young, 1975.

[4] H. Simon, 1951.

job so tiring and a wage so low that the worker is unable to accept these conditions, and of productivity so low and wages so high that the employer prefers to close the factory, there is a series of intermediate combinations which are all connected to the threat of a strike or a lock-out. In order to reach an agreement, it is necessary for both parties that their utility exceed their disutility. The series of solutions guarantee the largest sum of the two utility functions will be preferred.

This analysis is developed by Nash[1] in a way more conducive to our purposes with his "optimal threat" strategy. He discusses the situations given by the Game Theory at a nonzero sum which involve two parties whose interests are neither completely opposed nor completely alike within the Cooperative Theory in as much as it presumes the two parties are able to rationally discuss their problems and come to an agreement. The objective of any threatening action, be it strike or lock-out, is to increase the cost of conflict for the adversary in negotiating without increasing one's own cost at the same time. The hypothesis that the two parties know perfectly well the rules of the game and their roles can lead to determining the correct threat for each of the parties. If to this threat compatible claims are tied, there will be an immediate and satisfying agreement. In the opposite situation, though, one of the two partners will have to actualize his threat in order to reduce part of the adversary's surplus utility in order to reach an equilibrium. The solution will be given by the maximum product of the net utilities of the two partners.

Even before Nash and the formulation of the Game Theory,

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(1) J. Nash, 1953.

Zeuthen[1] had formulated his theory of the bargaining system. It is focused on "maximum risk," which is the maximum probability of conflict that each partner in play is willing to tolerate in order to obtain most favorable conditions rather than alternatives more favorable to his counterpart.

The two relations of "maximum risk" characterize the strength of "determination" of the partners in negotiations to fight in order to obtain the most favorable alternative. Nonetheless, each of the partners will begin to make concessions when they realize that the determination of the other (to risk conflict) is greater than their own, and that these concessions must be such as to invert the relation of the determination of the utilities of the partners.

After a finite number of subsequent steps, the two partners will reach an accord that will represent--to use Nash's terms--the maximum product of their utility.

Pen[2] tries to surpass Zeuthen's model by constructing a function of ophelimity of the negotiating partners, characterized in this case by the wage level. To this, given the mutual dependence of the partners, a conflict ophelimity is tied which does not depend on contracted wage but on other factors such as

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(1) F. Zeuthen, 1930. The formula in Harsanyi's terms for the maximum subjective probability of conflict for each party in play is:

$$c_1 = \frac{\eta_{11} - \eta_{12}}{\eta_{11}} \qquad c_2 = \frac{\eta_{22} - \eta_{21}}{\eta_{21}}$$

where n_{ij} is the net utility of i' person in condition j. The point of maximum utility will be $c_1 = c_2 = 0$.

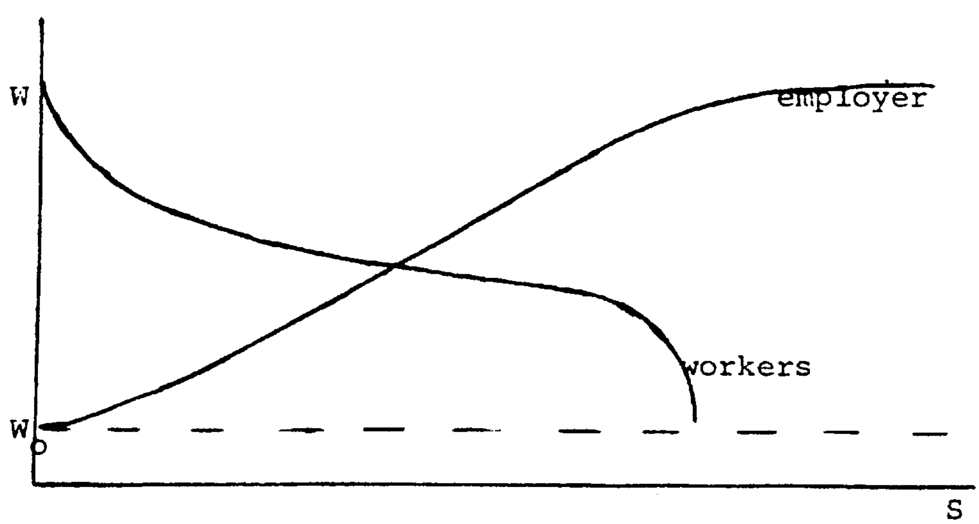
(2) J. Pen, 1952.

profits, political considerations, and "ludic" considerations, that is satisfaction with the results.

In this way, the author tries to free the partners' choice from the rationality limits of the same choice that in Zeuthen's model lead to characterize the point of equilibrium in the equalizing of the two risk tendencies.

The difference between the first and second functions gives rise to net contract ophelimity that singles out for each partner the conflict risk estimate and their own tendency to fight which in equilibrium are equal.

On the other hand, Hicks[1] speaks of the employer's concession curve and workers' resistance curve, both in increasing and decreasing function to the relation between wages and foreseen strike duration. The former starts out at the wage level the employer would be willing to pay without workers' claims and asymptomatically reaches a level "beyond which no workers' league can force the employer to go."



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[1] J.R. Hicks, 1959.

The latter goes down from a wage level much higher than that which the employer can reasonably concede to one to which "the workers maintain in a particular way to have a right" and ends at a minimum salary "because there must be a maximum time beyond which workers cannot persevere in their resistance."

The point where the two curves intersect represents the maximum salary that can be obtained while avoiding a strike threat; "the highest wage that skillful negotiations can get out of management." This asymmetry originates from the two basic asymmetries of the model, which implicitly assumes that the employer knows the position of the workers' resistance curve and not vice versa, and that the trade union propose a wage increase while management, instead of making other offers, limits itself to accepting or rejecting that proposal.(1)

The last author I would like to mention regarding the series of models for determining wages in a bilateral monopoly is Shubik.(2) He emphasizes, as did Hicks, that if the information of the negotiating partners be without error, then a strike will not take place and there would be only a variation in the distribution of profits according to the business cycle. A high level of information facilitates an accord; a low rate of information, on the other hand, apart from the phase of the business cycle, increases the likelihood of a strike or a lock-out.

Having also mentioned this last contribution permits one to emphasize that in the area of so-called classical Game Theory,

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(1) R.L. Bishop, 1964, synthesized the two classic theories of Zeuthen and Hicks into one composite Zeuthen-Hicks theory which, though better than the two separate ones, substantially maintains their limitations.

(2) M. Shubik, 1964.

given the assumption of rationality and of perfect and complete information of the two partners, strikes and lock-outs are valued only as potential threats in the search for a point of equilibrium which will be reached without these strikes and lock-outs actually taking place.

A strike will take place only when, according to Hicks and Shubik, there is an evaluation error by one of the parties in play or if his behavior is irrational.

In line with the goals of this research, to identify an economic model that explains the progress of strike frequency and duration, this approach is not very revealing due to the restrictiveness of the hypothesis.

1.1.2 Development of the Bargaining Theory

Other developments of game theory which analyze bargaining with imperfect or incomplete information seem more interesting.

Perfect information means that whoever participates in negotiations knows the previous moves and also the chance moves of the partner, while imperfect information means that neither previous moves nor any combination of moves are known.

On the other hand, complete information means that the players know the rules of the game and, therefore, also the utility function of the other player--classic game theory is based on this principle--while incomplete information means that the negotiating partners are uncertain about some important parameters: information about the other partner, pay-off functions, etc.

The difference between imperfect and incomplete information roughly recalls the difference between risk and uncertainty. In the first case the partners know at least "the objective probabilities associated with alternative possible outcomes of the game" and in the second case "where even some or all of

these objectives probabilities are not even defined in any straightforward sense."[1]

As has already been mentioned, the classic game theory considered negotiations in which rational partners possessed perfect and complete information and hold strikes only as a potential threat. A strike could happen only in the case of complete but imperfect information, that is the case in which the participant to bargaining behaves as if "he understands the nature of expected-utility calculations, and he is able to specify his preference ordering in cardinal rather than ordinal terms and accepts the implications of expected-utility calculations with respect to the phenomenon of risk."[2]

The more recent developments of Bargaining Theory deal with games with perfect but incomplete information in which the reaction functions of the partners are obtained through an infinite process of acquisition of information on reciprocal reactions. Harsanyi,[3] who is perhaps the most important author along these lines, tries to resolve the impasse of infinite regressive process that gives rise to the determination of the points of concession of the two partners through the utilization of compound expectations and of stereotype utility functions that would assure the consistency of reciprocal expectations.

An ulterior development is represented by the Bayesian game model in which the partners, even if they do not know or are uncertain about important data on the other partner are nevertheless in possession of a probability distribution on the alternative moves of the other partner, even though this may be subjective in origin. Now if these probability distributions

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(1) A. Schotter and G. Schwöblauer, 1980, p. 484.

(2) O.R. Yound (ed.), 1975, p. 11.

(3) J.R. Harsanyi, 1962.

are mutually consistent such that they can be considered as deriving from a basic probability distribution on parameters unknown to the partners, one falls back on a particular game with complete information, the Bayesian game.[1]

As far as being more representative of the real process of exchange and acquisition of information that happens between the two negotiating partner, this last branch of Game Theory as does basically the entire Game Theory, favors mathematical formulation and neglects empirical tests.[2]

On the other hand, economic literature on strikes favors exposing the econometric model to empirical verification normally achieved as a discussion of hypotheses on the behavior of the partners, employer and employees, and not as a derivation of an analytical model.

The first and perhaps the most valid example of a union of mathematical formulation and successive empirical verification is the Ashenfelter and Johnson model.[3] Nonetheless, this reaches the objective at the cost of an important principle of the game theory as presented. In fact, this model, which will be presented in detail in the following paragraph and discussed in Chapter Two, is based on perfect and complete information unilaterally possessed by the manager. He is aware of the reaction function of the workers and his own; therefore, he dominates the bargaining process by choosing the claims

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(1) J.R. Harsanyi, 1967, 1968.

(2) Though it is necessary to remember that B. Rustem and K. Velupillai in their article "A New Approach to the Bargaining Problem," furnish a computerizable version of bargaining processes as iterative procedures during which each player modifies his cost and utility functions.

(3) O. Ashenfelter and J. Johnson, 1969.

and the optimal strike duration resulting in equilibrium.

1.2 The Ashenfelter and Johnson Model of Bargaining Theory

Within the Bargaining Theory, the model presented by Ashenfelter and Johnson,[1] confronts three participants in labor-management negotiations: management, trade union leadership, and the rank and file. These are tied to each other by direct or indirect exchange relationships.

Trade union leadership maximizes its objectives of survival and growth of the union and of personal survival of the leader group by satisfying the expectations of the base (in this model convertible into monetary terms, mostly salary). Moreover, in bargaining with management, the leadership tries to maximize the expectations of the base in order to obtain, in turn, a maximization of consensus--support. When these expectations are greater than the concessions Management is willing to negotiate, trade union leadership will try to reduce the expectations of its members, or if not being successful, they must choose between two alternative strategies, sign a contract less than the basic expectations or call a strike.

The first strategy produces discontent at the base and a reduction of support, so the leadership group will prefer the second. On the one hand, in fact, this increases the bargaining power of the trade union with respect to management for the demonstration of strength (capacity to resist and inflict direct damages); and on the other hand, it will reduce the expectations of the base because of the resistance shown by management and the immediate loss of salary. (See Figure 1, p. 19.)

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[1] O. Ashenfelter and J. Johnson, 1969.

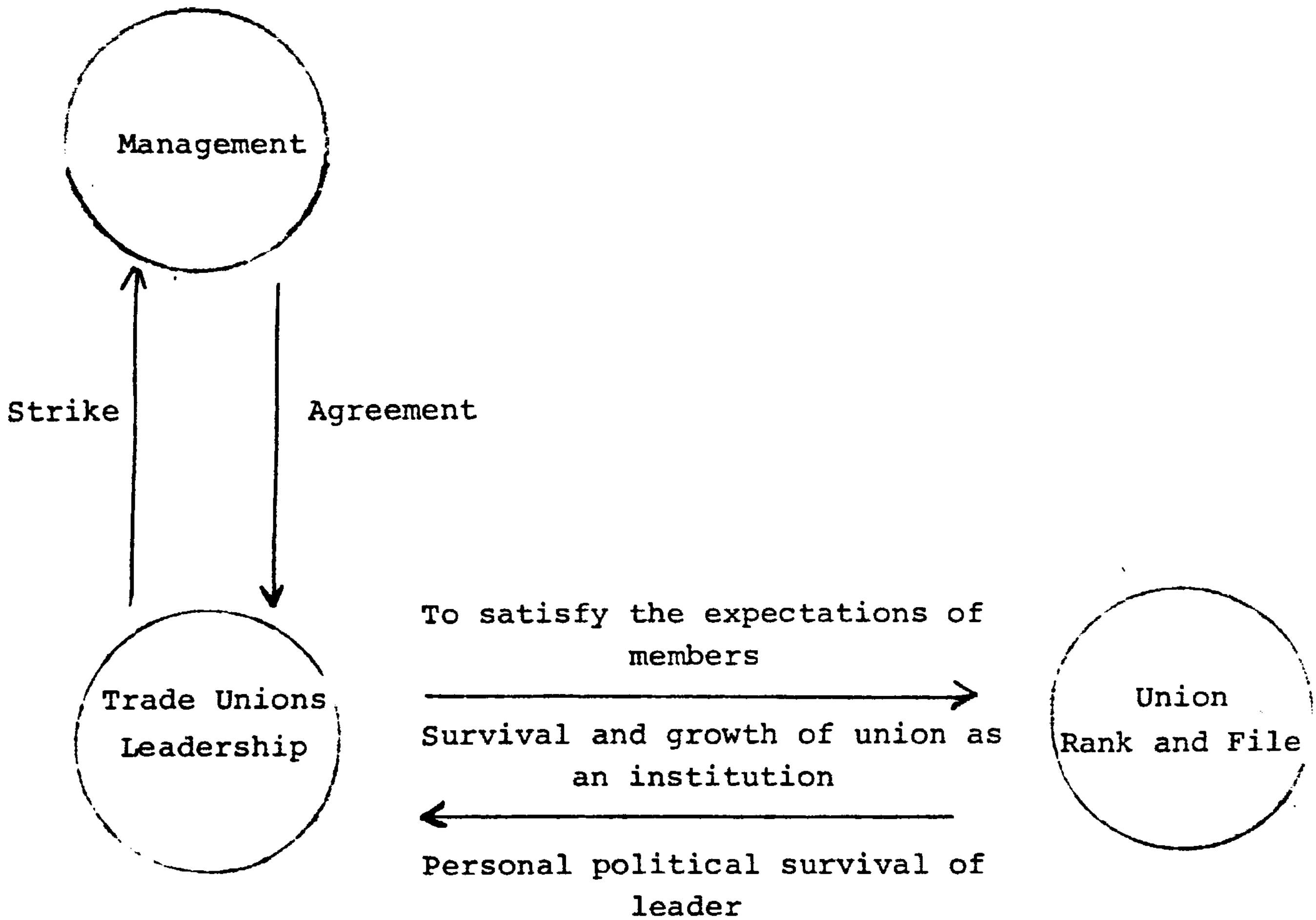


Figure 1

Derived from: O. Ashenfelter and J. Johnson, "Bargaining Theory, Trade Unions, and Industrial Strike Activity," American Economic Review, 1969.

From this essentially political model, the authors analyze and formalize the firm's choice between conceding the wage increase that the workers consider acceptable at the expiration of the contract or tolerating a strike to obtain a more favorable contract.

The negotiated wage increase, Y_a, that the workers consider acceptable is defined as proportional to the absolute wage increase, Δw, with respect to the previous contract wage, $\hat{w}$.

(1) $$Y_a = \frac{\Delta w}{\hat{w}}.$$

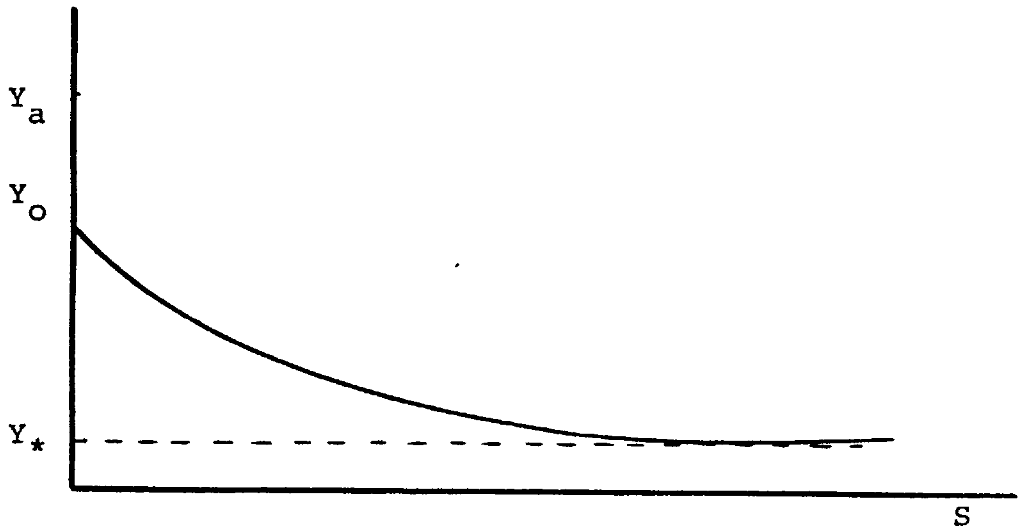
According to the above reasoning, this depends on the duration of the strike.

(2) $$Y_a = v(S).$$

The authors assume the relation between wage increase and strike duration can be represented by the following formula:

(3) $$Y_a = Y_* + (Y_o - Y_*)e^{-\tau S}$$

where $Y_o = v(0)$ represents the demanded wage increase at the expiration of the contract and, therefore, is not accompanied by strikes; $Y_* = v(\infty)$ is the wage increase the workers are not willing to accept even after a strike of infinite duration, and τ is the velocity with which the workers reduce their expectations.



On the other hand, the profits of the firm, Π, in each period, supposing a fixed output produced with the same technology to be sold at the same price in the future, will be given by:

(4) $$\Pi = \alpha P - \beta W - H$$

where P is the price of goods produced, H the level of fixed production costs, and W the negotiated wage rate,

(5) $$W = \hat{W}(1 + Y_a)$$

since the firm wants to maximize the present value of future profits, (V),

(6) $$V = \int_0^\infty \Pi e^{-rt} dt.$$

By substituting (3) in (5), (5) in (4), and (4) in (6), and after the mathematical steps in resolving for S, the optimal strike duration is obtained.

$$S = -\frac{1}{\tau} \cdot \ln \left[\frac{P - P\hat{W}(1+Y_*)}{\hat{W}(1+\frac{\tau}{r})(Y_o - Y_*)} \right].$$

From this solution it is deduced that:

-The likelihood of a strike, ceteris paribus, will be greater (the partners will be less disposed to come to an agreement before a conflict occurs) the greater Y_o and τ.

-The likelihood of a strike will be less, (the partners will be more willing to come to an agreement) the greater Y_*, minimum acceptable wage increase; r, the discount rate of the firm; P, price of goods produced; and $\frac{\alpha}{\beta}$ average product per worker (inversely correlated to the relation between wage-bill and total cost).

Finally, the authors derived from this analytical model an operational version that they tested successfully in the U.S.A. from 1952 to 1967.

The strike probability at time t (S_t) will be

$$(7) \qquad S'_t = \beta_o + \beta_1 T + \beta_2 Y_{ot} + \beta_3 \Pi^*_{t-1}$$

where T indicates time (in this particular case it is supposed to be negative according to the hypothesis of secular decline of strikes[(1)]) and Π^*_{t-1} the relationship between profit level and wage-bill, referring to the previous contract that takes the place of the above-mentioned relation $\frac{\alpha}{\beta}$ and where Y_{ot}

$$(8) \qquad Y_{ot} = f(\underset{(-)}{U}, \sum_{i=0}^{M} \mu_i \underset{(+)}{\Delta R_{t-i}}, \underset{(\pm)}{\Pi^*_{t-i}})$$

[(1)] See the thesis on "Secular Decline of Strikes" by P.T. Hartman and A.M. Ross, 1960.

depending on U, unemployment rate, R, previous variation of the lagged real wage[1] and on the profit share.

Substituting, one has:

$$(9) \qquad S'_t = \underset{(+)}{A} + \underset{(-)}{\beta_1} \sum_{i=0}^{M} \mu_i \, \Delta R_{t-i} + \underset{(-)}{\beta_2} U_t + \underset{(\pm)}{\beta_3} \Pi^*_{t-1} + \underset{(-)}{\beta_4} T + \varepsilon_t .^{(2)}$$

Strike probability defined by the authors as the number of strikes that begin in a period divided by the number of contracts that expire in that time, is explained in terms of real wage increase (no money illusions exist), of unemployment, and of profit share on the wage bill and is tested in the United States using quarterly data.

Pencavel[3] applies this approach to Great Britain from 1952 to 1967, obtaining similar results as the American authors, through substituting the rough data on the number of strikes begun in the time period for the probability of beginning a strike at the expiration of the contract in that period.

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(1) The lags were obtained according to the methodology of distributed lags proposed by Shirley Almon based on the polynomial method of Lagrange.

(2) Remember the symbols:

S_t = strike probability in time t

$\Delta R_t = \Delta W_t - \Delta P_t$

ΔW_t = annual rate of variation of monetary wage

ΔP_t = annual rate of variation of consumer price

U = unemployment rate

Π^* = profit level on the wage-bill

T = in time index (quarterly)

ε_t = disturbance element.

For the results of the tests, see the schematic presentation of the results which follow.

(3) J. Pencavel, 1970, continues the analysis by dividing into sectors.

Even D. Hibbs[1] tests this model with satisfying results from 1950 to 1969 in ten advanced industrial countries, using as a dependent variable the volume of strikes (frequency x duration x extension).[2]

1.3 Operational Versions of Bargaining Theory

As has already been emphasized, most of the literature on conflict that refers to Bargaining Theory as the interpretive paradigm of strikes favors the econometric model to be applied to empirical tests.

Authors generally follow two lines of reasoning, either they reconstruct the Ashenfelter and Johnson model and propose an alternative version or application to a different context, or they directly construct an operational model on hypotheses of the behavior of bargaining partners.

In this section, I would like to illustrate those which, in my opinion, are the best examples of the second line of reasoning. I will then offer a schematic presentation showing the results of the regressions from some of the most interesting articles on this subject, and conclude with comments on the variables used in the tests.

1.3.1 The Davies Model

The model developed by Davies in his 1979 articles seems to be the best example of a direct approach to the operational version for the particular clarity and coherency of the author's presentation.

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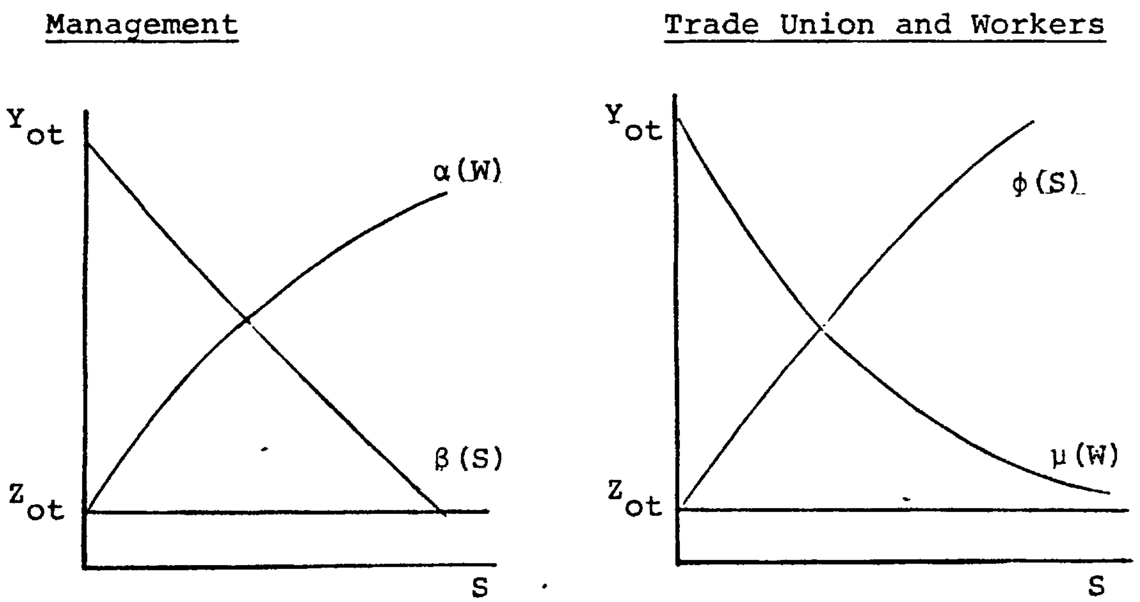
(1) D. Hibbs, 1976.

(2) For further explanation cfr. Appendix. Limits of Statistic Sources on Strikes.

He states his desire to explain "the time series profile of aggregate strike frequency in terms of variety of macro-economic variables."(1)

He also states that only work conflicts on wages of a direct monetary implication will be considered,(2) that three partners participate in bargaining--management, trade union and worker base--and that bargaining takes place under uncertain conditions and in an environment of imperfect information.



In fact, the author assumes that during negotiations begun at time t, the two partners exchange information beginning with the respective trade union wage claims Y_{ot} and management wage offers Z_{ot} which already allow for identifying a certain

(1) R.J. Davies, 1979, p. 205.

(2) This specification is extremely important because it is coherent with the econometric equation that will be tested using only pay-strikes.

interval within which a final accord should fall. Concessions will be made until their expected cost will be less than the cost of a strike. Taking the first graph into consideration, the employer will be willing to make concessions if $\alpha(W)$, his subjective estimate of the cost of conceding wage increases above the initial offer of Z_{ot}--understood in terms of production cost increase and a weakening of his position in future negotiations--be less than $\beta(S)$, his subjective estimate of cost in terms of a strike necessary in order to make the workers accept a wage increase less than that initially demanded, Y_{ot}.

By the same token, the trade union and the workers will be willing to reduce their demands if $\mu(W)$ the cost of an agreement less than Y_{ot}--in terms of lower wages, lower future bargaining power and less support from the base--is greater than their estimate $\phi(S)$ of the cost in terms of strikes necessary to obtain from the employer salary increases above the initial ones Z_{ot}.

Evidently, the two partners, as they gather more information during negotiations, continuously revise their initial estimates. It may be deduced that the strike probability $P(S)$ at time t will depend on the distance between the offer and the wage demand and the respective propensities of the bargaining partners to make concessions,

$$P(S) = a\{(Y_{ot} - Z_{ot}),\ b_{et},\ b_{wt}\}$$

b_{et} represents the attitude of the employer and

b_{wt} that of the trade union to bargain,

and will be greater, the greater the distance between the two positions of the partners $(a_1 > 0)$ and will be smaller the more they are willing to reach an accord $(a_2, a_3 < 0)$.

The author then goes on to identify the relationships and thus the proxies of the variables above, arriving at an operational equation to be subject to empirical test. In fact, it can be imagined that the wage increase demanded by the workers Y_{ot} varies in the same way as the degree of excess demand X_t in the labor market, as the expected rate of price increase $\dot{P}_t^e$, as the expected workers' wage $\dot{W}_t^e$, and as the profit level Π_t.

In this way a procyclic hypothesis of strikes is included for which in periods of expansion characterized by an increase in production, prices, profits, and expectations, there is an increase in claims.

$$Y_{ot} = \beta(X_t, \dot{P}_t^e, \dot{W}_t^e, \Pi_t) \qquad \beta > 0$$

where wage expectations are the result of the "going rate" of wage contracts $(\dot{W}_{t-j}^o)$ and of the recent erosion of workers' income by taxes (R_t).

$$\dot{W}_t^e = \phi\{\dot{W}_{t-j}^o, R_t\} \qquad \phi > 0.$$

The next step in specifying the model consists of discussing the manager's wage equation Z_{ot}. Moreover, it will be influenced by the same variables that condition workers' claims, even though in an opposite way. For example, price rises push workers to ask for an increase in income to maintain their purchasing power constant, and alternatively, make it easier for management to transfer the new costs onto the price of the products and not increase the incidence of strikes.

The last phase of the model is to specify the economic determinants of the respective propensities of the manager

b_{et}, and of the trade union and workers, b_{wt}, to bargaining.

$$b_{et} = \mu(\Pi_t, I_t, X_t) \qquad \mu_1, \mu_3 > 0$$
$$\mu_2 < 0.$$

The employer will be more willing to meet workers' claims the higher his profit margin (Π_t) and the larger the expansion phase of the business cycle (X_t); while, on the other hand, he will prefer to resist those claims the greater his stock of products (I_t).

As far as the labor base is concerned, the workers will be able to go on strike if they have the financial ability to do so, that is if occasional work is available, if they have accumulated economic resources, and if they are not subject to expenditure commitments. Their willingness to negotiate (b_{wt}) will vary in a procyclic sense (X_t) and according to seasonal terms (Y_t).

$$b_{wt} = \psi(X_t, Y_t) \qquad \psi_1 > 0, \quad \psi_2 \gtrless 0$$

$$Y_t = \text{seasonal dummy}$$

The behavior of trade union leadership in negotiations will be influenced by the available financial resources of the union which, however, do not directly imply a greater or lesser willingness to negotiate because it also is influenced by type of organization (D_t).

Trade union militancy will constitute the last limit M_t.

$$b_{wt} = \lambda(D_t, M_t) \qquad \lambda_1 \gtrless 0, \quad \lambda_2 < 0.$$

Substituting:

$$P(S)_t = a\{X_t, \dot{P}^e_t, \dot{W}^o_{t-j}, R_t, \Pi_t, I_t, Y_t, D_t, M_t\}$$

$$a_1, a_3, a_5, a_8 \gtrless 0 \quad a_2, a_4, a_6, a_9 > 0 \quad a_7 < 0.$$

Adding a dummy variable for the income politics (hard, soft, entry) and the element of error, and using the number of wage strikes as a dependent variable, this model was successfully subject to empirical verification in the U.K. from 1966 to 1975.(1)

The merit of this version of the Bargaining theory model lies in having clarified that the economic variables used in interpreting conflict refer only to wage strikes, in having emphasized the continuous process of information acquisition and of subsequent revision of final offers and demands of the two partners, and in having attempted, by introducing the propensities of the partners to bargaining, to render the model more manageable.

1.3.2 Schematic Presentation of Some Operational Versions of the Bargaining Theory Model

An attempt has been made to summarize and schematically present about twenty econometric tests on the development of strikes.

Reported in the charts are:

--in the first column, the author's name and bibliographic reference of the article examined;

--in the second column, the country or countries examined in the test and the time period in which empirical verification was applied;

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(1) For the test results, see the Section 1.3.2.

--then, the sectors under consideration, if the entire economy has been examined or if some sectors have been excluded or only a few considered;

--the strike measure on which the regression was made, number of strikes, hours lost, workers participating, and the periodicity (annually, quarterly, etc.);

--then the explicative variables represented by the most standard symbols in current literature; for example, $\dot{P}$ represents price variations, with the signs + or - if the variable is significant, otherwise the symbol (o) next to the variable if it has not proved to be significant;

--finally, the coefficient of determination (R^2) and the D.W. test of out-correlation of the residuals.

Legend[1]

U = unemployment rate,

W = wage,

real $\dot{W}$ = change of real wage,

money $\dot{W}$ = change of money wage,

$\dot{P}$ = change of consumption prices,

net profit

gross profit

capit$\dot{a}$l stock = change of capital stocks,

% women = proportion of women in the labor force,

% payment result = proportion of workers, paid by results schemes,

$\dot{W}$ diff. ind = change in the wage differentials between industries,

$\dot{W}$ diff. region = change in the wage differentials between regions,

plant size

firm size

prod$\dot{u}$ctivity = change in productivity,

concentration = industrial concentration rate,

% skilled workers = proportion of skilled workers on the employees,

E = employees,

W^{o}on-going = on-going wage rate,

T.U. organization = financial power of the Trade Unions,

T.U. members = proportion of T.U.'s members,

Hard I.P. = Hard Income Policy,

Soft I.P. = Soft Income Policy,

RE-entry = end of income policy,

P.P. = party of president,

% Dem. seats = percentage of Democratic seats in Congress.

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(1) The legend follows the order in which the variables appear in the following schematic tables. The index sub$_t$ maintains for each variable the contemporaneity or the lag in which it is used.

Author Yr. of article	Country Yrs.	Sector	Strike indicators	Explicative Variables	R^2	D.W.
Ashenfelter O. e Johnson.G. The Am.Ec.Rev.69	U.S.A. 1952I-57II	all sectors	n. strikes quarterly	$u_t(-)$, real $\hat{W}_{t-1}(-)$, money-$\hat{W}_{t-1}(-)$, $\hat{P}_{t-1}(+)$, net $Profit_{t-1}(°)$, Time(-), Seasonal Dummy, L.GriffinDummy(+).	.938	1.44
J.H.PENCAVEL Economica '70	BRITAIN 1950-67	Constract. transport. metal goods coal mining all together	n. strikes quarterly	$u_t(-)$, real $\hat{W}_{t-1}(-)$, money $\hat{W}_{t-1}(-)$, $\hat{P}_{t-1}(+)$, gross Profit(+), Time(+), Income Pol.Dummy, Labour Gov.Dummy, Seasonal Dummy.	.870 all sectors	1.36
J.VANDERKAMP Ind.Relations '70	CANADA 1901-66 1946-66	All industries	rel.n.strike rel.n.lav. ~~rel.n.manday at worktime~~ annual	G.N.P.$_{t-1}(+)$, $\hat{P}_{t+1}(+)$, WarDummy, UnionMenber. $u_t(-)$, real$\hat{W}_t(-)$, Time(+) 1946-66	.50 .638	correlation U.S. manday lost
D.HIBBS The Am.Pol.Sc.Rev. 1976	10 advanced ind. socetieş (no Germany)	All industries less mining e agriculture.	Manday lost on 1000workers. quarterly	$u_t(-)$, $Profit_t(+)$, real $\hat{W}_{t-1}(-)$, → .53 DummyBargainingLevel(°), LabourGov.(-), ElectionYear(*), ComunistPartyMenbership(+) → .58	.53 .58	
H.S.FARBER The AM.Ec.Review 1978	U.S.A. 1954-70	sample 10 Firms ind.	rate of concession of Union i.	realW_{ti}, u_t, $Profit_{it-1}$, DUMMY62-66, UnionFundBalances$_{it}$, Labour's share of total sales$_{ti}$.	/	

Author Yr. of article	Country Yrs.	Sector	Strike indicators	Explicative Variables	R^2	D.W.
J.H.PENCAVEL Economica 70	U.K. 57II- 67II	Constraction transport metal goods coal mining	N.Strikes quarterly	U_t(-), U_{it}(-), realW_{t}(-), T(+) I.P.(+) (-) (+) (+) (+) (-) (-) (-) (+) (+) (-) (-) (-) (-) (-) (-) seasonal dummy	0.65 0.73 0.77 0.94	1.68 1.66 1.64 1.48
H.FARBER D.LIPSKY Ind.&Labor Rel. Rev. 1976	U.S.A. 49-71	Constraction annual	strikes strikes rel dayworked manday-lost day-lost rel. dayworked day on strike by causes :ec.,work cond.,security,jurisdict. separately	U(-) W(-) Time (+) (-) (-) (-) (-) (-) (+) (-) (-) (+) (-) (-) (+)	0.43 0.9[illegible] 0.52 0.47 0.48	1.7 1.88 1.57 1.53 1.40
J.M.BRETT S.B.GOLDBERG Ind.&Labor Rel. Rev.1979	U.S.A. 75-76	Bituminous coal-mining	WildCatStrike	LowStrikeMines smaller, manager more accessible Local level solve grievances HighStrikeMine arbitrators unfair LSM's workers disciplined by manag. for striking		
C.KERR & A.SIEGEL 1954	11 country 1880-1923	all inter-industries	strikes high mediumhigh medium mediumlow low	LOCATION, TYPE of WORK Ec.environ.;pol.envir;human relat;Barg.;Dominant personal Ideological view;tech.of B;		

Author Yr. of article	Country Yrs.	Sector	Strike indicators	Explicative Variables	R^2	D.W.
R.J.DAVIES B.J.of INd.Relations 1979	U.K. 66-76	All economy	n.Strikes n.PAYstrikes n.non-pay strikes quarterly	$\hat{U}(-)$, $\hat{P}(+)$, $W^{net}(\bar{+})$, grossRealProfit(−), SeasonalDummy HARDInc.Pol($\bar{+}$) SoftI.P. Re-entry(+) Stock(°), Tax(°), $\hat{P}^e$(°), ExcessDemand(°) W on going, T.U.organisation(°), T.U.menbers(°), ConservativeI.P., LabourI.P.	0.8 0.86 0.6	1.9 2. 1.9
R.BEAN D.A.PEEL J.of Economics Studies	U.K. 62-70	4 industries	wageStrikes on Employees annual	$U_i(-)$, $U_{all}(+)$, $\hat{P}_t(+)$, $\hat{W}_t(°)$, $W/W_{all\,t-1}(\bar{-})$, realProfit$_{t-1}(\bar{-})$, Output/empl(+)	0.879	
P.K.EDWARDS B.J.of Ind.Relations 1978	U.S.A. 1881-1972	All economy less agriculture	n.Strikes annual	TROUGH(+), PEAK(−), realW(−), real$\hat{W}$(+), money$\hat{W}$($\overset{\circ}{+}$), $\hat{P}$(−), T.U.density(−), PartyPresident(−), °/₀seatsDemocrats(−), Time(−). 1949-1972	0.68 0.48	1.53 1.29
D.SNYDER The Am.Ec.Review 1975	U.S.A. 1900-70 France 1876-1966 Italy 1900-70	All economy	n.Strikes n.strikers annual	U(−) realW$_{t-i}$(−), T.U.menber(°), BP.(°) °/₀Dem.seats(°), Time(−) for U.S.A. 1949-70	0.704 0.587	2.16 2.26
G.P.CELLA Mulino, BO 1979	U.S.A. Italy, U.K., Germany, France. 1881-1976	All economy annual	n.strikes n.strikers n.Manday lost	1/U(+) {+ +}, real$\hat{W}_{t-1}$(+) {− −}, money$\hat{W}_{t-1}$(+) {− −}, $\hat{P}_t$(+) {+ −}, T.U.menber(+), P.C.votes(−) {+ +}, Elect(−) {+ +} Time(+) Italy 1952-73	0.9 0.6 0.77	1.4 2.2 2.4

Author Yr. of article	Country Yrs.	Sector	Strike indicators	Explicative Variables	R^2	D.W.
J.SHOREY Economica 1976	U.K. 63-67	33 groups. cross manifacturing industries.	n.Strike on workers annual	$\hat{W}$(+),CapitalStock(+),output per worker(-), u(°),°/$_o$women(-),°/$_o$ paymentResult(+),$\hat{W}$Diff.Ind.(+), $\hat{W}$Diff.Region(+),PlantSize(+),FirmSize(-). Employm.(-),Concentr.(-),Cap/labour(-), operatives $\dot{W}$ °/ net output (-), °/$_o$administrative clerical workers(-).	0.88	Plantsize Firmsize multicoll.
J.SHOREY J.of Ind.Economics 1975	U.K. 63-67	33 groups cross manifacturing industries.	n.Strikes on employees	Women°/$_o$(-),°/$_o$payed by result(+), CapitalStock(+),Productivity(-), $\dot{W}$(+),$\dot{W}$diff.ind.(+),$\dot{W}$diff.reg.(+), PlantSize(+),FirmSize(-). senza PlantSize,conFirmSize FirmSize e Concentration (a) FirmSize e °/$_o$skilled workers(-)	0.869 0.888 0.865	" " " F.S.eConcen nò multicol
J.SHOREY B.J.of IND.Relations 1977	U.K. 20-39 50-67	All industries less mining	n.of Strikes quarterly	$\dot{W}$Bill(°),$\dot{u}$(°),money$\dot{P}$rofit(°),$\dot{P}$rod.(°) P_t(+),$\dot{P}_{t-1}$(+),realProfit(+),$\dot{W}_{t-1}$externalDiff.(-),Strikes$_{t-1}$(+),DummySeasonal(+).	0.89	
L.LYNCH B.J.ofInd.Relations 1978	U.K. 50-74	Coal-mining annual quarterly	n.of Strike	E(+),P (+),Wrelative(-), (-)W_2averag.i-3to ith quarter (+)Seasonal second quarter	0.90 0.67	1.60 2.21

Author Yr. of article	Country Yrs.	Sectors	Strikes indicators	Explicative Variables	R^2	D.W.
K.J.ARMSTRONG D.BOWERS e D.BURKITT B.J.of Ind.Rel.'77	U.K. 51-68	14 industrial sectors annual	n.Strikes Jit.index	Unionisation (°) money$\hat{W}$ (-) JitIndex$=\frac{100}{3}-\left\{\frac{Si.t}{Si54}\cdot\left[\left(\frac{lavi.t}{lavi54}+\frac{Manday.it}{manday.i54}\right)\Big/\frac{EMPLit}{EMPLi54}\right]\right\}$	-0.291 -0.291	
P.K.EDWARDS B.J.of Ind.Rel. 1979	Grait Britain 1971	survey 26 manifact. ind. 10 regions	n.Strikes " Strikers Manday-lost	volontary absence cert.or uncertified sickness lateness U(+),W(+).	correlation u 0.20 W 0.63 industry	day-lost u 0.75 W 0.48 region
R.BEAN B.J.of IND.REL; 1975	Grait Britain 1968-70	Ind. manifact.	n.Strikes annual	sickness(+) absence (+) lateness(+)	correlation	+
M.ROOMKIN Ind.andLabour Rel. Rev.1976	U.S.A. 68-70	57 unions	n.Strikes on B.opportunity	contract national approuved (-) nat.permissions(-),interval in nat. union conventions(-),localiz.prod. market(+),menbers(-),intermediate body(+)	+centralized -conflict only local product market 0.68	unions
J.CRONIN Croom Helm London 1979	U.K. 1893-1974	all ind. all less mining mining	n.Strikes n.Strikers	G.D.P.(+),$\hat{W}_t$(+),$\hat{W}_{t-1}$(+),U_t(-),Labour Gov.(-),Repres.Leg.(-),Time(+) P_t(°),P_t(°),Prod.(°),Cons.Gov.(°), LiberalGov.(°),WarGov.(°),Election Year(°),Cons.MP.(°),T.U.menber(°), T.U.member(°),Strikers in Mining$_{t-1}$(°) Strikes in all except Mining$_{t-1}$(°).	0.90 all ind. n. of strikes	1.14

1.3.3. Comment on the Variables Used in the Tests

I will try to tie together this fragmentary presentation of the operational versions used to interpret the progress of strike phenomena by synthesizing the numerous independent variables used in the econometric formulations of the models.

They may be categorized into five groups:

Economic Variables in which we can have different combinations of variations of real wage levels, discretionary income, prices, unemployment, productivity, capital stock, variations of real or monetary profit (net or gross), unemployment rate, rate of fiscal imposition, at time t or lagged by a year, half-yearly, or quarterly.

Political-Organizational Variables which can range from a simple dummy variable for labor, government, election year, for the type of negotiations (centralized, decentralized, etc.), the presence of income policy or of a repressive legislation in force, until arriving at a rate of unionization or of a variation in that rate, to the number of voters for leftist parties, to the number of deputies from leftist or rightist parties.

Structural Variables used above all in intersectorial analysis such as percentage of women employed, of administrative, clerical, technical workers, of workers paid by result schemes to the total number employed, rate of industrial concentration.

Emulational or Environmental Variables used both in intersectorial and global analysis, made up of political strikes, strikes in another sector, usually leader or particular (e.g., in U.K., the mining and quarrying sector), and used finally with a one-year lag or with quarterly averaged lags.

Temporal Variables such as time normally used to substitute change in employment, labor force, technological change and other factors with an assumed linear progress, and seasonal dummy variables inserted to account for the seasonality of employment, of the termination of production cycles and family budget payments.

This variety of types of variables is in some cases explained by an attempt by some authors (Snyder, Hibbs, Cella) to test, with the same equation, the validity of the bargaining and political-organization paradigms and in other cases, even though a bargaining model, usually that of Ashenfelter and Johnson, is referred to directly, by the desire (or necessity) to consider other variables in order to improve the econometric test.

At this point, I would like to make a few comments on Cronin's approach,[1] defined by the author as historical. He

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[1] J. Cronin, 1979.
Economic variables: GDP, u_t, $\dot{R}_t$, R_{t-1}, P_t, $\dot{P}_t$, $\dot{\text{P}}$rod.
Political variables: Labour Government, Conservative Government, Liberal Government, Wartime Coalition, Election Year, no. Conservative MP's, Repressive Legislation in Force.
Organizational, Emulative Variables: T.U. Members,

considers 19 variables: seven economic, seven political, four organizational or emulative, plus the time variable. Using the stepwise procedure, he selects the seven that have the most explicative power. This type of analyses, realized in a very long period from 1893 to 1974 and for subperiods 1893-1913, 1893-1921, 1919-38, 1946-74, leads to interpretations of the conflict phenomenon that use different variables from time to time. In other words, it consists of having for each case, for each time period, and for each economic sector considered, an ad hoc model that certainly is more consistent with the real situation of the moment and allows for better testing of the equations, but in lacking a point of reference, does not permit an identification of the fundamental determinants of industrial phenomena.

And it is exactly with this idea in mind, identifying the determinants of industrial conflict, that we will now confront criticisms of the theoretical bargaining model.

1.4 Criticisms of the Bargaining Theory

I would like to conclude this chapter on Bargaining Theory with some critical considerations. Some fundamental limits of the model refer to the universe to which it is applicable.

1. In the model, negotiations between Management and Trade Unions,(1) within which strike action is legitimized, takes place in industrial sectors in which Management(2) obeys the rules of maximizing future profit stream. This analysis,

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Fn. continued

T.U. growth, strikers in mining_{t-1}, strikes in all time except mining_{t-1}.

(1) Trade Unions or workers.

(2) Management includes also the interests of the owners or stockholders.

then, does not cover conflicts that take place in public firms, in which management's logic theoretically follows other criteria, for example, employment, development, etc., which in reality present large deficits in the budget. Furthermore, the tertiary sector does not enter the picture. This lacuna, especially after the end of the 1960's with the beginning and increase of work conflict in the public and private tertiary sector, annuls the interpretive and predictive value of the model.

Cfr. in Italy the increase in the number of strikes in the commercial sector: 38 in 1967; 68 in 1968; 115 in 1969; 155 in 1970; 168 in 1971; 188 in 1972; the number of workers participating respectively: 24; 112; 284; 152; 73; and 63; and the number of days of work lost: 312; 1435; 4568; 5254; 1134.

2. Moreover, the same analysis of bargaining as formulated can be applied only to <u>unionized economic sectors</u> and a strike can only be realized after a first contact between the two parties in dialogue ending without success. It excludes examination of non-unionized sectors and also all forms of strikes that are separate from direct contact at the moment of negotiation, be they patronized by the Trade Union or spontaneously initiated by the worker rank and file.

If the limit of unionization of the sectors can be contested by demonstrating that areas of complete non-unionization do not exist, but only some professions in which the union is less strong, then it will be more difficult to deny the importance of the phenomenon of unofficial strikes and of strikes which subsequently coincided with union movements, especially after 1968. As the Donovan Report points out, there is an effective underdimensioning of official union structure from which the managing of workers' claims escaped.

3. It is exactly in the theme of claims that the other gross limitation of the model exists. It considers only wage claims and therefore can refer only to wage strikes. As has already been stated (cf. Introduction), this limitation often results in improper use of the model, using independent variables explicative of wage claims for interpreting conflicts that are not only about wages. Notwithstanding the already considered unreliability of statistics on strikes divided by cause, I would like to note that, for example, in the U.K. the number of disputes concerning employment rose from 234 in 1965 to 451 in 1971, the number of workers participating in such disputes was 49,500 in 1963 and 112,800 in 1971, and the days lost 141,000 in 1963 and 1,397,000 in 1972.

Generally, however, the increase in unemployment rate in the U.K. from 1.40 in 1966 to 5.70 in 1977, in Italy from 4.40 in 1970 to 7.20 in 1978, and in France from 1.1 in 1969 to 5.3 in 1978, sharpened the sensitivity of the workers to job security and initiated a series of conflicts to protect workers' rights and to defend jobs, which certainly cannot be explained by a model of wage claims.

4. Moreover, there is a global perplexity about the bargaining model[1] in regard to its capacity to completely represent the European bargaining system. This limitation can be attributed to the more frequent presence of a third partner, government, at the bargaining table. In fact, the government is called to intervene daily in labor relations with financings,fiscal tax reductions, or even rescues (financial bail-outs); and takes an active role in negotiations,

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[1] This perplexity is clearly brought out by Snyder who, for this reason, gives a residual role to the model in interpreting conflicts.

organizing trilateral encounters or institutionalizing forms of cooperation (German concerted action). Otherwise, one could respond with the legitimate doubt about Bargaining Theory by saying that the determination of wages does not come from negotiations between Management, Trade Union and Government, but is instead determined monopolistically by the Trade Union as Farber[1] points out as happening in the mining sector. In the last case, the global approach model is put under discussion because strikes would not have any reason to occur in relation to bargaining.

The internal ties between the variables of the model will now be examined.

5. A basic ambiguity exists in the model, the construction of which is implicitly based on procyclic characteristics of strikes and presumes a regressive power of unemployment and a propulsive power of price increases.

On the one hand, price increases push workers to strike in order to re-establish their real purchasing power,[2] inflation, therefore, stimulates strikes. On the other hand, unemployment taken as a proxy for the economic cycle and as an indicator of bargaining strength suggests a negative link to the industrial conflict.

In other words, the model implicitly presumes through the effect on strikes, a negative relationship between price variations and employment variations of the Phillips' curve type.

The moment the very theory of the Phillips' curve is questioned why both price rises (two-digit inflation) and

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[1] H. Farber, 1973.

[2] Workers suffer no money illusion.

unemployment increases, and new theoretical pictures for interpretation are sought (for example, the theory of partial equilibrium), the conflict model registers this inadequacy.

And being faced contemporaneously with more strikes, higher inflation, and more unemployment creates the need, in this context also, to explore new ways to resolve the problem.

6. Furthermore, changes have occurred in the income level considered the right of the workers, Y_O, in their willingness to negotiate, b_{wt}, and in their subject perceptions of the cost of a strike (τ) and that these have fed the threat of conflict.

These changes can be a product of various components:

--there is no longer any willingness on the part of the Trade Union to reduce the use of strikes as a threat (also because by now it causes little fear) by now limited only by the reaction of public opinion;

--the conflict potential of the workers is never annulled because the wage increases that the workers obtain do not allow them to reach that level of income which they maintain satisfactory, entitlement effect.

--Additionally, the search for an auxiliary source of income, that if it can theoretically reduce the workers' sensitivity to increase in primary wages, will increase his sensitivity to the increase in time dedicated to the second job, and in the end is a cause of greater conflict (strikes, lateness, sickness, etc.).

--Finally, the sensitivity of the workers to net loss of income during a strike which constituted (according to Hicks) the limit of the continuation of conflict until obtaining the objective, is notably reduced because of the more frequent presence of entries into the family budget, not of least

importance marginal works, and also because of the wide practice of alternating sick-days and vacation leave with strike days (striking at the expense of the firm).

7. I would like to end this chapter considering a more specific limitation of the operational version of the bargaining model that looks upon chosen measures as conflict indicators.

As is well known, there are three simple indexes of conflict (relative number of strikes, of strikers, of days lost) and four composite indexes (the dimensions which represents the average number of workers participating in the strike, the duration[1] that represents the average number of days lost for each striker, the gravity of the strike which represents the average number of days lost per strike, and the volume which is the product of the relative number of strikes and the dimension and the duration) but in the tests of the model the number of strikes or, alternatively, the volume of strikes is used. Leaving aside the pluridimensionality of the phenomenon is reductive, especially if it is not motivated by a particular interpretation of the Bargaining Theory model.

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[1] According to the classic terminology used by D. Hibbs.

CHAPTER TWO

Development of a Broader Bargaining Model
(Mathematical Version)

In this chapter, I will try to outline a model within the bargaining process, and despite the weakness already specified in the previous chapter, attempt to overcome some larger stumbling blocks.

I will begin, therefore, by defining the framework within which the model will be developed. First, it must be remembered that in the context of the Bargaining Theory strikes are interpreted above all with reference to the economic system. The analysis deals with the cost-benefits that work produces for each partner, in contrast to other interpretations which analyse industrial conflicts through their political connotations, thereby reducing the factory to a site where the struggle for political takes place.

2.1.1 Within the Limits of the Bargaining Theory

First, I will try to summarize the limits of the bargaining model.

1. The strike potentially takes form only at the moment in which negotiations are opened and can only occur after the failure of a first initiative to reach an agreement. This would exclude all strikes that do not take place concurrently with the termination of a contract and those that are held even before negotiations are initiated in order to demonstrate the strength of labour. One hypothesis which would overcome this limitation in the model

would be a continuous readiness to negotiate on the parts of the management and the trade unions. Using this hypothesis, the model could be extended to all strikes which do not take place following initial negotiations since such strikes would be interpreted as the result of an implicit and unsuccessful mediation.

2. The relationship between trade union leadership and trade union rank and file has hardly been explored. For example, questions such as: who calls the strike and who decides what objectives to emphasize, are still to be answered. This ambiguity between leadership and rank and file is emphasized by the spontaneous strikes which often are not recognized by the trade union leadership. There is one possible loophole in this view: following the tendency of decentralization of collective bargaining, the unit of bargaining has become smaller resulting in an exchange of roles. This has come about mainly through the increasing importance of shop-stewards, factory delegates, and local factory meetings in the decision-making process. Thus, the dichotomy between union leadership and rank and file diminishes and objectives that both want to reach, tend to be the same.

3. Moreover, in my analysis, I would have liked to have covered every economic sector, agriculture, industry, and especially services because of its increasing importance in the conflictual arena. However, I will limit my mathematic and econometric formulation to the industrial manufacturing sector. This will allow an internal consistency between theoretical application and operational methods. I would like to emphasize that this restrictive choice must be considered as only a first step towards a more coherent and complete model.

4. Last but not least, I will try to overcome restricting bargaining to wage claims alone. Together with the Bargaining Theory model as formulated along the lines of Ashenfelter and Johnson which implies a procyclic strike pattern (negatively correlated to the unemployment rate taken as a proxy of the economic cycle), this type of restriction strongly reduces the applicability and validity of the interpretation of this model. Owing to the unreliability of statistical information on strike causes, I would propose a theoretical subdivision of the fundamental motives for conflict. This, in my opinion, could be envisaged in two broad categories: wage claims and employment claims (understood above all in defensive terms, to safeguard the workers' position).

Within these two categories can be included all strikes for social security, housing, social reform, reduction of the working day, and job security, all of which can be viewed by the employer as an increase in labour's cost and an increase or impossible reduction of the work force. Even though this two-fold distinction is not an exhaustive one, for example, it ignores a large group of claims such as those on working conditions, it is a step towards increasing the explicative power of the model.

By using this subdivision, it is possible to overcome the impasse created by the trade-off between price and unemployment through strikes. Thus, it enables us to clear the field of such obstacles as contradictory relationships between the variables, ambiguous interpretations of the strike, and possible irrationalities in the logic of the claim mechanism of trade unions.

2.1.2 A Search for Trade Union Rationality

Keeping in mind this two-fold distinction, I would like to analyze the rationality of strikes on the assumption of a positive link between wage claims and the phases of the economic cycle.

In fact, the available literature has already proven a negative correlation between excess demand and strike increase (for wage increases), using as a proxy for excess demand the unemployment rate. Therefore, it would be irrational (and inconsistent with the above) to find claims for higher wages in periods of declining demand or increasing unemployment, as at the present moment.

I would therefore organize the rationale for strikes into sectors along the following guidelines:

1. in a sector in expansion with increasing demand (measured for instance by the number of positions offered and still available) and near full employment, strikes occur for wage claims (1).
2. in a sector in expansion or not in decline, strikes can occur to anticipate the risk of the worker being laid off, thereby increasing job security, but reducing job mobility.
3. in such a sector, even if the production is not increasing, the situation becomes similar to full employment (the employers cannot dismiss any workers) and strikes claiming wage increases are rational.

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(1) This type of analysis should be conducted at the firm level; however, the relative data is not available as well as the tool to manage the intercorrelations at that level. Therefore, the analysis will be conducted at the sectorial level, even though some firms are expanding while others in the same economic branch are in decline.

4. in addition, sympathetic strikes can occur in one sector for the unemployment of another segment of the labour force. Trade unions often consider themselves representative of the workers as a whole so they can protest in a strong sector in favor of another which does not have blackmail power, for instance the unemployed or the young in search of a first job.
5. in a declining sector strikes occur to protect jobs and to oppose the lay-off risk.

As can be seen, it is not my intention to subdivide strike data and the multiplicity of motives for striking and in such a way to speak only of wage strikes or employment strikes. It is my intention to widen the causes included in our approach in order to better understand strike rationale and strike patterns. (1) I will examine strike data as a whole in an attempt to clarify possibilities of conflict and the ties with economic variables, especially those whose origins lie in the present economic situation which developed after the oil price increase in 1973 and the perverse combination of inflation and depressed general demand.

2.1.3 Clarifying Ideas with the Holt Labour Market Scheme

The Holt Scheme can be helpful for understanding the various relationships within the labour market. Reducing these relationships to stock-flow helps to under-

(1) The real determination of the cause of a strike is through ad-hoc analysis for each strike using interviews with workers and examining strike documents.

line how the union creates new ties and changes them. This model analyzes labor market close to stochastic equilibrium in which the stock of vacancies and unemployed workers is nearly constant, re-establishing itself after short periods of imbalance because of the almost equal rates of gross inflows and outflows (see Fig. 1).

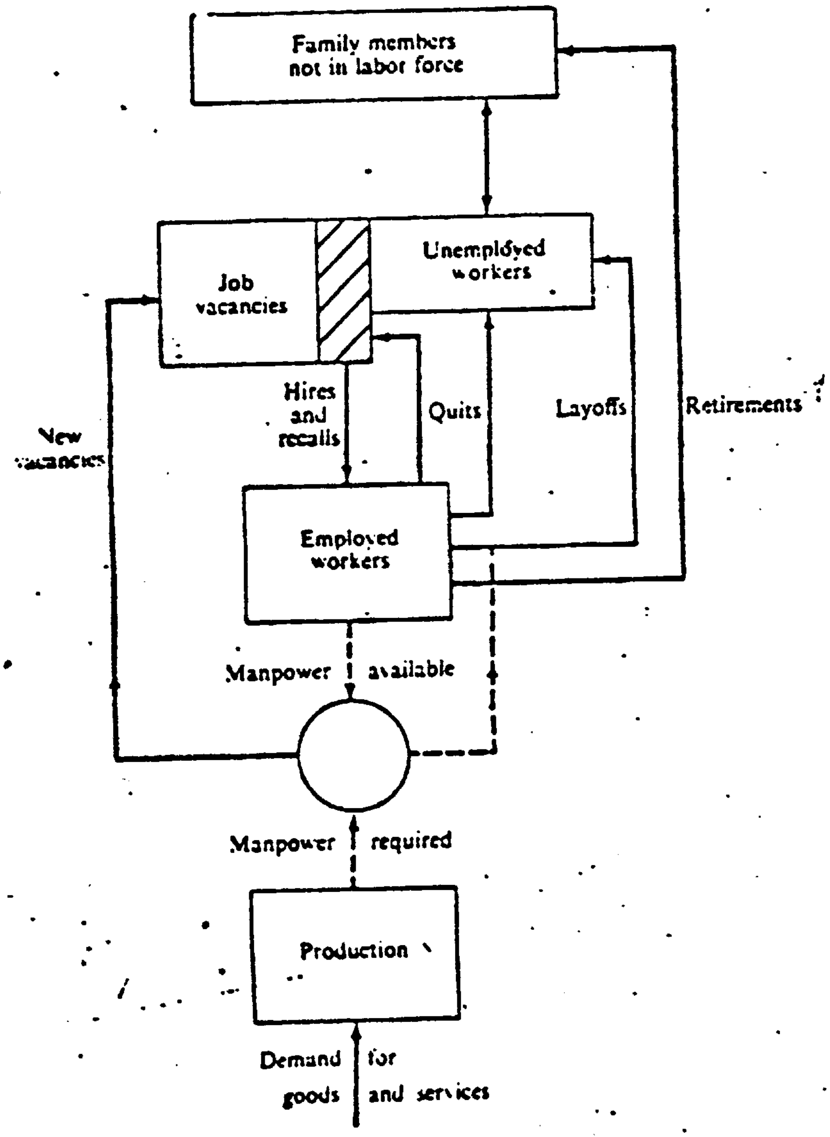

Figure 1. Labor-market schematic.

From the stock of employed workers comes the flux of retirees, layoffs, and quits. All of these, with the exception of the retirees who return to the family, go into the stock of unemployed workers. Furthermore, there is a flow of employed workers who go directly from one job to another. On the other hand, production creates new jobs which enlarge the stock of vacancies; and, this in relation to unemployed workers, produces recalls and hires. Family ties contribute to two flows, one into and the other out of the labour force.

For example, a sudden rise in production would generate a need for additional workers and, thereby raising the number of vacancies. With the increase in the stock of vacancies, there is an increase in the probability of worker-job matches resulting in new hires. This has a counter-effect on the increase in vacancies, reduces the stock of unemployed workers, and increases the average duration of vacancies while decreasing that of unemployment. Also some employed workers would tend to leave their jobs (more quits), thus creating vacancies and increasing unemployment. With the greater probability of worker-job matches, part of these increases will be re-absorbed while firms will reduce the layoffs (due to the greater number of quits). Other workers will be attracted to the labour market, constituting a new labour force and thereby re-establishing the equilibrium.

The total turnover flow, the sum of quit and layoff flows, is considered to be nearly constant. In fact, when the ratio of vacancies to unemployed rises, the number of quits increases. When the ratio decreases, the number of layoffs rises.

The author draws from this model several interesting

implications for wage changes which we cannot now consider.[1] Instead, the reduction of demand, which is not treated in the articles, and the introduction of trade union action will be developed in detail.

In a period of reduction of global demand, when employers find themselves with an excess of workers, the flux of layoffs and retirements (early retirements) increases while the search for better positions by already employed workers declines. At the same time, the number of vacancies declines, and the probability of worker-job matches. Some of the labour force will leave the market (women and the elderly).

Nevertheless, the possibility of re-establishing the preceding equilibrium which was abandoned, seems to be more difficult than in the before-mentioned case of expansion. Will the number of unemployed workers who, being discouraged, are willing to leave the labour market be enough to re-establish equilibrium?

For the moment, we will defer this question and, instead examine what effect the introduction of trade union activity could have on such a model.

According to Holt, in periods of expansion, the individual threat of quitting is mrre important than the collective one, striking. In fact, for the firm in periods of full employment the cost-risk of quits is

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[1] See also the interesting macroeconomic approach in which the author tries to derive a function for employment demand based on both salary and the index of job availability (V/U) and vacancies, in its turn a function of the two preceding variables. The infinitely possible combinations of these functions lead to a solution as an indeterminate equilibrium. (Holt, C., 1980).

greater than that of strikes. (1) In these periods, the employer is willing to concede wage increases for all workers, so the difference between union and non-union wages decreases. It is precisely for this reason that, in order to re-establish the margin between union and non-union wages (or where this problem of wage differences does not exist, as is often the case in Europe because of a greater contractual power of the trade union) the trade union increases the number of strikes. Yet, in periods of expansion, the stocks and flows of the Holt labour market scheme are not influenced by trade union intervention.

When global demand declines, when the stock of vacancies does not grow because of new flows, the stock of unemployed workers increases, and at the same time the probability of worker-job matches is reduced, the trade union, according to Holt, sees the collective threat gain power over the individual threat. So the trade union does not increase the number of strikes, because the wage differencial is re-established.

At this point, an ulterior motive for wage claims

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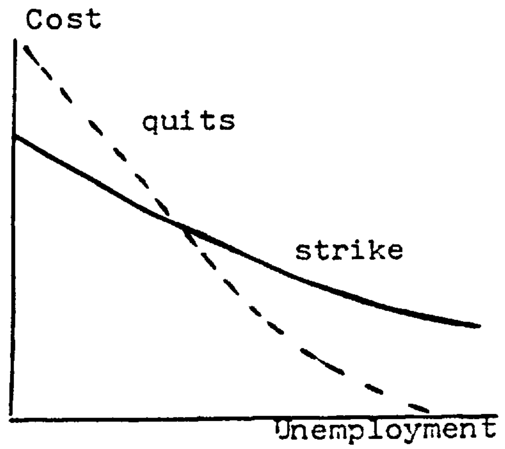
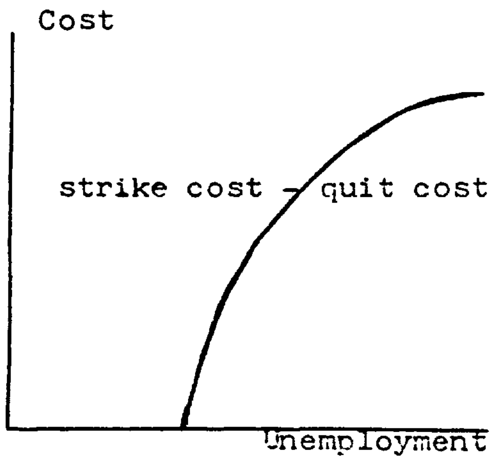
(1)



Costs of strikes and quits to company, union, and workers



Collective Bargaining advantage over Individual Bargaining

can be introduced to maintain employment.
Two different scenarios can be imagined.

Scenario A

Given a decline in global demand with its consequential reduction of vacancies and increase in unemployment, the trade union does not feel strong enough, is divided by individual interests, or perhaps is involved in direct management of the economy. It does not begin a series of strikes (usually well-attended and of long duration) to defend employment. In this way, the mobility of workers, the turnover rate, is left unaltered.

Scenario B

In this second situation (Fig. 2), the same economic conditions are given as in the first: decline in global demand, reduction of vacancies, and increase in unemployment (which could be made up primarily of the young in search of a first job). The trade union, however, has a more agressive behaviour and calls for strikes, usually long and well-attended, to prevent layoffs, in this way reducing the turnover rate. General unemployment being high, employed workers do not look for better job possibilities (less quits) and, at the same time, the trade union forces some firms to keep an overload of workers, labour hoarding.

According to the author, even if the voluntary reduction of the labour force would bring a marginal reduction in unemployment, equillibrium would not be reestablished because a key mechanism is blocked, that is, turnover.

The stock of unemployed is partly reduced because of those who go back to the family, mainly the young in search of a first job and marginal workers whose unique situation makes it difficult for them to leave the labour

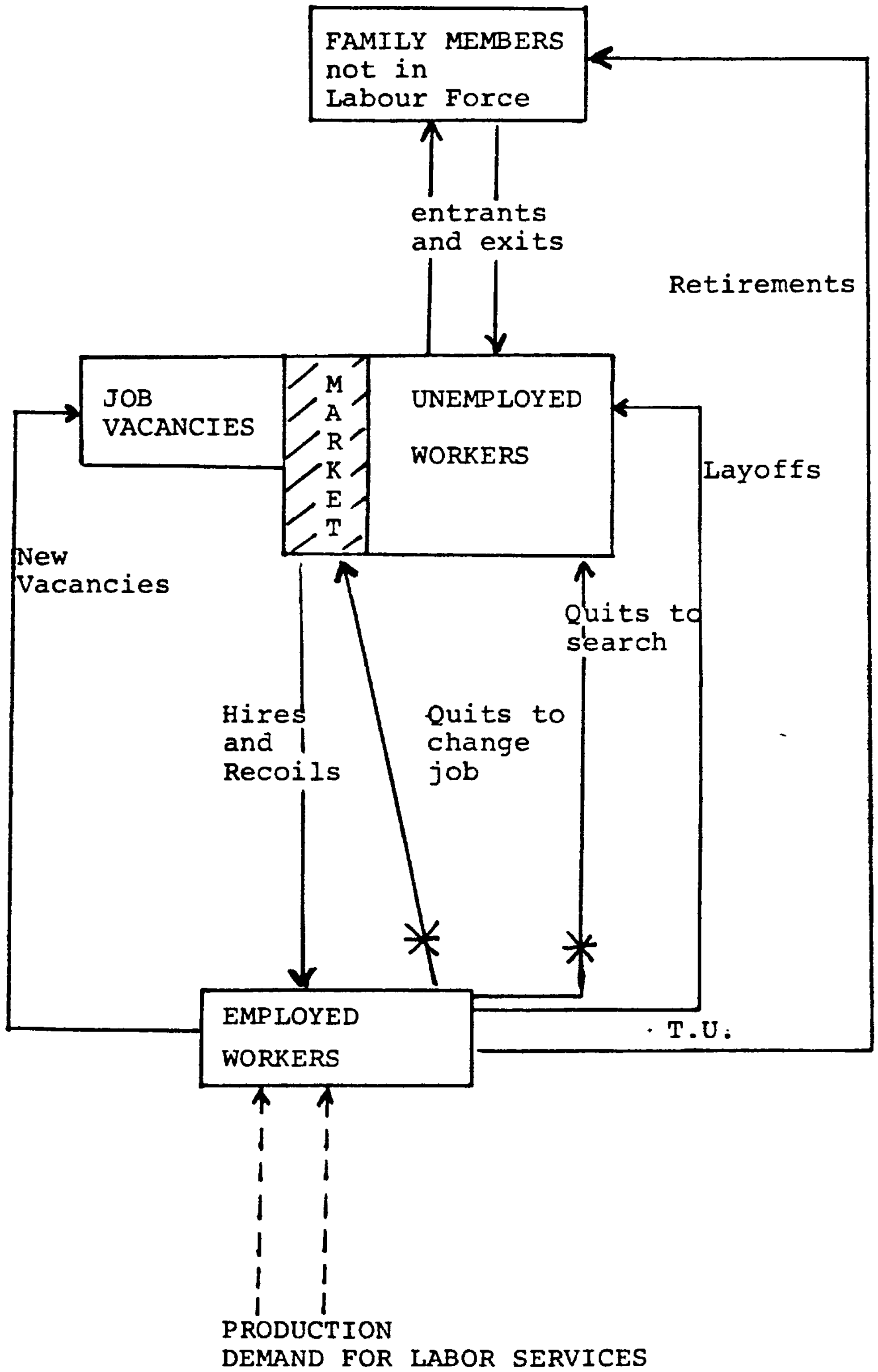


Figure 2, SCENARIO B

market but just as difficult to enter it. In fact, the number of vacancies remains low, as is the probability of being hired for one of the unemployed workers who is either unqualified or a layoff from a decling sector and, therefore, qualified but in an area not required by the labour market. The market, therefore, could settle with an excess of employed workers (labour hoarding) due to labour disputes and with an excess of unemployed without being able to re-establish the initial equillibrium until the trade union can utilize its power threat.

It is not the intention of this paper to continue with an analysis of the labour market, but with the various possible trade union actions.

The two scenarios that were presented above can correspond to two types of trade unions in different countries and with different systems of industrial relations, or to a single trade union that confronts different levels of unemployment. Scenario A represents one in which the trade union must confront an unemployment that does not directly affect its members, or more genarally speaking, of marginal workers.

In the second scenario , though, the "core groups" are threatened by unemployment; therefore, the trade union calls for a strike, not to maintain the salary differential, but simply to maintain its very reason to exist, that is, its very members. (1)

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(1) These strikes can often be demonstrative in order to obtain public intervention. In fact, when the number of layoffs rises, the capacity of the trade union to increase through strikes the cost of those layoffs for the company is minimal. On the one hand, this is because of the excessively high cost of workers that the firm is no longer willing to support, and, on the other, because of the limit of the workers' resistance (as Hicks sustains)

After this digression on the labour market and how the trade union could intervene, I would like to go back to the Bargaining Theory models with which strikes will be interpreted and try to integrate them according to new emerging concepts.

Before going into the development of the model, I will emphasize the limits of the approach used and within which the analysis will be developed.

2.2 Within the Limits of the Ashenfelter and Johnson Model

The limits, or rather the fundamental characteristic, of the Ashenfelter and Johnson model consist in the unilateral distribution of information possessed by Management. (1) It is not the intention here to resolve this limit directly. In fact, the model explains a strike as a result of the rational choice of Management (which wants to maximize profits) to accept the raise in wages demanded by the workers, Wa, or to withstand the cost of a strike in order to reduce that demand according to the workers' line of concessions of which Management is fully aware. (2) This limitation is even more important if one

Fn continued
which forces them into not being able to prolong the strike.

(1) As Kennan (1979) widely emphasizes.

(2) This unilateral manipulation or monopoly of information was already present in Hicks' work. It is not further developed here, but used to explain the strike phenomenon; a strike occurs because an employer is interested in reducing the workers' expectations. The only way for this to be done is through a strike.

considers the frequent strikes--proof of power--that precede the ending of a contract, and thus precede any possible managerial decision.

If a constant willingness on both parts to negotiate is imagined, that is, both parties are always seated at the negotiating table, every strike can probably be seen as part of the negotiations potentially begun. The initiative of the trade union may be compared to an intentionally high wage demand which is unacceptable to Management. Therefore, a strike would only be the answer to an inevitable refusal by Management to concede the salary increase demanded by the workers. In other words, if Wo is the line of concessions of Management and Wd the line of concessions of labour, then a strike occurring before the start of negotiations tends to reduce the area of encounter, increasing the cost of the conflict for the employer and giving proof of his own power. The employer finds himself in the usual position, to concede increase Wd or to run the risk of a strike of duration n - 1 (see Figure 3).

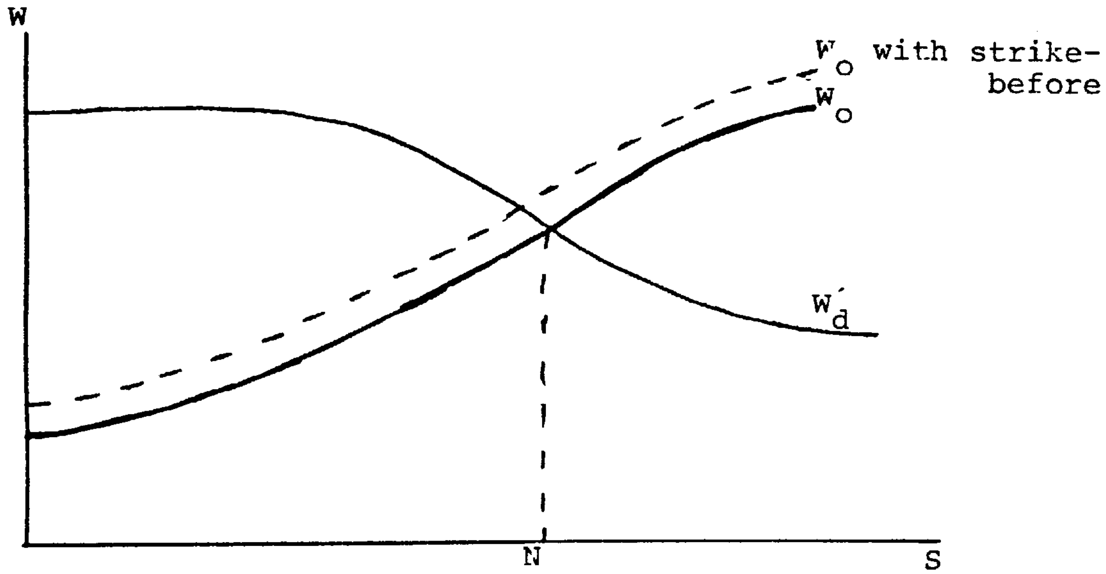

Figure 3

The occurrence of these strikes, before the very start of negotiations, also should increase the workers' cost and lower the curve of workers' concessions recreating the old power relationship. Nonetheless, it is reasonable to assume that they are more likely to happen if the curve of workers' concessions is flat at the beginning, that is, when workers are very determined and less sensitive to an immediate curtailment of their income.

Expressed in graphic form (H. Farber, 1968), the Ashenfelter and Johnson model would mean that, given the curve of the workers' concessions, the employer will maximize his profit by choosing a strike duration and conceding a wage increase compatible with the highest possible profit level (see Figure 4).

The duration of the strike is on the abscissa, while the wage claims are on the ordinate. The isoprofit curves, decrease in value the further they are from the origin. The workers' concession curve reduces the wage claims, Wa, exponentially in relation to the duration of the strike.

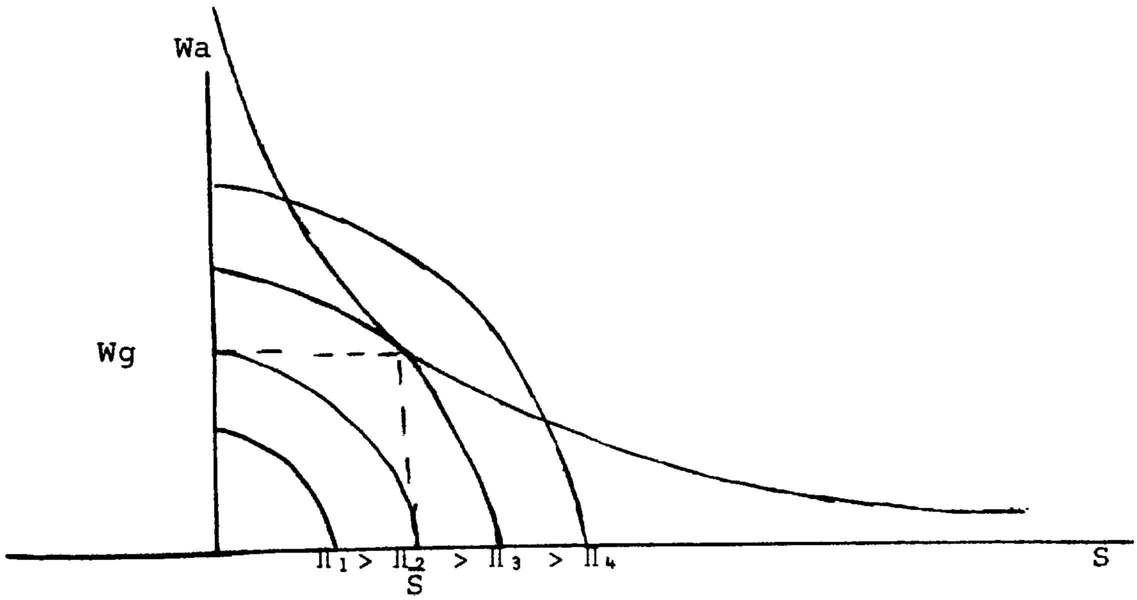

Figure 4

The meeting point between the workers' concession curve and the graphically lowest isoprofit curve will determine the largest obtainable profit for the employer and the optimal strike duration. Nonetheless, this does not represent the best solution because the employer could concede the same salary increase without a strike, settling for a profit curve which is lower graphically but of a higher value (for example see Fig. 4: Π_2 without strike, Π_3 with $\bar{S}$).

In this approach, the presence or absence of a strike during negotiations would be determined by the slope of the workers' concession curve and the profit curve.

In keeping with the Ashenfelter and Johnson formula for the two functions, we have:

- the workers' concession curve expressed as

$$Wa = W_* + (Wo - W_*)\, e^{-rS}$$

where the increase in respect to the preceding wage will vary from a minimum claim, W_*, for which labour is willing to strike even indefinitely, to one that is compatible to an agreement without strikes, Wo. The wage claim decreases with the duration of the strike according to an exponential form of concession rate (e^{-rS}).

The derivative of S, $\frac{dWa}{dS} = -r\, e^{-rS}(Wo - W_*)$ at $S = 0$

will be $\left.\frac{dW}{dS}\right|_{S=0} = +r\,(W_* - Wo)$

- the profit function Π of the employer will be

$$\Pi = PQ - W\,L - H$$

the expected future value discounted with the duration of the strike will be

$$V = \int_S^{\infty} PQ - WL\, e^{-rt} dt - \int_0^{\infty} H\, e^{-rt} dt$$

The derivative of the isoprofit curve

$$-\frac{\partial V/\partial S}{\partial V/\partial W} = -\left[PQ - WL\right]\tau/L$$

that no longer depends on the strike in point $W = W_o$ is

$$-\frac{\partial V/\partial S}{\partial V/\partial W}\Bigg|_{W=W_o} = \left[W_oL - PQ\right]\tau/L$$

Analysing these two derivatives, it can be noted that the slope of the workers' concession curve will always be negative since W_o is defined as always larger than W_* which itself could be negative, and that the slope of the isoprofit curve at S = 0 is uncertain depending on the workers' wage claims in respect to the employer's profits and so, can be positive or negative, or larger or smaller in absolute value than the rate of workers' concessions. There are four possible situations.

Situation I

$$(W_oL - PQ)\,\tau/L = r(W_* - W_o)$$

In this case both the derivatives are negative and the functions decrease at the same rate. We, therefore, do not have a strike because it would be more advantageous for the employer to stop at S = 0.

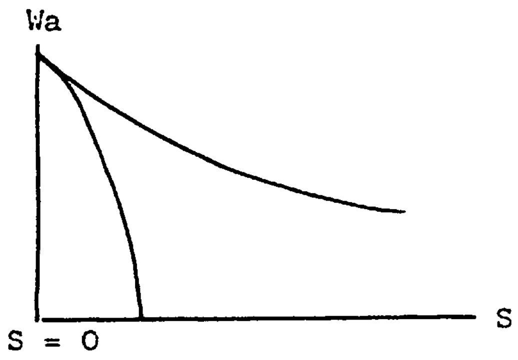

Figure 5

Situation II

$$(W_oL - PQ)\,\tau/L < r(W_* - W_o)$$

In this case the negative slope of the employer's profit will be greater than that of the workers, and therefore, it would be more advantageous for the employer to stop at S = 0 and give the requested increase to the workers.

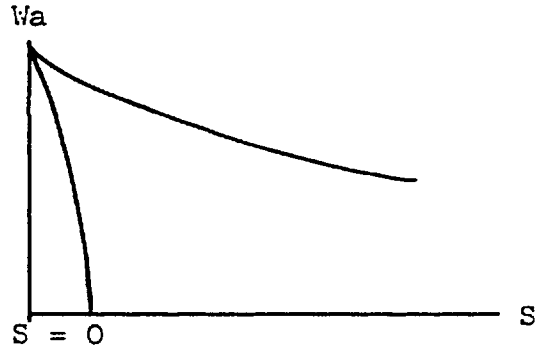

Figure 6

Situation III A

$(W_o L - PQ)^{\tau} / L > r(W_* - W_o)$

In this case, the slope of both functions is negative but less for the profit function which therefore will decrease more slowly than the workers' claims. Thus, it will be better for the employer to wait out the duration of the strike which will more quickly reduce the profit expectations of the workers.

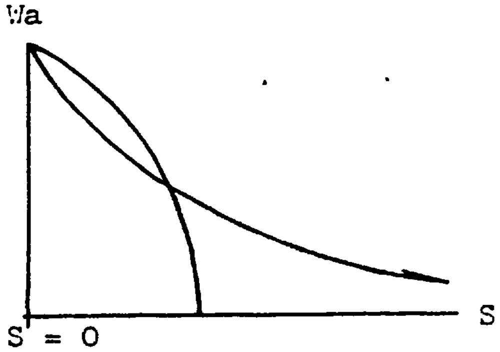

Figure 7

Situation IV

$(W_o L - PQ)^{\tau} / L > r(W_* - W_o)$

Here, there is a profit function with positive derivative and thereby a greater rate of reduction of the workers' expectations. In this case, it is very advantageous for the employer to allow a strike to occur as this will decrease the workers' expec-

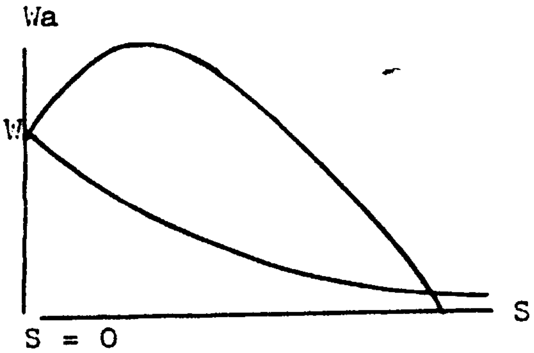

Figure 8

tations much more quickly than it will his profits.

This paper will examine only the profit functions that are subject to the limits of the workers' concession line and that at $S = 0$ have first derivatives greater than of equal to zero. There are only cases in which a strike contributes to attaining a more favorable agreement (not optimal in a Pareto sense), in other words, those cases in which the employer at the beginning of bargaining considers a strike of a certain length to be more advantageous, according to his view of maximizing profit. (1)

2.3 Adding the Trade Union Demand for Employment to the Ashenfelter and Johnson Model

Utilizing the formulation of the negotiating process as found in the Ashenfelter and Johnson model, a wider interpretation of strikes will be sought, which includes workers' employment claims as well as wage claims within the theme of bargaining itself.

This will be accomplished in stages by first seeing how the Ashenfelter and Johnson model can be reformulated within the area of employment demands and then within the entire area of labour claims (that is, employment demands and wage claims combined in a single line of Trade Union concessions) and finally in a more complete and true-to-life situation of two distinct claims, wage and employment, that have two different rates of resistance and concession.

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(1) This restriction, very rational from an economic point of view, will prove to be extremely useful in mathematical formulations, allowing a simplification of results.

2.3.1 First Stage: Only Employment is Negotiated

The first step to inserting employment in the Ashenfelter and Johnson model is to consider only negotiations for employment demands, with wages at a fixed rate and at the same time allowing the firm to vary its desired level of employment and the trade union to push for additional employment demands. We find the workers' line of resistence refers to employment demands.

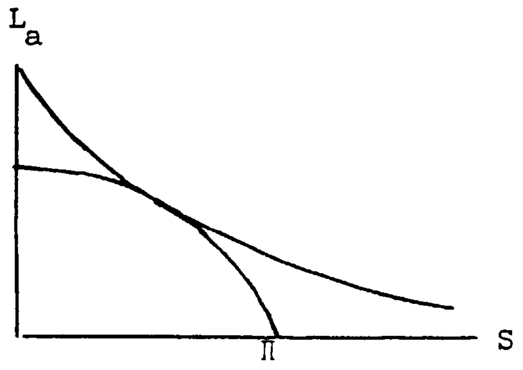


Figure 9

Examining a firm that produces a single product, as in the case considered by Ashenfelter and Johnson, and supposing that because of technological developments or because of a crisis in demand, one finds that management wants to decrease its production. (1)

The profit function would be

$\Pi = QP - \lambda W - H$

where P represents the price of goods produce, Q the quantity of the product, W the workers' salary, λ the quantity of work necessary to produce Q goods, and H the fixed costs of production.

Let $\overline{W}$ be the fixed salary for the previous contract, λ be the quantity of labour employed which is made up of: the quantity of labour requested by the firm L(Q) and the employment increase demanded by the union La(S), function

(1) The case in which a firm wants to increase its production is not taken into consideration given that it does not cause trade union claims.

of the length of the strike. When La is defined as

$La = \frac{Lt.u.(S)}{L(Q)}$ the profit becomes:

$$\Pi = PQ - \bar{W}\ L(Q)\ (1 + La) - H$$

Negotiations being limited to employment demands, the wage bill can diminish during a strike in relation to the workers' resistance rate, but only as regards the trade union demand for employment (the shaded area in Fig. 10).

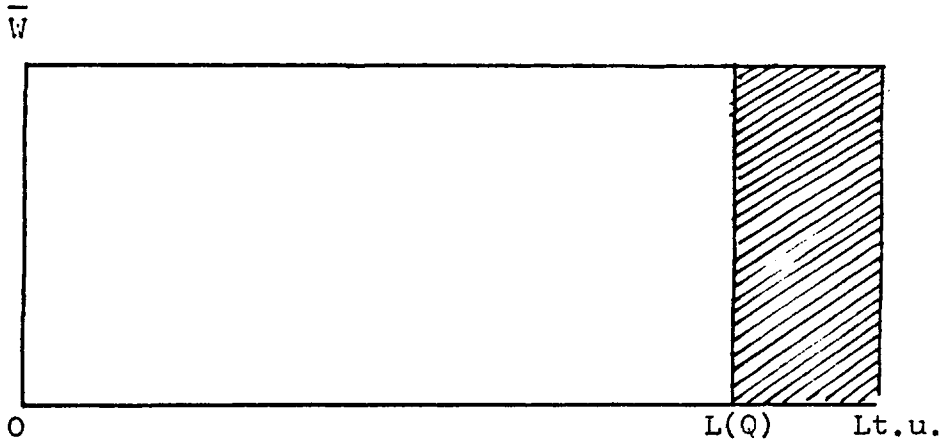


Figure 10

The trade union employment demand Lt.u. will consist of two parts.

$$Lt.u.(S) = (\hat{L} - L(Q) + \psi\ (U - Umax))\ (S) \quad (1)$$

---

(1) I have preferred to formulate the employment demand in this way, differing from the preceding formulation of wage demands which instead refer to the previous contract wage and a proportional increase that is acceptable to the workers. The motive is an attempt to simplify the model. Considering $\hat{L}$ as the number of employees of the previous contract would have led to a considerable complication in formulating the trade union demand if it had already included work hoarding as imposed by the trade union. In fact, if current unemployment U is larger than that of the preceding period $\hat{U}$ and both are greater than UMAX, then the trade union will intervene more forcefully.

$U > \hat{U} > UMAX \implies$ trade union intervention

If on the other hand $U, \hat{U} > UMAX$, but $U < \hat{U} > UMAX \implies$ the trade union will try to maintain the labour hoarding

The first part is entirely defensive in which an attempt is made to maintain the employment level of the previous contract, $\hat{L}$, whenever the firm would like to reduce it for technological or market purposes.

$\hat{L} - L(Q)$ exists only for $L(Q) < \hat{L}$

The second part is an explicit employment demand which reflects, above all, the probability of unemployment and, therefore, is an indicator of the strength and commitment of the the union to fight for jobs.

$\psi\ (U - Umax)$

This second component is a function of the increase in unemployment U greater than the maximum acceptable rate, UMAX (see Figg. 11-12). In other words, unemployment can consist of a conjunct part for which the trade union takes no responsability because it consists mainly of unemployed marginal workers, and of a structural part that mobilizes the union.

The trade union directly intervenes and imposes its employment demands when it sees its very work place or its members threatened with layoffs. This is when unemployment begins to attack the core groups which occurs when the unemployment rate is above the acceptable maximum (for example, the maximum unemployment rate of the previous three years).

We therefore have a function ψ which is not defined when the unemployment level is less than or equal to our maximum acceptable level when only marginal

Fn continued

$\hat{L}$ of the preceding period or will even be willing to reduce its pressure on management.

If even the current unemployment U was $<$ UMAX $< \hat{U}$, the trade union would be willing to give up the imposed level of employment. In the formulation used here, though, each year is independent of the preceding one.

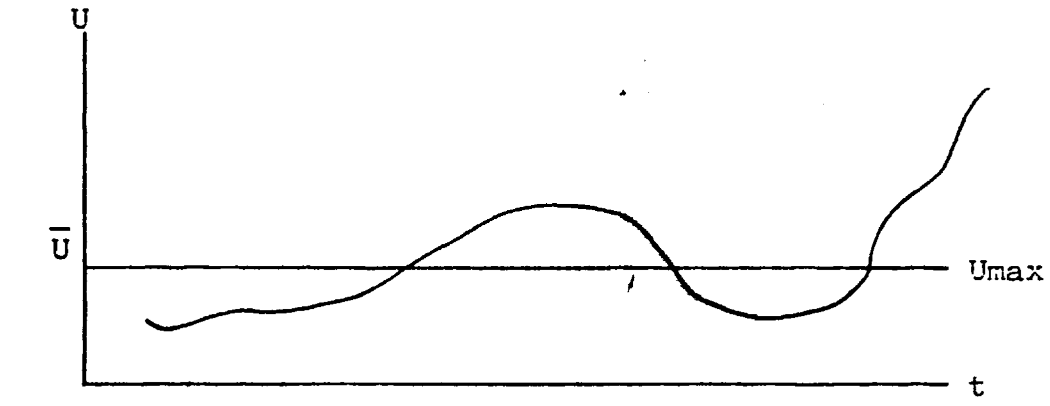


Figure 11

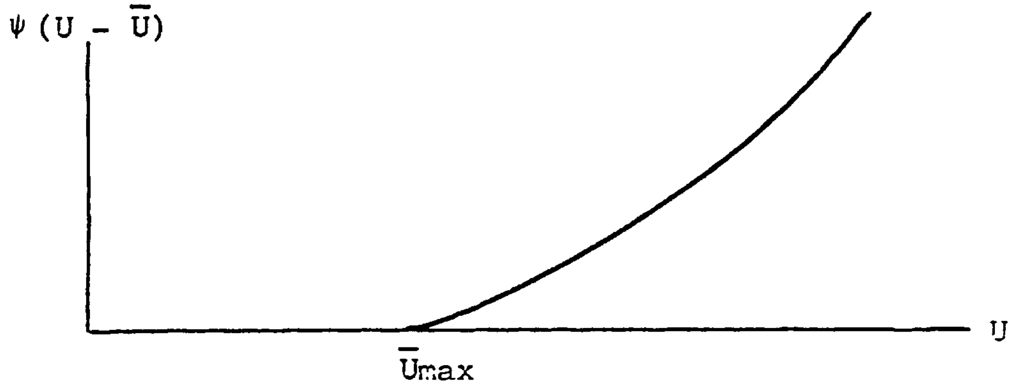


Figure 12

$$\begin{cases} U \leqslant \bar{U}max & \psi = 0 \qquad\qquad \text{(u decreases strikes)} \\ U > \bar{U}max & \psi = a(U - \bar{U}) \qquad a > 0 \quad \text{(increases strikes)} \end{cases}$$

if $u \leqslant \bar{U}max$ $\qquad \lambda = L(Q)$

workers are unemployed, which is an increasing function when the actual or threatened unemployment level is above the acceptable one.(1)

In the first case, until the trade union takes charge of the unemployment risk, the unemployment level could have the effect of reducing the number of strikes as in the classic model. Strikes would be interpreted only as wage claims (less unemployment, more demands for wage increase).

In the second case, the trade union could be lead to fight for the employment demand of its members right in the conflictual arena given that $a > 0$. Logically, such a behaviour on the part of the trade union presupposes its strength and maturity. In fact, it is unthinkable that the first workers' movements and leagues that fought for the survival of its members were so strong as to be able to defend jobs. I believe, however, that in the period under consideration, the last thirty years, it is reasonable to hypothesize that maturity and power have been attained by the trade union so as to enable it to defend a wide range of workers' rights.

The labour hoarding that the trade union seeks to impose on management is reduced in the strike duration by the cost increase that the workers are forced to accept in abstaining from work, and by the increase of information on the willingness of the other partner to give in to demands.

Therefore the employment demand is for:

---

(1) The trade union, in fact, intervenes above all when there is the threat of layoffs, not so much when layoffs have already been made.

$$\begin{cases} U < Umax & = 0 \qquad \text{and} \\ \hat{L} < L(Q) & = 0, \end{cases}$$

will include only one of the two parts if one of the two components is absent, or if $U > Umax$ and $\hat{L} > L(Q)$ results in $(\hat{L} - L(Q) + \psi(U - Umax))(S)$.

Therefore the profit is:

$$\Pi = QP - \bar{W} L(Q) \left(1 + \frac{(\hat{L} - L(Q) + \psi\ (U - Umax))(S)}{L(Q)}\right) - H$$

An explicit solution can be found by determining the form of the workers' resistance curve which may be assumed in a first approach to be a negative exponential, e^{-kS}, as was done for wage claims, and by maximizing the profit function.

$$V = \int_S^{\infty} (PQ-\bar{W}LQ(1+\frac{\hat{L}-LQ+\psi\ (U-\bar{U})\ e^{-kS}}{LQ}))e^{-\tau t}dt - \int_0^{\infty} He^{-\tau t}dt$$

$$V = (PQ - \bar{W}LQ(1 + \frac{\hat{L}-LQ+\psi\ (U-\bar{U})}{LQ}e^{-kS}))\frac{e^{-\tau S}}{\tau} - H\frac{e^{-\tau t}}{\tau}$$

$$\frac{dV}{dS} = -e^{-\tau t}(PQ-\bar{W}LQ(1+\frac{\hat{L}-LQ\ +\psi\ (U-\bar{U})}{LQ}\ e^{-kS}) + \frac{e^{-\tau S}}{\tau}\ ke^{-kS}\ .$$

$$.\ \bar{W}\hat{L} - LQ + \psi\ (U-\bar{U})$$

$$\frac{dV}{dS} <=> 0 \qquad PQ-\bar{W}LQ = e^{-kS}\ \bar{W}(\hat{L}-LQ + \psi\ (U-\bar{U}))\ (1 + \frac{k}{\tau})$$

$$\frac{d^2V}{dS^2} = -\tau\, e^{-\tau S}\left[-QP+\bar{W}LQ + \bar{W}(\hat{L}-LQ + \psi\,(U-\bar{U}))\right](1+\frac{k}{\tau})\ e^{-kS} -$$

$$- e^{-\tau S}\ ke^{-kS}\ \bar{W}(\hat{L} - LQ + \psi\,(U - \bar{U}))\ (1 + \frac{k}{\tau})$$

in the point in which $\frac{dV}{dS} = 0$ $\quad \frac{d^2V}{dS^2} < 0$ and therefore is a maximum point.

Solving for optimal S, we have

$$S_{opt} = -1/k \cdot \ln \frac{QP - \overline{W}LQ}{\overline{W}(L-LQ + \psi(U-\overline{U}))(1 + K/\tau)}$$

where

I. $S_{opt} = 0$

only if $QP - \overline{W}LQ = \overline{W}(\hat{L}-LQ + \psi(U-\overline{U}))(1 + k/\tau)$

Thus, if the Manager's profit is equal to the firm's cost increase as imposed by the trade union multiplied by the relation of the respective discount rates.

II. $S_{opt} > 0$

that is, if $\dfrac{QP - \overline{W}LQ}{\overline{W}(\hat{L}-LQ + \psi(U-\overline{U}))(1 + k/\tau)} > 0$

k and τ being positive, the demominator consisting entirely of positive elements will also be positive; the numerator, the employer's desired profit, will also be positive ($PQ > \overline{W}LQ$) therefore the fraction is greater than zero.

and if $\dfrac{PQ - \overline{W}LQ}{\overline{W}(L- LQ + \psi(U-\overline{U}))(1 + k/\tau)} < 1$

which is the function of the variables under consideration:

-- and that is, if $PQ - \overline{W}LQ$ (management's desired profit) increases, S_{opt} decreases,

-- while if $\overline{W}(\hat{L} - LQ + \psi(U - \overline{U}))$ (additional employment demanded by the trade union) increases, S_{opt} increases as a result of a greater profit margin from which the employer can draw when conceding employment increases, and as a result of greater trade union requests which require more time to diminish.

As far as management's discount rate, τ, is concerned, the larger it is, that is the more the employer neglects the future in advantage of the present, the more he will push to rapidly conclude negotiations and therefore make

S_{opt} decrease.

On the other hand, k, the discount rate of the workers' expectations, influences S_{opt} in two ways, that is directly and indirectly within the denominator of the fraction.

Rewriting the explicit form of the optimal strike in order to simplify the analysis:

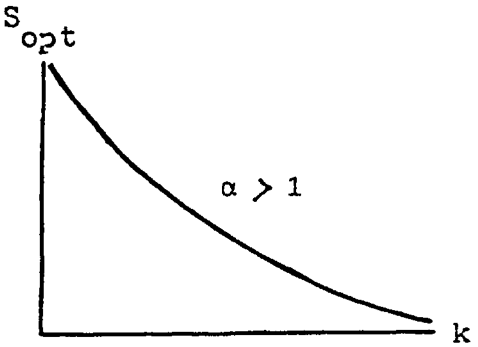
$$S_{opt} = \frac{1}{k} \ln \frac{\bar{W}(L - LQ + \psi\ (U - \bar{U}))(1 + k/\tau)}{PQ - \bar{W}LQ}$$

and calling $\beta = 1/\tau$ $\qquad \alpha = \dfrac{\bar{W}(L - LQ + \psi\ (U - \bar{U}))}{PQ - \bar{W}LQ}$

we can rewrite $S_{opt} = 1/k \ln \alpha(1 + \beta k)$ from which is derived three possibilities.

1. $\alpha > 1$

if $\alpha > 1$, that is, if the trade union's claims are greater than the firm's desired profits, S_{opt} will be a decreasing function of k. The faster the workers decrease their expectations, the shorter will be the optimal strike duration needed to reach an agreement. Viceversa, if the workers' claims exceed the profit wanted by the firm and the rate at which they diminish their expectations is very small, the optimal strike duration will tend toward infinity.



$$\lim_{k \to +\infty} S_{opt} = 0$$

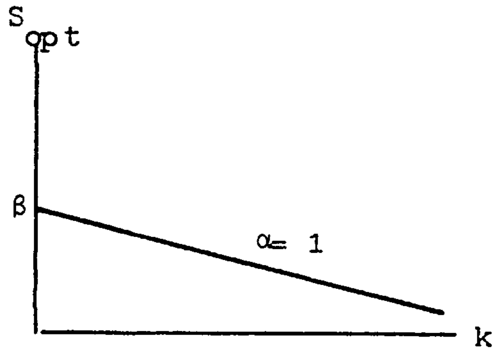
$$\lim_{k \to 0} S_{opt} = +\infty$$

Figure 13

2. $\alpha = 1$

if $\alpha = 1$, the workers' claims equal the employer's desired profits, then the possibility of reaching an agreement will be a function of the rate at which

workers' expectations diminish and its reduction will converge towards the inverse of the discount rate of management.



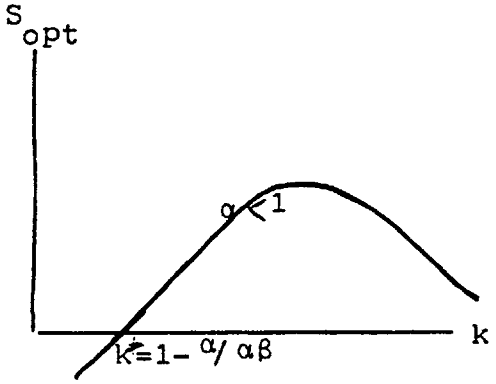
$$\lim_{k \to +\infty} S_{opt} = 0$$

$$\lim_{k \to 0} S_{opt} = \beta = \frac{1}{\tau}$$

Figure 14

3. $\alpha < 1$

If $\alpha < 1$, in the case that the trade union is rather reasonable in that it begins negotiations asking for less than the firm's desired profits, there is an alternating effect on the discount rate of workers' expectations. Above all, the duration of the strike is positive only for values of K above critical level K^* $K^* = \frac{1-\alpha}{\alpha\beta}$. For values of K less than K^*, it would be best for management to immediately grant the requested increases, which in this case is still lower than the profit, instead of waiting for an all-too-slow reduction of claims. Furthermore, even though the rate of reduction of the workers' expectations increases,



$$\lim_{k \to +\infty} S_{opt} = 0$$

$$\lim_{k \to 0} S_{opt} < 0$$

Figure 15

in a segment immediately following K*, the optimal duration of a strike will increase until it reaches maximum point $\bar{K}(\alpha,\beta)$ at which it will begin to decrease.

The examination of this component will help explain analytically how a rapid reduction in workers' expectations does not necessarily shorten the strike; on the contrary, in the case of a reasonable union $(\alpha < 1)$ it could lengthen it in certain segments.

The optimal length of a strike nevertheless remains dominated by the opposite forces of a firm's desired profits, trade union demands, and the tendencies of both to reduce their ambitions.

This approach will not be discussed in depth because it presupposes the possibility of distinguishing between wage claims and employment claims and of applying the model to the case of pure employment claims. This does not actually occur, however. Employment claims are often brought forth together with wage claims, and, as strike data divided by cause is not well-founded, it is more reliable to analyze strikes in global terms.

2.3.2 Second Stage: Negotiating the Wage Bill as a Whole

The second stage in arriving at a more complete formulation consists in taking into consideration the wage bill made up of wage and employment claims that workers and the union discount at the same global rate. Thus, there is only one line of concession which includes various combinations of increases in salary and employment.

Also, in this case, the firm will have a profit function to maximize subject to the constraints of the concession line of workers' demands in terms of wage increases, Wa, as well as in terms of an increase or maintenance of employ-

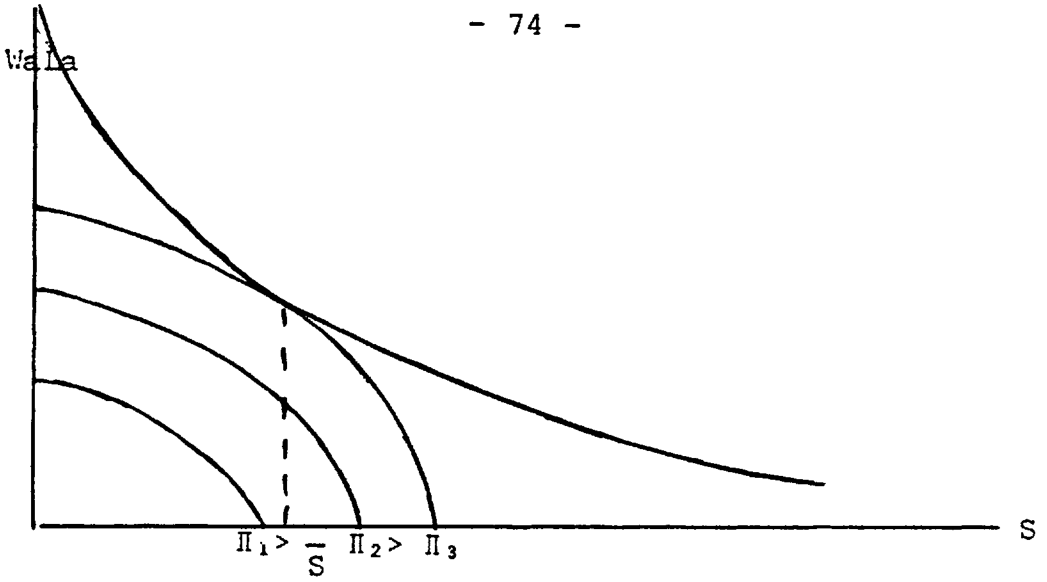


Figure 16

ment, La.

$Wa(S) \equiv \Delta W/\bar{W}$ is defined as the salary increase acceptable to the workers, also called wage demand, where $\bar{W}$ is the wage relative to the previous contract and is a function of the duration of the strike. La being the increase requested by the union, $La(S) \equiv Lt.u./L(Q)$ which is also a function of the strike's duration.

The firm's profit will then be $\Pi = QP - W\lambda - H$ and in this case we have:

$$\Pi = QP - \bar{W}L(Q) - \bar{W}L(Q)(La + Wa + LaWa)(S) - H$$

Substituting for Wa and La and defining the form of the workers' resistance curve, a clear solution is obtained. It is important to note that as the negotiations regard both employment and wages, combinations of these two will be included in the area of the wage bill which undergoes negotiation and is therefore capable of shrinking during the strike (see the shaded area of Fig. 17).

This formulation, even though quite different from the preceding description of the claims process as including two completely separate claims, may be considered a good approximation. In fact, in some countries this actually

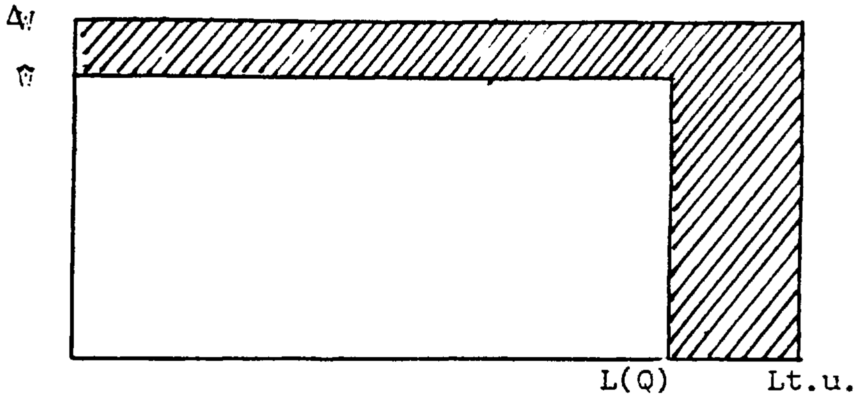


Figure 17

occurs; the union maximizes a wage bill and so, during a strike, discount the combinations of the two claims.

It is my opinion that the union's discount rate not only varies from country to country or union to union, but also, and above all, as regards the type of claim. Keeping environmental data constant (country, union, economic ties) the rate at which the union reduces its wage expectations will, without a doubt, be different from that at which it reduces its employment ones.

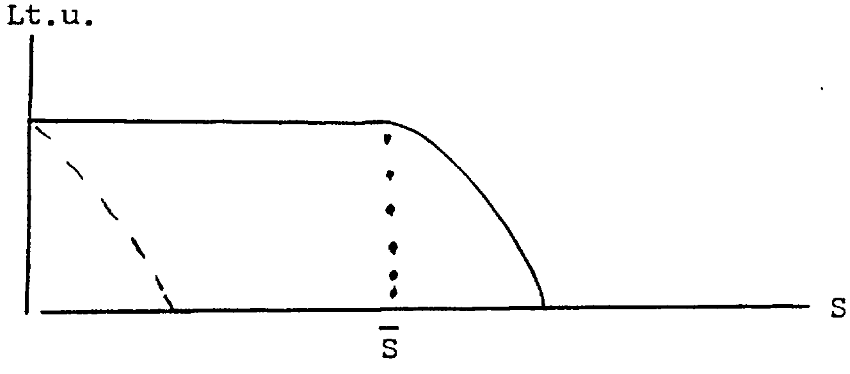


Figure 18

For example, it could be imagined that in the case of a large company in a period of economic depression, the union, because of the greater risk of unemployment, is very rigid about its employment claims, increasing the cost of layoffs, in order to induce management to

to settle and to induce government to intervene with aide to the company or with a system of aide for the workers. These claims are quickly reduced when the two possibilities are exhausted.

In the case of a small company, however, the workers' resistance is, without doubt, less rigid. They do not have the strength to resist a strike and would immediately reduce their claims.

Notwithstanding the fact that some disputes have developed in the way just described, there is very little information on the reduction of workers' expectations as regards both wages and employment. Thus, a global reduction has been presumed, at least in this first phase, along with a single discount rate which for simplicity's sake has been assumed to be a negative exponential, e^{-yS}.

$$\Pi = QP - \tilde{W}LQ\,(La + Wa + WaLa)\,e^{-yS} - H$$

$$V = \frac{e^{-\tau S}}{\tau}\left(PQ - \tilde{W}LQ - \tilde{W}LQ(Wa + La + WaLa)e^{-yS}\right) - H\,\frac{e^{-\tau t}}{\tau}$$

$$\frac{dV}{dS} = -e^{-\tau S}\left(PQ - \tilde{W}LQ - \tilde{W}LQ(Wa + La + WaLa)e^{-yS}\right) + \frac{e^{-\tau S}}{\tau}\cdot$$
$$\cdot y\, e^{-YS}\tilde{W}LQ(Wa + La + WaLa)$$

$$= e^{-\tau S}\left(-PQ+\tilde{W}LQ+\tilde{W}LQ(Wa+La-WaLa)e^{-yS}+\frac{y}{\tau}\tilde{W}LQ(Wa+La+WaLa)e^{-yS}\right)$$

$$= e^{-\tau S}\left(-PQ + \tilde{W}LQ + \tilde{W}LQ(Wa + La + WaLa)e^{-yS}(1 + y/\tau)\right)$$

$$\frac{dV}{dS} \lesseqgtr 0 \qquad PQ - \tilde{W}LQ = \tilde{W}LQ(Wa + La + WaLa)e^{-YS}(1 + y/\tau))$$

$$\frac{d^2V}{dS^2} = -\tau e^{-\tau S}(-PQ + \hat{W}LQ + \hat{W}LQ(Wa + La + WaLa)e^{-YS}(1 + y/\tau) -$$
$$- ye^{-yS}(Wa + La + WaLa)\hat{W}LQ(1 + Y/\ )e^{-\tau S}$$

where $\frac{dV}{dS} = 0 \qquad \frac{d^2V}{dS^2} < 0$

The explicit form is obtained for S_{opt} .

$$e^{-yS} = \frac{PQ - \hat{W}LQ}{\hat{W}LQ(La + Wa + WaLa)(1 + y/\tau)}$$

$$Sopt = -1/y \cdot \ln \frac{PQ - \hat{W}LQ}{\hat{W}LQ(Wa + La + Wa + La)(1 + y/\tau)} \qquad (1)$$

$$Sopt = -1/y \cdot \ln \frac{QP - \hat{W}LQ}{(1+\frac{y}{\tau})\hat{W}LQ\left[\frac{(\hat{L}-LQ+\psi(U-\bar{U})}{LQ}+\frac{\Delta W}{\hat{W}}+\frac{\hat{L}-LQ+\psi(U-\bar{U})}{LQ}\cdot\frac{\Delta W}{\hat{W}}\right]}$$

---

(1) In formulating employment claims, a simplification has been reached by not using the classic demand for wage increase, $W^* + (W_0 - W^*)$, which assumes a minimal limit of salary increase, which could also be negative, beyond which workers would be willing to strike indefinitely. Introducing the version with W_*, the minimum increase acceptable to the workers, would have imposed a complication of the model which at this point does not seem significant. It would have been necessary, in fact, to hypothesize on the relationship between the variables W^*, minimum increase, and $\hat{W}$, the wage relative to the preceding contract. Whenever W^* is negative, the salary for which one would strike would be lower than that of the previous contract. In Figure 19, the negotiating area would no be limited only to the shaded area, but could also occupy the area below.

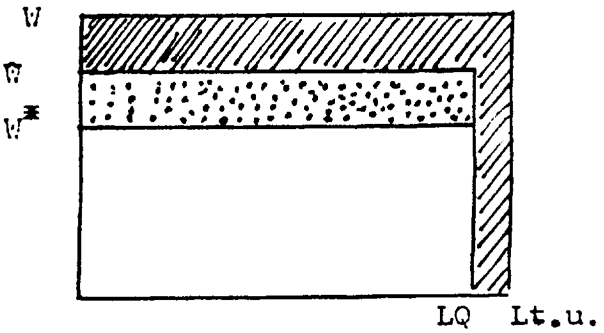


Figure 19

where

I. Sopt = 0

only if $QP - \bar{W}LQ = \bar{W}LQ(Wa + La + WaLa)(1 + y/\tau)$

that is, if the manager's desired profit is equal to the increase in the wage bill proposed by the union multiplied by the respective discount rates.

II. Sopt > 0 $\quad 0 < QP-WLQ \ / \ WLQ(Wa+La+WaLa)(1+y/\tau) < 1$

where, as in the preceding case, the relation will be greater than zero and will vary

- inversely to the employer's profit and discount rate
- directly to the demanded increase in the wage bill and

with an alternating line with respect to the reduction rate of the workers' expectations as regards the entire wage bill, y.

2.3.3 Third Stage: Negotiating Wage and Employment with Two Distinct Demands from the Trade Union

In this third stage, an attempt will be made to introduce in the Ashenfelter and Johnson model two seperate demands for wage increase and employment. The negotiations will revolve around two types of claims that will be reduced during the strike at two distinct rates. The employer will maximize his profit by choosing an optimal strike duration and the most favorable increases within the limits of the concession curve.

This approach brings us closer to the aforementioned negotiating porcess, even though it be with some degree of approximation, and also to the two distinct patterns of claims. (1)

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(1) In this regard, see the latest sociological writings, for example the doctoral thesis of Sabine Erges-Sebin, Paris.

Graphically, the shaded area is subject to negotiation and will diminish according to the concession and resistance rates of the workers. (1) The case of a one-directional reduction can be verified when the trade unions favor employment, for example, and are willing to reduce all the demanded wage increases before beginning to reduce employment claims.

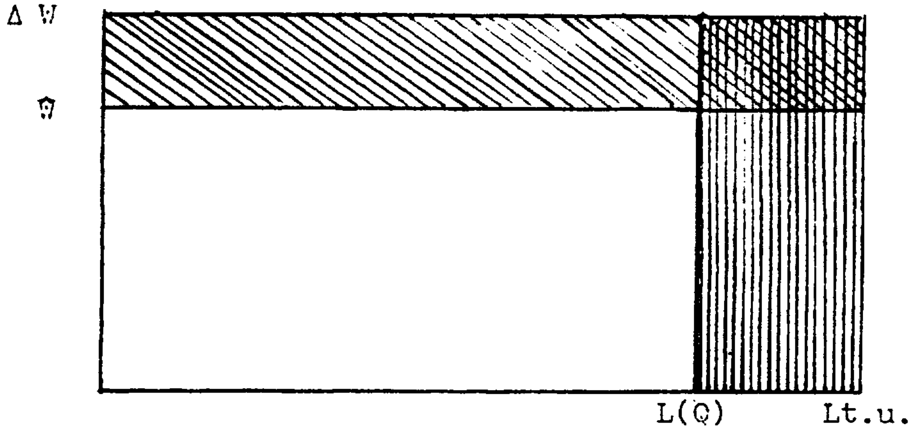

Figure 20

This model which represents more a stimulus to further development than a final version, will be developed by using linear curves of union concession and resistance in order to simplify this first approximation. (2)

The employer's profit will be given, as before, by the function $\Pi = QP - W\lambda - H$

where the wage will be $W = \hat{W} + \Delta W_{t.u.}(S)$

---

(1) Here 'concession rates' has been used to mean the wage claims and the resistance rate for employment claims. Even if there really is no difference between the two terms, concession rate and resistance rate, the former has been introduced to simplifly the explanation.

(2) An exponential version has also been worked on, but given the complexity of possible solutions, not explicitly expressed, it is necessary to use a linear model in this phase of study.

and $\Delta W_{t.u.}$ reppresents the union's requested wage increase and will decrease during the strike according to the linear function,

$$\Delta W_{t.u.}(S) = W_0 - W_0 rS$$

for $rS \leqslant 1$

and $S \lesssim 1/r$

while

$$\Delta W(S) = 0$$

for $S \gtrsim 1/r$

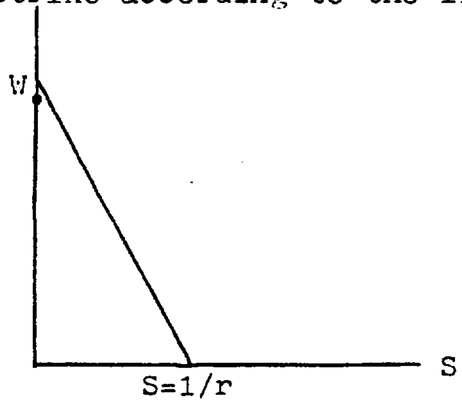

Figure 21

As far as the union's employment demand is concerned, a slightly reduced model in respect to the previously proposed ones has been used.

$$\lambda = L(0) + L_{t.u.}(S)$$

$$\hat{L} - LQ = \Delta L$$

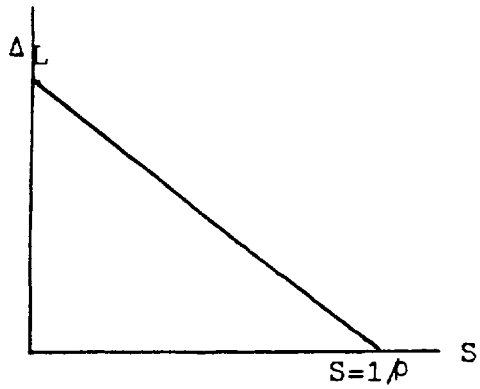

Figure 22

where $L_{t.u.}$ reppresents only the union's <u>defensive</u> employment claim made up of the difference between employment pertaining to the previous contract and that asked for by the firm. It will be a function of the workers' expectations.

$$L_{t.u.}(S) = \Delta L - \Delta L\, S \qquad \text{for} \quad S \leqslant 1/\rho$$

$$L_{t.u.}(S) = 0 \qquad \text{for} \quad S \geqslant 1/\rho$$

It is more consistent with the rule and with the real strength of the union's economic blackmail to consider

their action regarding the threat of layoffs in relation to an autonomous employment demand that is mainly of a political nature.

Thus, the function ψ , previously described as an index of potential worker risk of unemployment, is used. This can be a good proxy for the determination of the union to defend employment and, therefore, its resistance rate.

$$\rho \cong \frac{1}{\psi\ (U - \bar{U})}$$

Evidently, when $LQ \geqslant \hat{L}$ and $U \leqslant \bar{U}max$, the employment component will disappear and will fall back upon the model presented by Ashenfelter and Johnson of only wage claims.

On the other hand, under opposite conditions the profit will be:

$$\Pi = PQ - (\hat{W} + \Delta W_{t.u.}(S))(LQ + L_{t.u.}(S)) - H$$

which can be rewritten:

$$\Pi = PQ - \hat{W}LQ - (W_o - W_o rS)LQ - \hat{W}(\Delta L - \Delta L\rho S) -$$

$$- (W_o - W_o rS)(\Delta L - \Delta L\rho S) - H$$

from which we have:

$$\Pi = PQ - \hat{W}LQ - W_o LQ - \hat{W}\Delta L - W_o\Delta L - W_o r\Delta L\rho S^2 + W_o rSLQ +$$

$$+ \hat{W}\Delta L\rho S + W_o rS\Delta L + W_o\Delta L\rho S - H$$

$$\Pi = PQ - \hat{W}(LQ + \Delta L) - W_o(LQ + \Delta L) - W_o\Delta Lr\rho S^2 +$$

$$+ (W_o r(LQ + \Delta L) + \Delta L\rho(\hat{W} - W_o))S - H$$

$$\Pi = \underbrace{PQ - (\hat{W} + W_o)(LQ + \Delta L)}_{\alpha} + \underbrace{\left[W_o r(LQ + \Delta L) + \Delta L\rho(\hat{W} + W_o)\right]}_{\beta} S -$$

$$- \underbrace{W_o\Delta Lr}_{\gamma} S^2$$

redefining the preceding terms in order to simplify the

calculation, the expected profit will be

$$V = \int_S^\infty (\alpha+\beta\ S - \gamma\ S^2) e^{-\tau t} dt - \int_0^\infty H e^{-\tau t} dt$$

$$V = (\alpha + \beta\ S - \gamma\ S^2)\ \frac{e^{-\tau S}}{\tau} - H\ \frac{e^{-\tau t}}{\tau}$$

$$V = \frac{-e^{-\tau S}}{\tau}\ (-\alpha - \beta\ S + \gamma\ S^2) + \frac{e^{-\tau t}}{\tau}\ H$$

the first derivative of which is

$$\frac{dV}{dS} = e^{-\tau S}(-\alpha - \beta\ S + \gamma S^2) + \frac{e^{-\tau S}}{\tau} \beta - 2\ \frac{e^{-\tau S}}{\tau}\ \gamma S$$

$$\frac{dV}{dS} == 0 \iff -\alpha - \beta S + \gamma S^2 + \frac{\beta}{\tau} - 2\ \frac{\gamma}{\tau}\ S = 0$$

$$\iff \underbrace{\gamma}_{a}\ S^2 + \underbrace{(-\beta - 2\ \gamma/\tau)}_{b} S + \underbrace{(-\alpha + \beta\ /\tau)}_{c} = 0$$

$$\left.\frac{dV}{dS}\right|_{S=0} = -\alpha + \beta\ /\tau \qquad \left.\frac{dV}{dS}\right|_{S=0} \gtrless 0 \iff \beta/\tau \gtrless \alpha \quad (1)$$

that is,

$$\tau(PQ - (\varpi - W_0)(LQ + \Delta\ L)) \leqslant W_0 r(LQ + \Delta L) + \Delta\ L\rho\ (\varpi - W_0)$$

In economic terms, if the employer's daily profit with the maximum of the union 's claims discounted according to management's expectations will be less than the amount that the workers reduce their demands daily -- according to their rates r and ρ -- it will be in the employer's interest not to accept the workers' claims but to allow a

---

(1) Preceding imposed limits consider only increasing profit functions at S = 0.

strike to occur which will produce, from this point of view, only relative gains.

On the other hand, it will be in his interest to halt the process only when the two terms are equal, that is, when each strike day brings in no profit. Proceeding now along the lines of thought outlined on page 63, speculating on $\beta/\tau \gtrless \alpha$. A second derivative is obtained to show that the point in which the first one annuls itself to be a maximum point:

$$\frac{d^2V}{dS^2} = e^{-\tau S}((+\alpha\tau - 2\beta - 2\gamma/\tau) + (4\gamma + \beta\tau)\, S - \gamma\tau\, S^2)$$

in point $S = 0$

$$\left.\frac{d^2V}{dS^2}\right|_{S=0} = \alpha\tau - 2\beta - 2\gamma/\tau \lessgtr -\beta - 2\gamma/\tau < 0$$

and being at $S = 0$ $\quad \beta \geqslant \alpha\tau \quad \frac{d^2V}{dS^2}$ the second derivative will certainly be negative, that is, the profit function is concave toward the bottom.

The explicit form of Sott. can now be obtained.

$$S_{opt.} = \frac{2\gamma/\tau + \beta \pm \sqrt{(-\beta - 2\gamma/\tau) - 4\gamma(-\alpha + \beta/\tau)}}{2\gamma}$$

The discriminant will be given by:

$$\Delta = \beta^2 + 4\gamma^2/\tau^2 + 4\gamma\alpha \gtrless 0$$

the value of which depends on the sign and dimension of α:

$$PQ - (\bar{W} + \Delta W)(LQ + L_{t.u.})$$

If the wage and employment claims of the union greatly exceed the value of goods produced and $\Delta \leqslant 0$, then the profit function will always be negative and it would be more advantageous for the employer to close the plant as soon as possible.

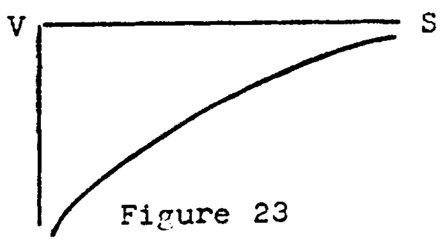

Figure 23

Excluding then, these cases, the situation where $\Delta > 0$ can be examined.

Clear information has not been obtained on the signs of workers' claims, which are certainly positive and therefore β and γ > 0. At the same time, nothing is known about the importance of claims relative to the value of goods produced.

- If $\alpha > 0$, that is if the workers are reasonable and leave a certain profit margin to the employer, the profit function has the form shown in Figure 24 in which the maximum will be reached at the first fluctuation.

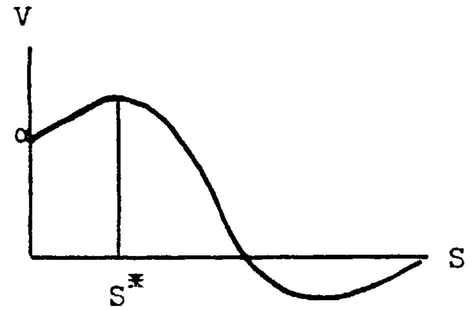

Figure 24

- If $\alpha < 0$, that is if the union presents claims that are greater than production value, the profit function will first be negative, then positive, then again negative (Figure 25).

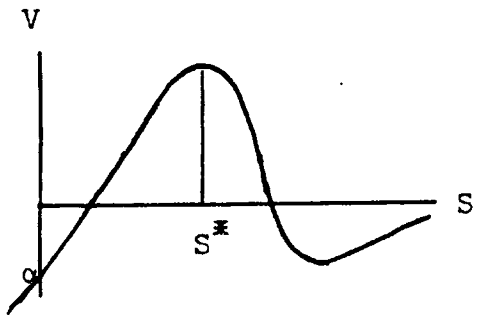

Figure 25

- In fact the idea that the two possible radicals be negative can be excluded, given the signs of the terms $\frac{dV}{dS}$, b, and c, and that the function could therefore have the form described in Figure 26.

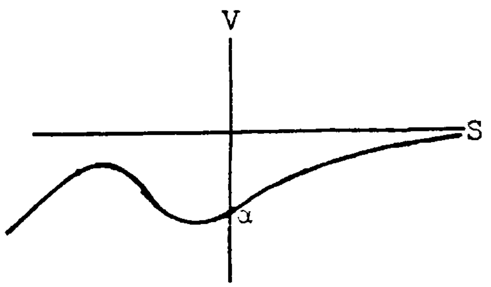

Figure 26

After having analysed the form of the profit function, we can now examine the real solutions the manager has in choosing the optimal strike duration that would maximize his profit.

As has already been emphasized, the workers' concession line, r, and the workers' resistance line, ρ , reach a limit beyond which the workers are not willing to strike for $S = 1/r$, $S = 1/\rho$ and in which the claims equal zero.

In other words, the union and management negotiate only the quota of the wage bill which is greater than the previous contract wage, $\bar{W}$, and the number of workers, LQ, which the employer wants to hire, for which during bargaining the wage bill cannot go below $LQ \cdot \bar{W}$; and, there will be a strike duration beyond which the workers no longer reduce their claims which corresponds to the larger of 1/r and $1/\rho$, limits of the concession and resistance curves of the workers' demands.

Since information on the discount rate of the workers is not available, one can only hypothesize.

Case A $\quad 1/r = 1/\rho$

Supposing the workers' discount rates to coincide, $S_{opt.}^{*}$ to be the theoretical optimal duration of the strike, derived from the profit function, and Sott. the strike duration that will be chosen by management.

1. $S_{opt.}^{*} \quad \frac{1}{r} = \frac{1}{\rho} \Longrightarrow$ Sopt. $= \frac{1}{r}$, $\frac{1}{\rho}$

If $S_{opt.}^{*}$ exceeds 1/r and $1/\rho$, it would be better for management to stop at 1/r instead of proceeding until $S_{opt.}^{*}$. In fact, after 1/r there are no more workers' demands, $L_{t.u.}$ and ΔW are equal, and the real profit curve at 1/r decreases according to the discount rate of the employer's expectations, τ , Figure 27.

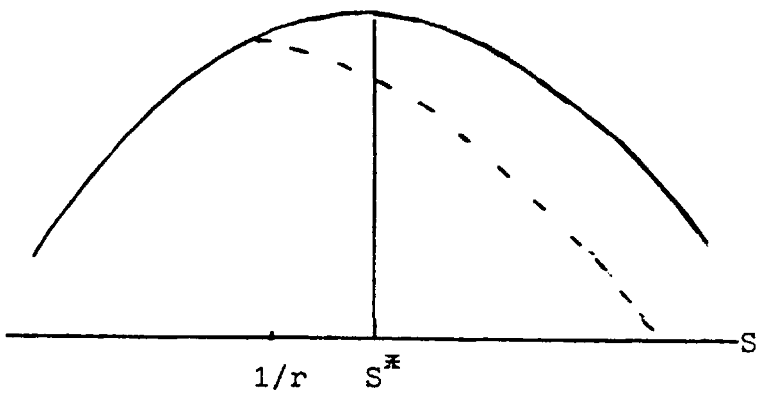

Figure 27

2. $Sopt^* \leqslant 1/r\ ,\ 1/\rho \implies S_{opt}^* = S_{opt}$.

Evidently in this case the theoretical profit curve coincides with the real one $\frac{dV^*}{dS} = \frac{dV}{dS}$ and it will therefore be best for the employer to stop at the point of maximum profit.

It is necessary to remember that $Sopt^* < 0$ is not acceptable for the hypothesis and restrictions that were previously made on the derivative of the profit function.

<u>Case B</u> $1/r \neq 1/\rho$

1. $Sopt^* > \max\ (1/r\ ,\ 1/\rho) \implies \min \leqslant Sopt \leqslant \max$.

If the optimal solution is greater than the maximum of the reciprocals of the two discounts rates, the optimal solution for management will be between them.

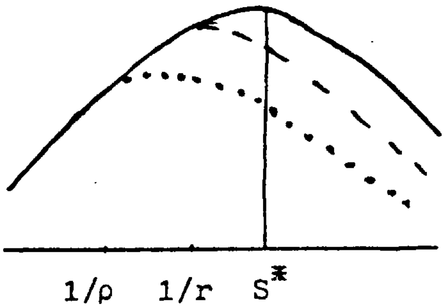

Figure 28

2. $\min < Sopt^* < \max \implies \min \leqslant S_{opt} < S_{opt}^*$

If the theoretical solution is between the maximum and minimum rates, the employer's optimal solution will be less than $Sopt^*$ and more than the least of the two discount

rates (see Figure 29).

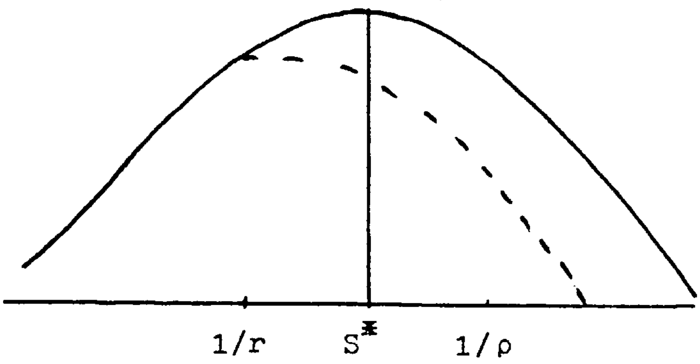

Figure 29

3. $S\,opt^{*} < min \implies S_{opt} = S\,opt^{*}$

In this case, the theoretical optimal solution lies in the segment where the theoretical profit curve and the one whose limits are $1/r$ and $1/\rho$ cross $\frac{dV^{*}}{dS} = \frac{dV}{dS}$ for which the solutions will coincide.

2.4 Final Remarks

Before going on to discuss the impact of the model's variables on the solution which will serve as a prologue to the operational version, the results obtained with the Ashenfelter and Johnson model as presented in this work will be emphasized.

Incorporating the workers' employment claims in the bargaining model puts a new light on the prospects and results of bargaining itself and on the limits to the union's actions and interventions. In fact, the union no longer seems limited to the role of voicing wage demands, but assumes a generic responsability towards the fate of the workers; while on the other hand, the employer is no longer free to determine employment level ($L(Q)$) according to his wants, but is conditioned by the needs of the workers, in turn determined by the general economic situation (ψ).

The last version (third stage) of the model, which incorproates defensive employment claims ($\hat{L}$ - L(Q)) as well as wage claims (Δ W) and the respective and distinct rates of resistance (ρ) and concession (r), permits the applicability and validity of the Bargaining Theory to be significantly widened even though the formulation has been rather simple and manageable.

It conserves the validity and applicability of the model which is made up only of wage claims, adding to it one of only claims made in defense of employment ($\hat{L}$ - L(Q)) and of one which contains both.

Introducing two types of reduction rates for claims, one for wages and one for employment, has permitted the adaption of the model to the union's protest reactions which realistically are assumed to vary according to the objectives that the union intends to reach.

For the sake of simplicity, a linear form in which only the rate of reduction varies for both types of claims has been used in the formulation of the model. This approach nevertheless suggests further study on the form of the function of the workers' and of the union's actions and a qualitative analysis of the appearance of claims deriving from the developing phase of the union and, above all, from the different context of industrial relations.

Such a model could be applied to expansive periods of economic development in which there can be only wage claims, and also to periods of recession accompanied by a weak union and characterized by layoffs not resulting in resistance or strikes. In fact, this does not necessarily impose the presence of employment claims. When these are also justified by the will of the firm to reduce employment ($\hat{L}$ - LQ) their absence or rapid reduction de-

pends on the workers' rate of resistance (ρ).

The influence of the variables in the model on its solution will now be discussed. This will allow an operational version of the model to be found, one which will be subject to an empiric verification in the three countries previously considered.

Given that:

$$S_{opt} = \frac{2\gamma/\tau + \beta \pm \sqrt{(-\beta - 2\gamma/\tau)^2 - 4\gamma(-\alpha + \beta/\tau)}}{2\gamma}$$

the duration of a strike that maximizes management's profit will be the smallest positive solution $S_1 \geqslant 0$. Rewriting Sopt in a more simple way, we have that:

$$S\,opt = \frac{1}{\tau} + \frac{\beta}{2\gamma} - \sqrt{\frac{\beta^2}{4\gamma^2} + \frac{1}{\gamma^2} + \frac{\alpha}{\gamma}}$$

the result will be equal to zero,

$$S_1 = 0 \qquad \text{only if} \quad \left.\frac{dV}{dS}\right|_{S=0} = 0$$

For the employer, in fact, it would be better to give in to the workers' claims without any proof of strength because the initial profit (Π) will be the mazimum obtainable given the limits of the workers' resistance and concession curves.

We are faced with a strike when

$$S_1 > 0 \qquad \text{if} \quad \left.\frac{dV}{dS}\right|_{S=0} > 0$$

The maximum attainable profit level of the employer leads to resorting to a strike to reduce the workers' claims and will vary in the following ways:

i. $\frac{dSopt}{d\alpha} < 0 \qquad \alpha = PQ - (\hat{W} + W_o)(LQ + \Delta L)$

The optimal strike duration for the firm will be greater as the union's demands increase -- be they salarial or occupational -- in relation to the production value.

In fact, the larger the profit margin of the employer, the easier it will be for him to concede the demanded increases to the workers. This relation between high profit margin and easily conceding to demands suggests an expanding production phase and therefore pressures on the employer to sell and deliver.

ii. $\frac{dS_{opt}}{d\beta} \begin{array}{l} > 0 \quad \text{for} \quad \alpha \gtrless 0 \\ \gtrless 0 \quad \text{for} \quad \alpha < 0 \end{array} \qquad \begin{array}{l} \beta = W_o r(LQ + \Delta L) + \Delta L \rho(\bar{W} + W_o) \\ \alpha < -\gamma/\tau^2 \end{array}$

This is viceversa in the majority of cases, that is when the union asks less or at most all the production value, the increase of both wage and employment claims and the increase in their determination to hold to such demands (smaller r and ρ) will naturally lead to a longer strike.

Only in the case of an irrational or extremely greedy union that asks a wage bill that is higher than production value, will the impact of such claims on the duration of the strike be uncertain. In fact, it could bring about either a prolongment of the strike in an attempt to reduce the irrational demands or a reduction of the strike itself motivated, for example, by a claim bluff or by a mistaken interpretation by the union of the firm's profit margin, or by the closing of the firm or by external intervention in the case of reasonable claims made, however, in a firm at the production margin.

Going on to examine the discount rate:

iii. $\frac{d\dot{S}_{opt}}{d\tau} < 0$

The higher management's discount rate, that is, the more the present is valued instead of the future, the more incentive the employer will have to conclude negotiations and the shorter will be the strike duration that maximizes his profit.

iv. The same is true for the workers' discount rates.

As has already been seen, the inverses of the rates of concession and resistance represent discontinuous points for the line of concession and resistance of the workers. The higher these rates are (the lower the reciprocal) the relatively shorter will be the duration of the strike chosen by the employer in order to maximize his profits.

It is important to note, nonetheless, that the rates of resistance and concession influence the optimal duration of a strike in two ways: as previously stated, in the employer's choice of optimal strike duration (S_{opt}) and directly in the calculation of the employer's maximum profit limits ($Sopt^*$). Unfortunately, little can be said of the latter as the signs of the derivatives $\frac{dSopt}{dr}$ and $\frac{dSopt}{d\rho}$ are indeterminate.

CHAPTER THREE

The Operational Version and Empirical Verification of the Broader Bargaining Model

An attempt will be made in this chapter to present an operational version of the mathematical model previously described and to subject it to empirical verification in the countries under consideration--France, Italy and Great Britain, between 1950 and 1980.

The passage from a mathematical model to an econometric one is not direct. It is first necessary to overcome the deterministic character of the algebraic model in which the dependent variable, strikes, is determined simultaneously by the relationships of the model between the exogenous variables (ΔW, $\hat{W}$, ΔL, LQ, PQ, r, ρ, τ) and to substitute them with a stochastic version in which one or more random variables appear. Moreover, it is indispensable to reformulate the relations expressed by the model in a less complex form with linear parameters and to find operational proxies for the economic variables in the model. The stochastic character of the model has the role of absorbing the imperfections of measure and of aggregation present in the data utilized for the tests and the element of error, above all the eventual errors of the model in specification, in lack of important variables, or in inappropriate specification of the relations.

In the case under examination, there is no strict correspondence between economic variables used in the model and statistical data.

For example, there is no detailed and systematic information on wage increases demanded by the workers. The difference between the quantity of work the firm needs and that which the trade union wants to maintain is even less known. Thus, one falls back on suppositions regarding workers' rates of resistance and concession.

Furthermore, the analysis that has been confronted in order to develop a bargaining model is a microeconomic one that has its fulcrum in the bargaining unit with the firm or firms on one side and the workers on the other. It is quite different from statistical sources found on a national scale and can be reduced at most to a single economic sector.[1]

3.1 Operational Derivation of the Mathematical Model

The final result of the mathematical model was:

$$\text{(I)}\quad Sopt = \frac{\frac{2\gamma}{\tau} + \beta + \sqrt{(-\beta - \frac{2\gamma}{\tau})^2 - 4\gamma(-\alpha + \frac{\beta}{\tau})}}{2\gamma}$$

which rewritten in complete form with the variables with which it was originally formulated is:

$$\text{(II)}\quad Sopt = \Bigg\{\frac{2W_o \Delta L\rho}{\tau} + W_o r\ (LQ + \Delta L) + \Delta L\rho(\hat{W} + W_o)$$

$$\pm \left[(-W_o r(LQ-\Delta L) - \Delta L\rho(\hat{W}+W_o) - \frac{2W_o \Delta Lr\rho}{\tau})^2\right.$$

$$- 4W_o \Delta Lr\rho(-\ (PQ - (\hat{W}+W_o)$$

$$\left.\cdot (LQ + \Delta L)) + \frac{W_o r(LQ+\Delta L) + \Delta L\rho(\hat{W}+W_o)}{\tau})\right]^{1/2}\Bigg\}/2W_o \Delta Lr\rho.$$

The optimal strike duration that maximizes management's profit under the two limits of workers' claims is determined in the mathematical solution by the variables of the model: wages claims (W_o), previous contract salary (W), labor claims (ΔL), the labor the firm wants to employ (LQ), production value (PQ), and the respective discount rates (τ) of management,

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[1]In statistical data there are also regional subdivisions that really do not resolve the problem but statistically complicate it because of the particularly of geographic areas.

and r and ρ of the workers.

Nevertheless, the complexity of the relations between the variables of the solutions impedes identification of the impact each one has on the dependent variable, and, therefore, hinders the construction of an operational version.

To overcome this impasse it is necessary to refer to the conclusions of Chapter Two, where the ties between the variables in the simplified version and strikes were examined.

Briefly:

$$\frac{d\ \text{Sott}}{d\alpha} < 0 \qquad \alpha = PQ - (\hat{W}+W_o)\ (LQ + \Delta L)$$

$$\frac{d\ \text{Sott}}{d\beta} > 0 \qquad \beta = W_o r(LQ+\Delta L) + \Delta L\rho(\hat{W}+W_o)$$

$$\frac{d\ \text{Sott}}{d\tau} < 0$$

and r and ρ have an influx that is mainly negative.[2]

Because I am not in possession of statistical measures either for the variables α, β, γ, τ of the simplified version or of the original variables that were their components, I will try to approximate their economic significance with known statistical variables.

For instance, α represents the employer's profit before bargaining begins. This is before the duration of a strike can reduce workers' demands $(W_o, \Delta L)$. Evidently, this data does not exist, but as it consists of the residual of production value minus the workers' initial wage and labor claims, an attempt will be made to approximate this specification.

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[2]For more detailed discussions, see 2.4.

When the profits are greater, Sopt will be less. When the production is greater with claims being constant, it can be deduced Sopt will be less. Vice versa, when the claims are large with production value remaining constant, the residual profit will be less; therefore, there will be greater conflict taking place.

As far as industrial production value is concerned, information gathered by official statistical sources will be used. The variation in industrial production [$\dot{\text{Prod}}$. Ind. (-)] at time t will be expected to have a negative sign, supposing that an increase in industrial production will correspond to a reduction in the likelihood of a strike.

Because a direct statistical measure of workers' claims is not available, an attempt will be made to approximate them by making some behavioral hypotheses.

In fact, it can be reasonable supposed that workers' wage claims follow objectives to increase or, at least, maintain their purchasing power. Therefore, a rise in prices above the monetary wage increase previously contracted will cause protests. The index of real wage lagged by a unit of time, with an expected negative sign [W/P_{t-1} (-)] will be taken as a proxy of claims.

However, the rate at which this process of erosion of workers' real income, that is the rate of change of real income [$(\dot{W}/P)_t$ (-)] can be used as an indicator of the strength of determination of workers or the trade union to defend demands made. In fact, the faster workers see their purchasing power decrease, the more decisive their defense of their own interests will be.[1]

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[1]Many other variables influence wage claims and the determination of the trade union to defend them, to cite just a few: the effects of both inflation and income increases in other sectors. Nonetheless, I believe that these components are more consistent in the tertiary sector in which wage differences can be considered the most important parameter for wage demands. Some studies suggest for the industrial sector the presence only of

As far as trade union employment demands $\Delta L = \hat{L} - L(Q)$, it can be imaged that with the technological level remaining constant during a period of expansion the production increase wanted by the employer would be accompanied by a diffuse increase in employment.[1] This would then be characterized by an absence of employment claims and less conflict.

Alternatively, a contraction of production (Q) would lead to a reduction in the labor the firm wants to employ (LQ) with respect to the previous level ($\hat{L}$) and will lead to a protest on the part of workers and the trade union in defense of excess labor (ΔL).

Supposing that the greater the industrial production the less the likelihood of conflict and the greater the reduction in industrial production the greater the likelihood of conflict, the variation in industrial production could be used as a proxy for the employment demands.

Therefore, the variation in industrial production is expected to have a negative sign [Ind. Prod._t (-)].

In my opinion, the strength of resistance of the workers (ρ) can be approximated by the probability of unemployment for the workers.

The unemployment rate, or even better, the function of ψ (U-Umax) previously inserted in the mathematical model could

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(Footnote continued)

a phenomenon of wage leadership. It is my opinion, then, that the variable $(\dot{W}/P)_t$, chosen as a proxy of the trade union's determination to defend demanded wage increases can be acceptable, even if it neglects, as on the other hand, the entire Bargaining Theory does, the evolution and growth of the Trade Union movement.

[1]Also applying a labor-saving technology in a period of expansion in production, the employer may not increase employment, but should not decrease it.

be used as its measure. The function ψ is constructed assuming that there is a "maximum acceptable" level (Umax) of unemployment that the trade unions consider "alarming" because it no longer has a frictional or cyclical origin but a structural one.[1] When the unemployment rate goes above this threshold (Umax) and begins to attack the internal market (the core groups), the trade union deems it necessary to intervene in defense of threatened jobs, and the more the unemployment rate exceeds the maximum acceptable threshold, the more decisively will the trade union believe it right to intervene. Both the unemployment rate and ψ will be expected to have positive signs $[\psi(U)\ (+)]$.[2]

Recapitulating, the likelihood of conflict at time t will be less the greater the industrial production, greater the faster workers' real income is reduced, and greater the higher the unemployment rate.

$$\text{(III)} \qquad P(S)_t = b\ [\text{Ind. } \dot{\text{P}}\text{rod}_t,\ \frac{W}{P_{t-1}},\ \frac{\dot{W}}{P_t},\ \psi(U)] + \varepsilon$$

$$b_1,\ b_2,\ b_3 < 0 \qquad b_4 > 0$$

Before proceeding to an empirical verification of III, I will discuss the dependent variable of the equation (S), strikes.

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[1]The threshold Umax is political and will vary according to country, type of trade union organization, and above all, according to prospective economic crisis. The unemployment function ψ, discussed more thoroughly in Chapter 2, is also very important because it allows for an integration of a political component in a rigorously economic model.

[2]More detailed data on worker mobility as layoffs and quits would perhaps be more suitable. The unemployment rate being calculated as number of unemployed to the number in the entire work force hides phenomena such as implicit unemployment and discouraged workers that respond to variations in the work force with respect to the progress of production.

Previously, general terms have been used, such as number of strikes, strike duration, and conflict. In order to test the original model, duration of strikes is needed as a sum of the duration of each strike and not as a sum of hours or days lost by the participants of each strike.[1] In fact, this second data which is furnished by official statistical sources shows the effects of the component of workers participating in the conflict and represents more an indicator of economic damage than of conflict duration.

For the above, both the frequency indicator (number of strikes) that represents the proxy of probability of conflict and the indicator of intensity (number of hours lost per strike) will be used as a proxy for strike duration in the verification of the model.

Moreover, the choice of indicators is limited by the data furnished by national statistics. In fact, for France only one set of data is available, the number of hours lost per strike. After 1967, the other conflict indicators divided according to economic activity were no longer available.

3.2 Empirical Verification: General Principles

In this chapter, the hypothesis previously discussed will be empirically verified in Great Britain, Italy and France from 1950 to 1980.

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[1]For complete clarity, by duration of strikes it is intended to mean the number of days of each strike. Let us suppose that in a year there is a one-week strike with ten workers participating and another five-week one with three workers. The data that interests us is the sum of the duration of the strikes, six weeks which averages to three weeks per strike. The data given by official statistics considers twenty-five weeks of strikes which even if it is divided by the number of participants gives an average of 1.9 weeks per striker.

The procedure was aimed at obtaining successive improvements on the proposed model through adaptations of the specifications of the variables.

Given the complexity of the strike phenomenon which presents ties and interdependencies with other variables that were not considered such as trade union organization, the system of industrial relations, and the social political environment, I have preferred to use a simple model and unsophisticated techniques in order to not complicate their interpretation.

I have adopted the classic model of multiple linear regression accepting the hypothesis according to which the form of multiple regression between the strike and the independent variables can be expressed, with sufficient approximation and significance, by a linear combination of independent variables, though retaining the opportunity to introduce in a second phase any eventual transformations of the variables in order to improve the adaptation of the model to empirical data. Regarding the procedure for calculating the estimate of the model of multiple linear regression, the program Multiple Regression Analysis: subprogram regression has been used.[1]

The program determines the linear function in successive stages, first considering a single explicative variable, then two, then three, and so on. First, the indicator with the largest absolute value coefficient of simple correlation with the strike variable is inserted. The second independent variable which presents the largest index of partial correlation

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[1]Multiple Regression Analysis: subprogram regression (J.O. Kim, F.J. Komout), S.P.S.S. Statistical Package for the Social Sciences, version 8.1, McGraw-Hill, 1973.

is then inserted.[1] The program is repeated until all the variables are included or until their insertion is not impeded by a value already fixed by the 'F' test relative to the coefficient of partial correlation.[2]

The tests will be carried out within each country, adapting the initial model to a version most suited to highlighting the links between the variables.

The ability to compare the regressions between the different countries while maintaining characteristic national patterns is given by the presence of the same variables in corresponding equations.

The time interval chosen is annual due to the greater accuracy of historical series on strikes made on a yearly base.[3] Given the importance of seasonal cycles of this phenomenon, quarterly data also has been examined, and will be reported only if its of particular significance.

The model and the analyses made were developed within the industrial sector; therefore, the dependent variables will include the number of strikes (MS) and the number of work days lost per strike (MD) in the manufacturing industries. Regressions also will be applied to strike data which refers to the entire economy (GS, GD) to verify whether the general conflict follows a claim pattern that has industrial

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[1]This procedure of calculation takes into account the correlation between the indicators for which if two of them are closely correlated, the one which is more closely correlated with the dependent variable, is inserted. At the next step in the program the other could have a null correlation with the residuals of the regression that has already occurred.

[2]'F' default value = 0.01.

[3]For further clarification and specifications on the problem of historical series on strikes see the Appendix I, "Limitations of Strike Statistics."

characteristics[1]--in fact, the opinion is widespread that claims in other sectors follow industrial ones--and to verify the validity of regression made- with global strike data found in literature.

3.3 Great Britain 1950-1979[2]

Empirical verification will now be made in successive phases of specification of the model, starting with a series of regressions of simple variables.

The dependent variables used are the number of strikes (MS) and of work days lost per strike in manufacturing industries (MD) and the number of strikes (GS) or work days lost per strike (GD) in the entire economy.

The independent variables used are:

--The rate of change in industrial production obtained from the index of production of all manufacturing industries according to the formula:

$$\text{Ind. }\dot{\text{P}}\text{rod.}_t = \frac{\text{Ind. Prod.}_t - \text{Ind. Prod.}_{t-1}}{\text{Ind. Prod.}_{t-1}} \cdot 100.$$[3]

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[1]It is important to keep in mind that all the independent variables of the equation are not limited to only the industrial sector, see for example, consumer prices and the unemployment rate. On the other hand, the hypothesis on which the model is constructed is specific to the industrial sector.

[2]For specific information on statistical sources and on the elaboration of the historical series of data on Great Britain, see Appendix IV.

[3]Variations in the productivity of labor as a mechanism of wage claims have not been taken into consideration because data on the productivity of labor is obtained by dividing the production index of all manufacturing industries by the number of employed by the industries. Its progress, then, is not very far from that of industrial production which nevertheless allows for an interpretation that is not limited to income share.

--The real salary obtained as a ratio between the index of weekly earnings for all manual workers and the consumer price index, lagged by a unit of time (RW_{t-1}).

Consistent with the hypothesis previously made on the objectives of wage claims as being the maintenance of purchasing power at the same level, workers construct their claims keeping in mind real income, not just wages and consumer price.

--The rate of change of real wages with the above mentioned formula ($\dot{RW}_t$).

--And the unemployment rate (U_t) as a ratio between the number of unemployed, excluding those temporarily laid off, and the labor force.[1]

3.3.1. Phase I (Simple Variables)

The first step in verifying the model was done with a series of simple regressions of the variables of the model just presented.

An attempt has also been made to improve the model by making some changes: For example, substituting the variation in industrial production ($\dot{\text{Ind. P}}$) with the variation in the rate of unfilled vacancies [$\dot{V}$ $(\bar{-})$] obtained as a ratio between the number of jobs offered and the number employed. It is my opinion that this indicator, as the preceding one, can be taken as a proxy for the economic cycle, and, on the one hand, represents the willingness of management to concede salary increases and, on the other, the willingness of the trade unions

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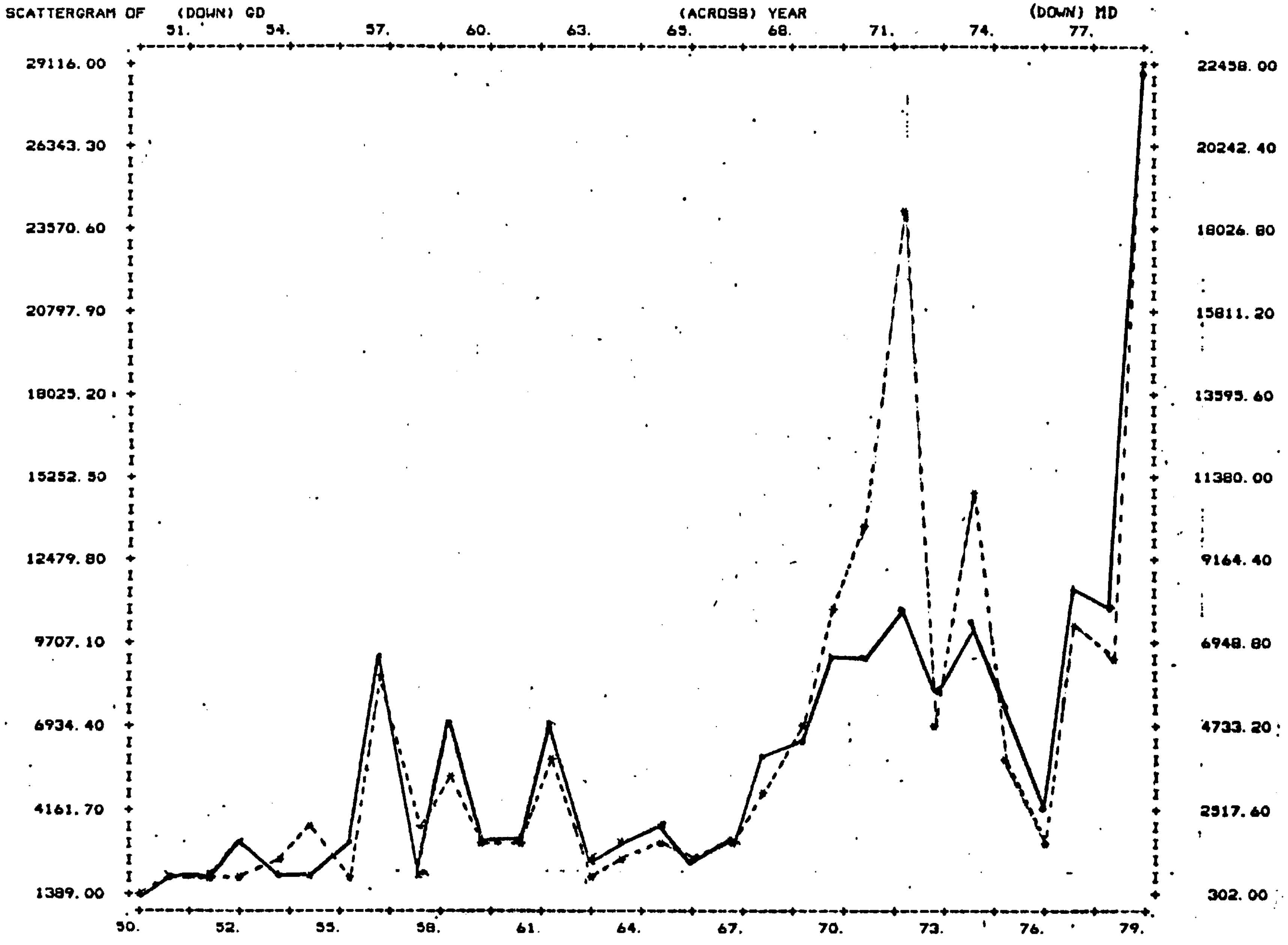
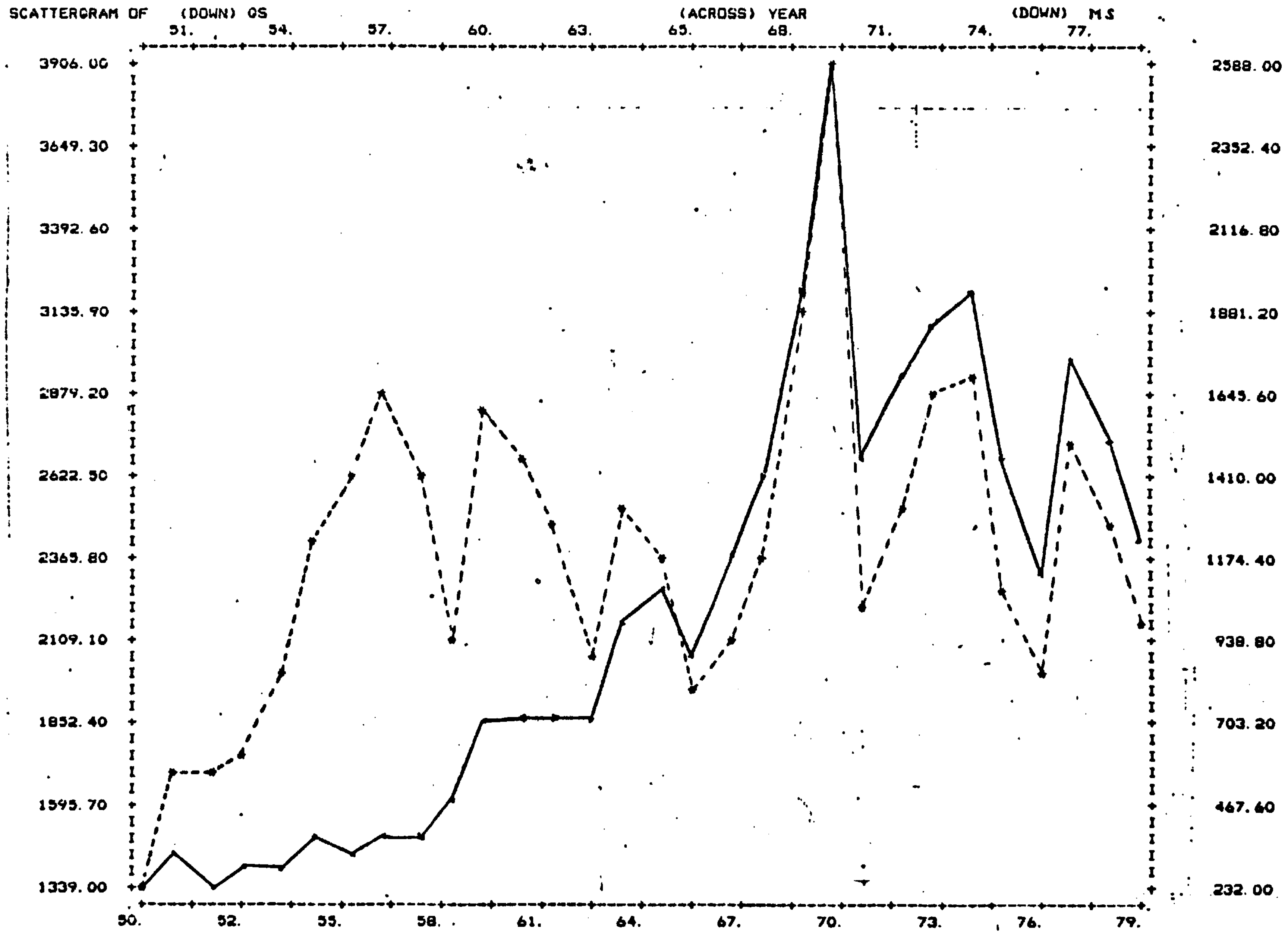
[1]Though the problems connected with the insufficiency and ambiguity of information expressed by the unemployment rate will not be discussed, it is nevertheless important to keep in mind its insufficiency in interpreting the likelihood of unemployment for industrial workers, above all because it does not take into account the division of job offers.

Graph U.K. 1950-80
GD= number of man-day-lost in all the economy (-----------)
MD= number of man-day-lost in the manufactuting sector(———————)



Graph U.K. 1950-80
GS = number of strikes in all the economy (-----------)
MS = number of strikes in the manufacturing sector (———————)



and workers to defend jobs. As with the preceding indicator, it will be expected to have a negative sign.

Moreover, the same set of regressions has been tested with or without lagged real wages and with or without the time index.

There are many reasons for the insertion of the time factor. With this factor an attempt will be made to capture the secular tendency of the phenomenon in which variations due to the impact of the economic variables are inserted. In fact, it is reasonable to suppose that strike phenomena has a trend of macrosociological origins that is influenced by long period variations of the labor force, of the activity rate, of the unionization rate, of the rate of instruction of the workers, of their political consciousness, as well as others that condition their propensity to conflict and thus the occurrence of manifestations of conflict.

(^{oo}) Legend

Dependent Variables

MS = number of strikes in the manufacturing industries

MD = number of days lost per strike in the manufacturing industries

GS = number of strikes in the entire economy

GD = number of work days lost in the entire economy

Independent Variables

T = time

$I\dot{N}D.P.$ = annual variation in industrial production, rate obtained as:

$$I\dot{N}D.P._t = (INDP_t - INDP_{t-1})/INDP_{t-1} \cdot 100$$

$\dot{V}$ = annual rate of variation of the number of unfilled vacancies

RW = real wages in industry

RW_{t-1} = real wages in industry lagged a year

W_{t-1} = monetary industrial wages lagged a year

$R\dot{W}$ = annual rate of variation of real wages in industry

$\dot{P}$ = annual rate of variations in consumer price index

U = unemployment rate

$RW_{t-1} \cdot RW$ = wage erosion index

$\dot{W}$ = annual rate of variation of monetary industrial wages

ψ = ψ (U-Umax)

$AI\psi$ = index of the gravity of the economic situation obtained as a product of $INDP_{t-1}/INDP_t$ and ψ

$AV\psi$ = index of the gravity of the economic situation obtained as a product of V_{t-1}/V_t and ψ

$O.\dot{C}.I$ = variation in hours conceded from Cassa Integrazione Guadagni in industry.

The tests of equations (Ia) and (Ib) are differentiated by the cycle indicator, in the former the variation in industrial production and in the latter, the number of vacancies.

S.E.E. = Standard Errors of Estimate of the estimated coefficients of regression are in parenthesis under the corresponding coefficients.

R^2 is the coefficient of determination of the entire regression.

DW is the Durbin-Watson statistic.

'F' test of statistical significance.

* 99% significance (for regression coefficients according to the 'F' test).[1]

**95% significance.

(/) independent variable not included in the calculation of regression because of 'F' default value 0.01.

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[1]The 'F' test relative to the regression coefficients is obtained from the relation between the estimated regression coefficient and the corresponding standard error, a random variable results with distribution 't' with (n-k) degree of freedom. Nonetheless, since quantity 't' is a relationship between a standardized normal random variable and the square root of a variable (χ^2) divided by its degree of freedom, if we square at a quantity 'F' is obtained with (1, n-k-1) degrees of freedom.
(n = number of cases, in our case 30, which is the number of years considered; k = number of explicative variables present in the regression equation.)

Table U.K. 1950-79 n.1/A (°°)

		Costant	IND̂.P.	RW_{t-1}	$R\hat{W}$	U	R^2	DW	F
a	MS	-2359	-24 (23)	+2338* (348)	+21 (25)	-140* (67)	0.76	1.31	19.2
Ia	MD	-9107	/ /	+6129** (3303)	+397** (217)	+910 (641)	0.53	1.8	9.5
IIa	GS	1032	-24 (44)	+1727* (669)	-83** (48)	-486* (130)	0.43	1.2	4.5
Va	GD	-1026	-358 (327)	+12680 * (4941)	-40 (358)	-1428 (963)	0.28	1.7	2.33
		Costant	$\hat{V}$	RW_{t-1}	$R\hat{W}$	U	R^2	DW	F
b	MS	-2517	/ /	+2332 * (349)	+9.5 (22)	-133** (67)	0.75	1.3	25.0
Ib	MD	-1408	+2852 (2749)	+7377 * (3511)	+418 ** (216)	+1189 ** (694)	0.56	1.83	7.4
IIb	GS	2986	-942 ** (527)	+1309 ** (673)	-102 * (41)	-571* (133)	0.49	1.33	5.7
Vb	GD	-116	-5109 (4089)	+10358 ** (5221)	-248 (322)	-1824** (1033)	0.29	1.70	2.5

Table U.K. 1950-79 n.1/B (°°)

		Costant	IND̂.P.	RW	RŴ	U	R^2	DW	F
a	MS	-2524	-15 (20)	+2475 * (306)	-22 (22)	-166 * (60)	0.81	1.12	26.5
Ia	MD	-8180	+23 (227)	+5345 ** (3127)	+303 (256)	+1022 ** (603)	0.52	1.84	6.1
IIa	GS	+1005	-18 (44)	+1749 * (666)	-114 * (49)	-492 * (181)	0.43)	1.2	4.5
Va	GD	-1137	-310 (321)	+13607 * (4838)	-280 (362)	-1596 ** (950)	0.31	1.6	2.7

		Costant	V̂	RW	RŴ	U	R^2	DW	F
b	MS	-2769	+91 (260)	+2527 * (332)	-30 (20)	-155 * (65)	0.81	1.14	25.9
Ib	MD	-14071	2764 (2827)	+6619 ** (3608)	+314 (227)	+1274 ** (709)	0.53	1.9	6.9
IIb	GS	+2915	+912 ** (531)	+1333 ** (677)	-123 * (42)	--574 * (133)	0.49	1.3	5.7
IVb	GD	-2488	-4553 (4041)	+11670 * (5157)	-430 (325)	-1966 ** (1014)	0.32	1.7	2.8

Table U.K. 1950-79 n.1/C (°°)

		Costant	T	IND̂.P.	RW	RŴ	U	R^2	DW	F
Ia	MS	-3309	/ /	-15.8 (20)	+2475* (306)	-22 (22)	-166* (60)	0.81	1.12	26.5
IIa	MD	-2524	-985** (500)	+176 (197)	+28940* (11911)	/ /	+1998 * (855)	0.56	1.95	7.6
IIIa	GS	+1774	+29 (134)	-23 (49)	+1043 (3288)	-105 (65)	-521* (188)	0.43	1.17	3.5
IVa	GD	-7675	-2503*+ (824)	+80 (305)	+73566* (20178)	-1054* (824)	+882 (1157)	0.51	2.13	4.7
		Costant	T	V̂	RW	RŴ	U	R^2	DW	F
Ib	MS	-3180	-16 (56)	+85 (266)	+2919* (1384)	-33 (25)	-140** (84)	0.81	1.2	19.9
IIb	MD	-3259	-745 (596)	+2491 (2803)	+24272** (10584)	+140 (264)	+1967* (894)	0.56	2.06	6.0
IIIb	GS	2617	-12 (115)	-916** (544)	+1620 (2830)	-126* (51)	-562* (173)	0.49	1.33	4.4
IVb	GD	-6470	-2502* (710)	-5470 (3337)	+70956* (17363)	-1015* (315)	+363 (1065)	0.56	2.3	5.8

Table U.K. 1950-79 n.1/D (°°)

		Costant	T	$\hat{IND}$.P.	RW_{t-1}	$\hat{RW}$	U	R^2	DW	F
a	MS	-39	+90** (47)	-30 (22)	+205 (1164)	+11 (24)	-241* (83)	0.79	1.0	17.8
Ia	MD	-30924	-854** (462)	+61 (215)	+26181 * (11330)	+491* (239)	+1857* (809)	0.59	1.93	6.9
IIa	GS	2147	+43 (97)	-27 (45)	+702 (2398)	-88** (50)	-534* (171)	0.43	1.2	3.5
Va	GD	-23331	-746 (709)	-307 (330)	+30312** (17375)	+42 (366)	-601 (1262)	0.31	1.90	2.1

		Costant	T	$\hat{V}$	RW_{t-1}	$\hat{RW}$	U	R^2	DW	F
b	MS	-490	+81** (46)	+74 (284)	+440 (1130)	/ /	-215* (83)	0.78	1.1	21
Ib	MD	-33321	-776** (458)	+2118 (2684)	+25289* (11108)	+525* (218)	+1961* (809)	0.60	1.96	6.9
IIb	GS	+2986	/ /	-942** (527)	+1309** (673)	-102* (41)	-571* (133)	0.48	1.33	5.7
Vb	GD	-237777	-1011 (691)	-6067 (4048)	+33708* (16755)	-110 (329)	-817 (1221)	0.35	2.01	2.5

From examining Tables 1A, B, C, and D, it can be seen that the proposed model does not adapt itself to interpreting strike data that refers to the entire economy (see equations III and IV of each block in the above-mentioned tables). Even though the variables of regression are almost always significant in the case of number of strikes, the coefficient of determination which measures the part of variation of the dependent variable, as explained by the model used, never goes above 50% and the result can be considered unsatisfactory.

This result was foreseeable in part by an examination of the graphs of conflict indicators, number of strikes, and hours lost for the manufacturing industries (solid line) and for the entire economy (broken line), see page 103-4. The two jagged lines develop very differently before 1967 regarding number of strikes, while differences are accentuated after 1970 regarding hours lost. As much as this fact leads to emphasizing the appropriateness and importance of the limitations of applicability of the Bargaining Theory model; nevertheless, it does not authorize excluding the applicability of the model or of a similar one to other sectors of the economy, for example, the tertiary sector. It is my opinion that global strike data GS, GD is affected by the anomalous behavior of the mining-quarrying sector[1] and in the last few years by the transportation sector in the component days lost.

The study by P. Galambos and E.W. Evans[2] is also illuminating in this regard. It brings out the composition by sector of the number of strikes as seen in the following table.

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[1]See M.A. Turner (1963) who considers the mining sector a special case, and the article by L. Lynch (1978) on the coal-mining sector in Great Britain, J. Pencavel (1970).

[2]P. Galambos and E.W. Evans (1973).

The number of strikes in the manufacturing industries (MS), equation (I) of each section of 1A, B, C, and D will now be analyzed.

At first glance, they present a coefficient of determination R^2 which is very high, from 0.75 to 0.81. The model which has been used does not seem to adapt itself to interpreting the development of the number of strikes phenomenon in industry. In fact, only two variables are always significant, unemployment rate and real wages. Moreover, if the latter is lagged a year it loses its significance in favor of trend.

More specifically, variation in industrial production and variation in number of vacancies are never significant. The use of one or the other variable, both of which are indicators of the economic cycle, produces no difference in test results.

Furthermore, the rate of fluctuation of real wages never becomes sufficiently significant whereas the only significant variables, unemployment rate and real wages, have signs different than the expected ones: negative for unemployment and positive for real wages.

These results, upheld in successive versions of the model, lead one to suppose that in the United Kingdom the number of strikes, or more generally the likelihood of a strike beginning, is less when the unemployment rate is higher and that there is a positive trend in increase in claims even when there are increases in real wages.

The indicator MD, number of days lost per strike, equation (II) of Tables 1A, B, C, and D, seem to adapt themselves better to the model.

--The variation in industrial production and in vacancies are never significant.

This result can be explained by the fact that these two variables are indicators of the economic cycle. In fact, if it is true that in periods of expansion management is more

willing to give in to workers' claims because there will be a higher profit margin and because production deadlines have to be met, then the workers will tend to increase their demands given their greater blackmail power (damage to the firm). The final influence on probability of conflict could, therefore, be nothing.

--The unemployment rate, a crucial variable for the model, always has a positive sign, as expected.[1]

--The rate of change of real income which always has a positive sign is not always significant, while real wages are always significant whether or not they are lagged or if they are accompanied by the time index.

In examining the whole of equation (II) in group D, it presents a negative trend (always negative in the corresponding equations), lagged real wages, and variation in real wages and unemployment rate that are positive and significant at 99%. It also presents a coefficient of determination R^2 0.60 and D.W. 1.9 which shows, given the lack of autocorrelation of the residuals, the efficiency of the estimates.

It seems that this second measure of strikes better adapts itself to the improved model. The positive unemployment rate seems to be a good start in interpreting it along the lines laid out in the preceding chapters.

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[1]The tests were done using also (1/U) instead of the unemployment rate, assuming a nonlinear relation between unemployment and conflict. The results were hardly satisfying even though they presented the expected sign which in this case was negative. Nonetheless, (1/U) did not reach a sufficient level of significance and the coefficient of determination R^2 was always less than the corresponding one in the equations in Tables 1A, B, C, and D.

3.3.2 Phase II (ψ)

The second step made to improve the specification of the model under empirical verification was to construct the variable ψ = (U-Umax). It was obtained by choosing a value Umax maintained to be the necessary limit in making the union react in defense of the workers.

After having studied the historical series of unemployment rates, a threshold of 4% was chosen. In fact, in 1975 the unemployment rate in Great Britain, after having fluctuated for twenty years around 2%, varying from 1.1 to 2.6, suddenly jumped to 4.1% and continued to climb in the years following to 5.7, 6.2, 6.1, and 5.7. The question was whether or not to choose a lower threshold. On the one hand, a lower one did not seem significant enough to determine trade union action. On the other, it would have enabled consideration of the years 1971-1972 in which unemployment rate went from 2.6 in 1970 to 3.4 and 3.8 and then went down to 2.7 in 1973. Inasmuch as it was temporary, this increase did not seem enough to cause a protest by the workers and the satisfactory results obtained with a 4% threshold validates that choice.

As can be seen from Table U.K. no. 2 A/B, the results partially follow the preceding lines of interpretation for the conflict indicators which, referring to the entire economy, generally are not well interpreted by the proposed model even though an improvement can be noted in equation (IVb) in which the coefficient of determination and of the significance of the variables increases, and for the number of strikes in the manufacturing industries (MS) which, as in the preceding version has good statistical tests but only two significant variables, the time index which has a positive sign and ψ with a negative one, which is the opposite of what was expected.

Table U.K. 1950-80 n. 2/A/B(°°)

		Costant	T	INDP	RW_{t-1}	RW	ψ	R^2	DW	F
	MS	+337	+95 * (47)	/ /	-447 (1252)	/ /	-3891* (1252)	0.78	1.4	29.4
I	MD	-4280	-1284* (441)	-265 (200)	+40385* (11500)	+681* (223)	+46673* (12990)	0.68	2.2	9.3
II	GS	3454	+73 (106)	+45 (48)	-1221 (2768)	-119* (53)	-9468* (3126)	0.42	1.5	4.2
V	GD	-20300	-377 (746)	-150 (338)	+20304 (19449)	-76 (377)	-24845 (21967)	0.34	1.95	2.4

		Costant	T	V	RW_{t-1}	RW	ψ	R^2	DW	F
	MS	114	+104* (49)	+202 (272)	-545 (1270)	/ /	-3845* (1387)	0.78	1.3	21.8
I	MD	-42139	-1121* (461)	986 (2428)	+87543 * (11804)	536 * (200)	+41073* (12649)	0.65	2.1	8.8
II	GS	2116	+34 (72)	/ /	-126 (1902)	17 (32)	-2671* (2047)	0.22	1.5	1.4
V	GD	-66470	-1831* (697)	/ /	+61292* (18300)	-907* (311)	-41821* (19692)	0.59	2.4	9.4

As far as the number of work days lost in the manufacturing industries (MD) is concerned, the results of the regression (II) are notably improved, the coefficient of determination R^2 increases and goes from 0.59 (equation (IIa), Table no. 1/D) to 0.68 which shows a growing explanatory ability from the proposed model. The significance of the avariables increases while keeping the previous signs of regression, negative for time, positive for real wages and its variation, positive as expected for ψ,[1] and industrial production is not significant. Finally, the D.W., showing the lack of autocorrelation of the residuals, assures the accuracy of the estimate.

3.3.3 Phase III (AIψ, $RW_{t-1} \cdot \dot{RW}$)

Encouraged by this success, an attempt was made to perfect the specification of the model, bearing in mind that the mathematical version which represented the entirety of wage and employment claims of the workers with a positive effect on conflict, was made up of those same claims multiplied by their respective concession and resistance rates ($W_o r$ and $\Delta L\rho$). I then thought of restructuring the two products by obtaining an index of economic gravity and one of wage erosion.

A. Index of Economic Gravity

The variation in industrial production, as was the variation in the rate of unfilled vacancies in the economy, was obtained[2] as a percentage of variation, with the following formula: $\Delta = \frac{t-(t-1)}{t-1}$ resulting in a variable that has a negative sign with decreasing production.

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[1] Compared to the mathematical version $\psi = a(U-U\max)$, the variable that was constructed presumes the value $a = 1$.

[2] For more detail, see Appendix IV.

Because the formulation did not lend itself to the scope of the research, the indices of variation of these variables were reconstructed as the relation $\Delta' = \frac{t-1}{t}$ in such a way as to obtain a variable that would increase (AI, AV) when there is a worsening of the economic situation, a reduction in industrial production or in the number of vacancies. In fact, this variation multiplied by the variable ψ previously described, gives rise to two indices of economic gravity $AI\psi$ and $AV\psi$ that can interpret the employment claim of the trade union. As previously stated, the more industrial production is reduced, in the mathematical model $LQ < \hat{L}$, the more the trade unions will want to protest against the threat of layoffs, and the greater will be the likelihood of unemployment, the more violent will be their protest.

Therefore, $AI\psi$ and $AV\psi$, indicators of economic gravity intended as a reduction in industrial production and threat of unemployment, will stimulate strikes and will be expected to have positive signs.

As can be seen in Table U.K. no. 3/A, in examining only MD, the indices of economic gravity are always significant and have the expected positive sign.

In order to be thorough, the tests for MS have been reported. Though the results are not amenable to the model that has been used, they are even less so to its variations.

B. Index of Wage Erosion

Having by now identified the indicator adapted to interpreting the "gravity" of the economic situation, the indicator of wage erosion $(RW_{t-1} \cdot \dot{RW})$ can now be added to the equation (see Table 3/B, equation (IIa) for MD).

This index, as the preceding one, was obtained by multiplying the two components of wage claims: the wage demand, the operational proxy which was identified as lagged real wage,

Table U.K. 1950-80 n. ^{3}/A (°°)

		Costant	T	IN̂DP	RW_{t-1}	RŴ	AI ψ	R^2	DW	F
[a	MS	229	+93 * (48)	/	-466 (1264)	/	-3926 * (1433)	0.77	1.39	28.
[Ia	MD	-43642	-1314 * (403)	-267 (194)	+41173 * (11456)	+698 * (222)	+49272 * (13367)	0.685	2.2	10
[IIa	GS	3444	72 (107)	+44 (48)	-1197 (2803)	-121 * (54)	-9647 * (3271)	0.41	1.5	3.
[Va	GD	-19822	-407 (336)	-159 (339)	+20943 (19619)	-74 (380)	-24241 (22892)	0.34	1.95	2.4
		Costant	T	IN̂DP	RW_{t-1}	RŴ	AV ψ	R^2	DW	F
[b	MS	-280	+71 (44)	-3.78 (20)	+144 (1195)	/	-3679 * (1454)	0.77	1.5	20
[Ib	MD	-40337	-1231 * (335)	-271 ** (166)	+38201 * (8867)	+740 * (188)	+57159 * (10961)	0.77	2.2	15
[IIb	GS	1917	+14 (97)	+35 (48)	+298 (2574)	-116 * (54)	-8944 * (3183)	0.40	1.67	3.0
[Vb	GD	-23794	-508 (671)	-171 (332)	+23734 (17727)	-75 (376)	-24857 (21911)	0.34	2.0	2.4

and the strength of determination of the claims, the rate of change of real wages.

When lagged real income is higher and it will increase faster and the likelihood of conflict about wages will be less. Vice versa, when the real income is lower and it will decrease more (the more slowly it rises), the likelihood of conflict will be greater. The expected sign is therefore negative.

The results for the dependent variable MD are clearly improved. The coefficient of determination R^2 rises to 0.80 relative to 0.59 in the first equation. As before, variation in industrial production is not significant. The trend is significant and has a negative sign, as always. The variable of the gravity of the situation in the economic cycle is positive as expected. The wage erosion index and lagged real wages are significant but positive.

This last result leaves one a bit perplexed. In fact, if the positive link of the indicator of the gravity of the economic situation can be associated with employment claims, it nonetheless seems contradictory to have a positive link between strikes and real wage index, variations in real wages, and the composite index. It would be more rational and conform with the hypotheses previously made, to suppose that when real income decreases, wage claims presented by the workers would increase.

A study on wage claims has been made to investigate this idea.

3.3.4 Phase IV (A Study on Wage Claims)

It was decided to substitute the variation of real wages, indicator of the workers' determination in their wage claims, with its components, variation in $(\dot{P})$ consumer prices and variation in monetary wages $(\dot{W})$.

Table U.K. 1950-80 n.3/B (oo)

		Costant	T	INDP.	RW_{t-1}	$R\bar{W}$	$RW_{t-1} \cdot R\bar{W}$	AVψ	R^2	DW	F
	MS	-280	+71 (44)	-3 (20)	+166 (1195)	/	/	-3679 * (1454)	0.77	1.5	20
I	MD	-3420	-1124 * (323)	-168 (167)	+33619 * (8769)	-1232 (1068)	+1068 ** (570)	+52245 * (10734)	0.80	2.3	14.8
II	GS	-252	-23 (86)	/	+1915 (2355)	+581 * (267)	-378 * (146)	-7224 * (2747)	0.52	1.76	5
V	GD	-29327	-604 (687)	-264 (354)	+27866 (18609)	+1703 (2267)	-963 (1211)	-20426 (22779)	0.36	2.1	2.1

		Costant	T	INDP.	RW_{t-1}	$R\bar{W}$	$RW_{t-1} \cdot R\bar{W}$	AIψ	R^2	DW	F
	MS	+159	+90 ** (53)	-3 (23)	-289 (1509)	+44 (165)	-24 (88)	-3806 * (1731)	0.78	1.4	12.7
I	MD	-35929	-1156 * (433)	-149 (203)	+35139 * (11599)	-1423 (1282)	+1146 ** (683)	+43144 * (13376)	0.72	2.4	9.5
II	GS	982	+21 (101)	+6 (47)	+728 (2708)	+555 ** (299)	-366 * (159)	-7690 * (3123)	0.53	1.7	4.1
V	GD	-27369	-540 (778)	-258 (364)	+26012 (20808)	+1708 (2300)	-963 (1225)	-19012 (23996)	0.36	2.0	2.

Table U.K. 1950-80 n.4 $\dot{\phi}$o)

		Costant	T	INDP.	RW_{t-1}	AIψ	$\dot{P}$	$\dot{W}$	R^2	DW	F
I	MS	542	+101** (60)	+3 (28)	-658 (1680)	-4182* (1890)	+5 (21)	/ /	0.78	1.4	16
II	MD	-5768	-1 852 * (445)	- 558 * (209)	+5 8646 * (12321)	+6 76 47 * (13 904)	- 890 * (205)	460* (197)	0.75	2.1	11

		Costant	T	$\dot{V}$	RW_{t-1}	AVψ	$\dot{P}$	$\dot{W}$	R^2	DW	F
I	MS	-6 46	+80 (48)	+2 43 (2 91)	+1 40 (1295)	-36 36* (1488)	-/	-3.8 (1.8)	0.78	1.5	16
II	MD	-46 57	-1 235 * (362)	+1392 (2090)	+41954 * (.9828)	+56667 * (11.123)	-597 * (158)	400* (192)	0.7	2.0	12.2

Conforming with the hypotheses previously made, the more real wages decrease, the faster prices increase, and the more monetary wages decrease, the more workers will want to protest in order to defend their purchasing power. Variation in real wages ($\dot{RW}$) with an expected negative sign has been substituted by the variation of ($\dot{P}$) prices with an expected positive sign and the variation of monetary wages ($\dot{W}$) with its expected negative sign.

By examining the results of Table 4, equation (IIa), referring to the number of work days lost in industry, the opposite of what is expected can be seen, as happened previously. The variation in prices, which is significant, has a negative sign and the variation in monetary wages, which is also significant, has a positive one.

An attempt has been made to investigate the relationships of wage claims by applying the multiplicative model and the regression with the logarithms of the variables. Industrial production, unemployment rate, real wages and alternatively monetary wages, and consumer prices have been inserted in the regression. The preceding results were confirmed by the positive sign of real and monetary wages and by the negative sign of consumer prices, all of which were highly significant.

As far as days lost per strike (MD), the statistical test ($R^2 \cdot 0.67$, D.W. 2.2) were less than the previous ones in the linear version, and this was also true as a whole for (MS) the number of strikes where the increase in the coefficient of determination ($R^2 \cdot 0.91$) was compensated for by a worsening of the D.W. test (D.W. 1.3). It is necessary to interpret these results.

Cella, the author who is closest to this approach because he analyzes the period 1946-71 using annual data, obtains similar results using as a dependent variable the number of days lost in the entire economy excluding the mining and quarrying sector.

The coefficient of variation of real wages is positive and significant, confirmed by the negative sign of price variations which is not always significant. The interpretation suggested by the author, utilizing the efficient terminology adopted by Bain and Elsheikh for unionization, is based on a "credit effect" that raises wage expectations and faith in a successful strike after repeated increases in real wages.

In other words, it would not be the compression of the consumer level that brings about conflict but phenomena of "wage catch-up"[1] sustained by the greater financial capacity of the workers who can allow themselves the resources to invest in future wage increases.

This result also can be interpreted in a more economic way be considering the mechanism of workers' expectations. The version proposed hypothesizes that which can be called a purely defensive wage claim based on the presumption of a continual delay of the workers that only if it is surpassed by inflation will the workers protest in order to recover their purchasing power.

On the other hand, the positive sign of the coefficients of the wage claim indicators leads one to suppose the presence of a mechanism of expectations that is the fruit of memory of past experiences for which the greater the wage increases the higher the expectations will be and thus the likelihood of conflict is greater.

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[1] On the importance of the modification of the relative differentials between categories of workers, cfr. M.A. Clegg, 1970.

3.4 Italy 1950-1980[1]

As in the preceding section, successive phases in specification of the model will be treated.

The dependent variables, number of strikes (MS) and of work days lost per strike in the manufacturing industries (MD) and the number of strikes (GS) and of work days lost per strike (GD) in the entire economy, have been interpreted with:

--the unemployment rate (U) given by the relation between the unemployed, people in search of a first job or others looking for work over the labor force,

--the rate of change of industrial production obtained as a percent variation in the industrial production index ($I.\dot{P}.$),

--real wages lagged by a year (RW_{t-1}) obtained as a relationship between minimum contracted wages for workers of the manufacturing industries including welfare (W) and the general cost-of-living index (P),

--the variation in real wages has been replaced by its two components, change in price($\dot{P}$) and change in wages ($\dot{W}$), in order to better identify their respective effects, and

--finally, for reasons already mentioned above, the time variable has been inserted.

3.4.1 Phase I (Simple Variables)

From the results of the tests presented in Table 1 A/B, it can immediately be noted that in contrast to Great Britain, the tendency toward conflict in the entire economy follows a model that has an economic-industrial interpretation. In fact, in the regression the dependent variables GD or GS give results that are at times better than the corresponding MD and MS for

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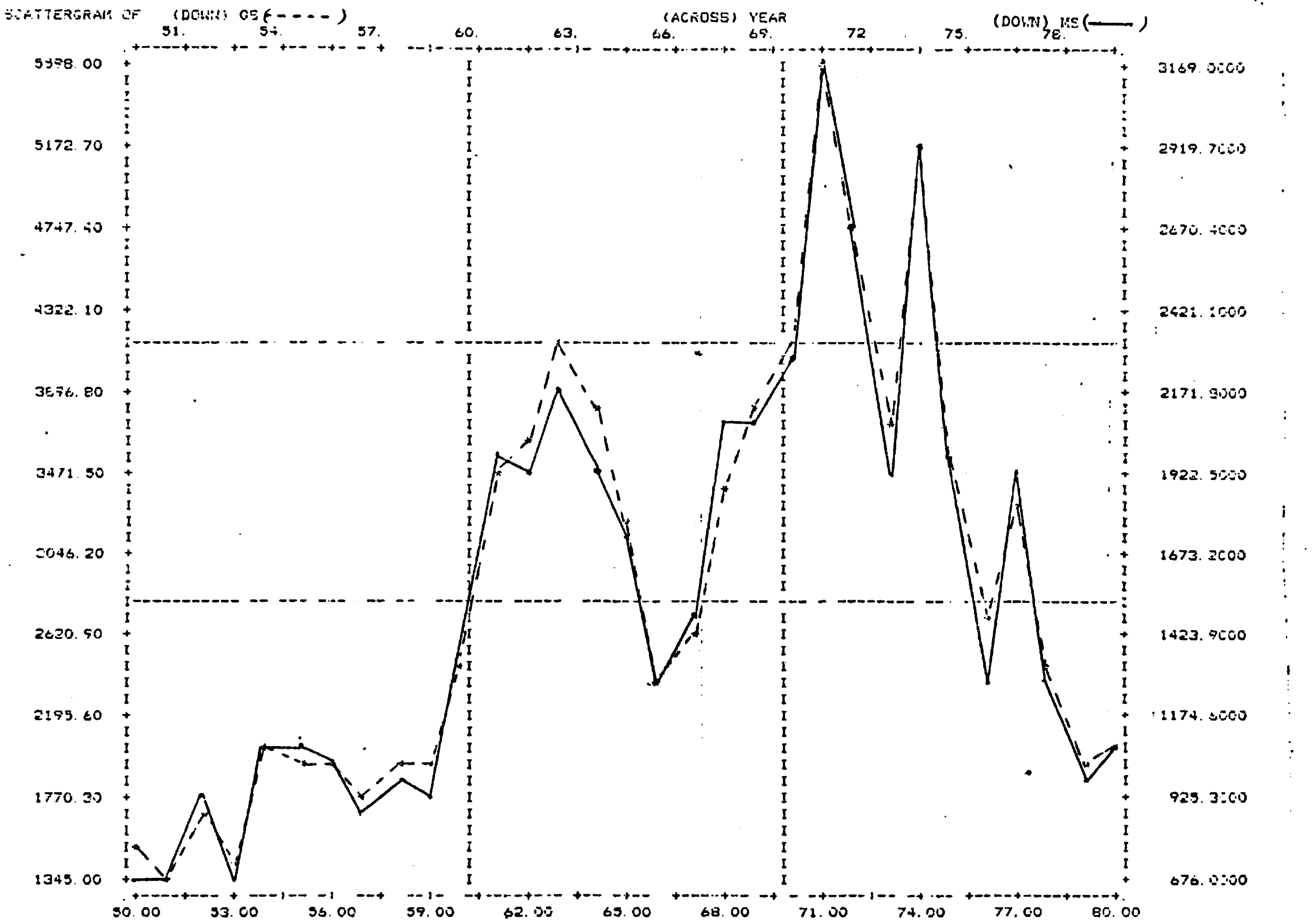
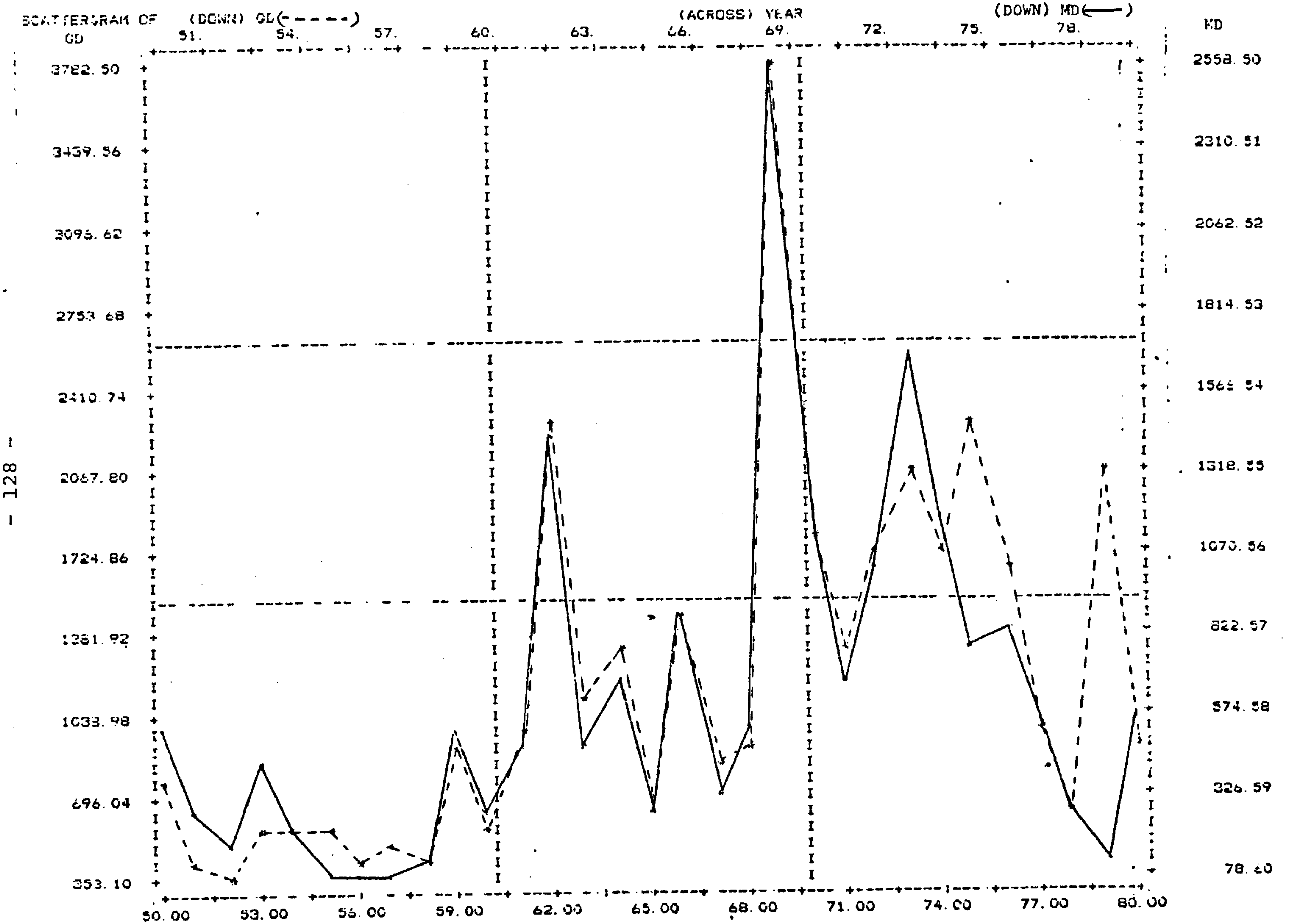
[1]For more detailed information on statistical sources or on the historical series of data on Italy, see Appendix III.

Graph ITALY 1950-80 number of Strikes in all Economy(GS) and in the Manufacturing Sector(



Graph ITALY 1950-80

number of man-day-lost in all the Economy(GD) and in the Manufacturing Sector(MD)



the manufacturing industries. Nevertheless, the result was foreseeable given the similar, if not identical, developments of the two strike indicators in industry and in the entire economy. This can easily be seen in graphs no. 1/2.

This fact can be interpreted first of all by ascertaining that in Italy there is no sector with an atypical tendency toward conflict which changes the general progress of conflict and deviates it from the industrial one.

Secondarily, this means that the other economic sectors, and above all new groups that entered the conflict arena at the end of the sixties, that is Commerce, Transportation, and Public Administration, have adopted a pattern of claims that is "borrowed" from the industrial sector (cfr. Table Italy No. A).

Therefore, the strike variables for industry will be analyzed at the same time as those for the entire economy. The examination of equations (II and IV) of the variables work days lost per strike (MD, GD) in both industry and the general economy demonstrates how much these indicators are not sensitive to the proposed interpretive model. In fact, the coefficient of determination R^2 varies around the threshold of 50% and almost all the variables of the model are not significant. As will be seen later, the course of strike duration is captured mainly by the time variable and by the lagged monetary wages variable.

The number of strikes in industry and in the economy (MS, GS) better responds to the model; on a positive trend there is a protest reaction to the reduction in lagged real wages. The results of the regression tests are improved above all in the version that considers lagged monetary wages (W_{t-1}) as an indicator of wage demands instead of lagged real wages (which has a correlation that is too high with time (0.9) and variations in consumer prices ($\dot{P}$) as the indicator of workers' determination in carrying through their claims instead of the

Table Italy 1950-80 n.1 A/B (od)

		Costant	T	IND.P.	RW_{t-1}	$\hat{P}$	$\hat{W}$	U	R^2	DW	F
	GS	4841	2.37* (118)	-25 (27)	-5026* (2501)	+18 (75)	+57 (47)	+37 (226)	0.70	1.4	8.8
I	GD	23 214	+849 (1067)	+26 (250)	-17712 (22399)	-94 (676)	+374 (427)	-979 (2025)	0.48	2.3	3.5
II	MS	2 332	154* (72)	-24 (14)	-3176* (1511)	+14 (45)	+27 (28)	+58 (136)	0.69	1.5	7.2
V	MD	1 1515	428 (788)	+195 (186)	-8221 (16557)	-348 (499)	+440 (316)	-866 (1497)	0.46	2.4	3.1

		Costant	T	IND.P.	W_{t-1}	P	U	R^2	DW	F
	GS	666	208* (58)	-35 (23)	-11* (3)	+59** (31)	+81 (156)	0.77	1.4	15.2
I	GD	7319	8615 (588)	-27 (234)	-48 (30)	+262 (320)	-642 (1566)	0.51	2.2	4.7
II	MS	68	128* (35)	-24** (14)	-7* (1)	+28 (19)	+74 (94)	0.76	1.5	13.7
V	MD	757	667 (443)	144 (176)	-35 (23)	+160 (241)	-315 (1181)	0.46	2.1	3.7

TABLE ITALY n.A

Number of working days lost through industrial stoppages, by branch of activity *(cont.)*

		1971	1972	1973	1974	1975	1976	1977
					1 000			
					ITALIA			
1	Agriculture, forestry, fishing	2 250	1 239	743	1 214	3 188	2 006	1 131
2	Extraction industries	86	225	180	95	192	96	58
3	Manufacturing industries	5 826	8 925	14 372	10 189	8 328	12 196	8 451
4	– Food, drink, tobacco	472	313	129	616	291	349	524
5	– Textiles	375	344	1 705	949	874	1 373	846
6	– Clothing	193	192	207	417	402	399	255
7	– Footwear, leather and connected products	213	47	226	210	203	195	100
8	– Wood and furniture	49	58	284	208	249	286	107
9	– Metals and machinery	2 676	5 647	9 840	5 664	3 977	7 189	4 477
10	– Non-metalliferous minerals	338	443	498	248	220	350	263
11	– Chemicals and rubber	782	1 652	995	1 241	1 350	1 428	1 160
12	– Paper and printing	661	156	360	251	304	249	398
13	– Miscellaneous	68	74	130	385	460	378	321
14	Building	248	1 885	283	1 243	1 941	1 701	1 171
15	Electricity, gas and water	68	118	253	171	149	94	46
16	Commerce	407	142	1 058	726	1 081	1 396	191
17	Transport and communication	897	938	1 606	774	1 569	1 014	627
18	Finance and insurance	182	908	48	180	221	623	81
19	Services and miscellaneous social activities	781	1 423	682	916	1 259	962	1 199
20	Public administration	2 214	1 258	1 267	1 526	5 864	2 119	1 560
21	Total of working days lost	12 949	17 060	20 492	17 033	23 791	22 205	14 495
22	Working days lost per 1 000 employees	950	1 245	1 472	1 200	1 669	1 542	1 000

TABLE ITALY n.A

1 000

No.		1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
				ITALIA						ITALIA		
1	Agriculture, forestry, fishing	1 532	2 011	3 672	1 320	1 761	1 048	853	1 275	941	2 500	416
2	Extraction industries	171	305	382	344	601	94	278	104	99	262	96
3	Manufacturing industries	2 864	4 512	14 168	4 792	6 591	2 674	9 050	3 282	5 370	25 585	9 528
4	– Food, drink, tobacco	159	313	252	445	189	282	458	125	228	467	182
5	– Textiles	292	1 382	346	1 450	3 163	367	150	1 571	470	982	4 030
6		:	:	:	:	:	:	:	425	479	482	589
7	– Footwear, leather and connected products	:	:	:	:	:	:	:	249	145	167	776
8	– Wood and furniture	:	:	:	:	:	:	:	163	93	212	426
9	– Metals and machinery	1 760	1 118	12 286	1 600	933	723	7 626	309	2 478	19 399	1 811
10	– Non-metalliferous minerals	:	:	:	:	:	:	:	281	400	909	544
11	– Chemicals and rubber	:	:	:	:	:	:	:	116	659	2 353	877
12	– Paper and printing	:	:	:	:	:	:	:	33	189	422	159
13	– Miscellaneous	:	:	:	:	:	:	:	32	229	192	137
14	Building	519	446	1 059	2 692	659	426	1 395	140	537	3 144	322
15	Electricity, gas and water	144	92	233	119	50	229	250	61	224	119	654
16	Commerce	59	80	95	108	68	30	25	39	179	571	657
17	Transport and communication	185	609	404	652	1 540	710	1 144	608	684	1 451	1 405
18	Finance and insurance	23	8	14	325	21	74	128	749	17	742	37
19	Services and miscellaneous social activities	116	413	377	500	1 897	1 809	1 351	656	381	658	1 024
20	Public administration	184	1 416	2 316	646				1 663	808	2 892	4 137
21	Total of working days lost	5 786	9 891	22 717	11 396	13 089	6 993	14 474	8 569	9 240	37 825	18 277
22	Working days lost per 1000 employees	486	825	1 842	908	1 059	583	1 223	709	757	3 051	1 445

two components of variation in real wages, variation of prices and of wages, which mutually annul each other and have a correlation of 0.91.[1]

In fact, in conforming with the preceding hypotheses, workers reduce their wage claims with an increase in monetary wages, but at an increase in variation in prices, they protest in order to hold back a cost-of-living increase.

The variation in industrial production ($\dot{IP}$) in this second version, which incorporates monetary wages, is significant and has the expected negative sign (cfr. equation (III)).

The unemployment rate variable which indicates the likelihood of workers to find jobs was used as a measure of workers' determination to defend their own jobs and is never significant.

This variable will now be discussed. Along with the variation in industrial production, it should characterize employment claims. It has already been noted that the variation in industrial production often is not significant for the fact that too many conflicting influences interpose themselves. The more industrial production increases, the more management will be willing to concede salary increases and will increase (or at least not reduces) employment; therefore, workers will make wage claims but not employment ones. The influence of this variable on strikes is doubtful even if the negative component should prevail. Having first encountered a negative value for the index of simple correlation between this variable and GS and MS respectively at -0.43 and -0.45 and then the negative sign of its regression coefficient (significant only for MS), would lead one to suppose that in Italy there are smaller claims in periods of expanding production.

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[1]I realize this version hypothesizes a certain monetary illusion of the workers that at an increase in monetary salary they reduce the conflict, but this was unavoidable in order to obtain a degree of adaptability of the model in its entirety. Moreover, if variation in monetary salary as well as variation in consumer price is considered, we only succeed in losing the significance of the two coefficients.

Therefore, there would be assumptions for an interpretation that follows the model of employment claims.

The insignificance of the unemployment rate nonetheless causes some doubt. The perplexity is re-enforced by the significance of its regression coefficient which has a negative sign if the time variable of the regression is eliminated.

It is my deep conviction that, above all, in Italy a highly conflictual country, the insertion of the time variable is indispensable in grasping the national connotations of manifestations of protest that have cultural and socio-political origins. Nevertheless, the validity of the specification of this connotation expressed by the arithmetical progression of a linear trend remains to be proved.[1]

3.4.2 Phase II (ψ)

The variable ψ = (U-Umax) will now be constructed. In the case of Italy, the choice of unemployment threshold that the trade unions consider alarming was more complex than for Great Britain. In fact, the historical series on unemployment, already at a high level, shows much higher values than average at the beginning of the 50's. I have, nevertheless, maintained it is possible to exclude those years inasmuch as the employment rate after the first World War was high, not so much as a result of loss of jobs but as a result of the increase in the labor force (entrance of women into the job market).

In this approach, the unemployment level "alarms" the trade union inasmuch as it is an indicator of the likelihood of future

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[1] The variation in industrial production has been substituted by the index of utilized productive capacity which, in my opinion, should better interpret the course of production with respect to the job market. Nonetheless, this has never proved to be significant and the determination coefficient of the regression is less than the previous ones. The regressions were also done with the inverse of the unemployment rate with no better results.

Table Italy 1950-80 n.2 A (°°)

		Costant	T	IÑD.P.	W_{t-1}	Ṗ	ψ	R^2	DW	F
	GS	1480	+244* (41)	-35** (21)	-23* (7)	+113* (41)	+1883* (1017)	0.80	1.4	17.9
I	GD	709	+1038* (428)	/	-47 (73)	+222 (437)	-1533 (10667)	0.51	2.2	6.
II	MS	805	+138* (25)	-24** (13)	-12* (4)	+58* (25)	+1038** (627)	0.78	1.6	15.6
V	MD	-2374	+774 * (182)	+148 (172)	-40* (14)	+161 (236)	/	0.45	2.2	5.

unemployment, and corresponds to a phase in which there is a fall in demand and in production. This tie allows for excluding the period of economic reconstruction and the successive boom. Another reason that is political-organizational in character, permits excluding the 50's. In fact, the employment claims that have been described are characteristic of a mature trade union that is strong and well-rooted in the system of industrial relations and that, therefore, does not correspond to the trade union after the first World War.

A threshold of 5% was decided upon. The results of the regressions are satisfactory only for GS and MS, the only variable that can be interpreted by the proposed model. The tests of equations (I) and (III) of Table No. 2 will be analyzed. All the variables of the model have significant coefficients of regression with the expected sign. The coefficients of determination is very high, 0.78 and 0.80, which shows that the specification of the model in large part interprets 80% of the variation of the dependent variable. Nonetheless, for both the equations the variables show the D.W. test in an uncertainty area which does not assure efficient estimates.

3.4.3 Phase III ($AI\psi$; $RW_{t-1} \cdot \dot{RW}$)

The index of economic gravity ($AI\psi$) was then constructed working as before, by constructing first an index (AI) of the variation in industrial production such that at a decrease in production it increases $\frac{(t-1)}{t}$ and multiplying it by the variable ψ.

Even though the results were good, they were no better than the previous ones. In fact, the coefficients of determination were slightly less. The insertion of the wage erosion variable ($RW_{t-1} \cdot \dot{RW}$) did not improve the test. In fact, the variable itself is never significant and the variation in industrial production loses its significance.

Table Italy 1950-80 n.3 A/B (°°)

		Costant	T	IND.P.	W_{t-1}	P	AI ψ	R^2	DW	F
	GS	1466	231 * (39)	-34 (22)	-20* (6)	+98* (38)	+1546 ** (956)	0.79	1.4	17.3
I	GD	965	1005 * (412)	-24 (235)	-42 (66)	+203 (408)	-2413 (10083)	0.51	2.2	4.6
II	MS	797	134 * (23)	-23 ** (13)	-12* (3)	+52* (23)	+965 ** (579)	0.78	1.6	15.6
V	MD	-2374	774 * (182)	148 (172)	-40* (14)	+161 (236)	/	0.46	2.2	4.8

		Costant	T	IND.P.	W_{t-1}	P	AI ψ	$RW \cdot RW_{t-1}$	R^2	DW	F
	GS	1478	226* (40)	-31 (23)	-20 * (6)	+93 * (40)	+1645 ** (988)	+20 (37)	0. 79	1.6	13.9
I	GD	844	991* (419)	/	-43 (66)	+189 (416)	-2008 (10183)	+75 (383	0.51	2.3	4.6
II	MS	802	132* (24)	-22** (14)	-12* (3)	+50 * (24)	+1008 ** (601)	+9 (23)	0.78	1.7	12.5
IV	MD	-2222	718* (321)	+180 (182)	-43 (50)	+110 (317)	+1479 (7777)	+253 (297)	0.47	2.4	3.2

3.4.4 Phase IV (Cassa Integrazione Guadagni)

The application of the model to Italy is completed by considering one last variable, the authorized hours of Cassa Integrazione Guadagni (C.I.G.) conceded by industry. C.I.G. (a form of unemployment insurance) which began after World War II is a tool used in interventions in defense of workers' wages that the firm with the consent of the trade unions can use in periods of temporary market crisis and, since 1968, for the restructuring, reorganizing and reconversion of industry.[1] It consists in an integration of the workers' wages which can vary from 80% to 99%, and can reach a maximum of forty hours per week, without any established time limits.[2]

Given the low insurance coverage of the unemployed (the lowest in Europe),[3] the system of reducing work hours and unemployment compensation (financed by the Instituto Nazionale per la Previdenza Sociale) has become the only tool that can be used by firms in a stagnant phase or in crisis. From a tool to protect labor, it has been transformed into a tool which guards workers' income in periods of crisis.

Besides institutional changes which hinder a direct use of the historical series, it is my opinion that the variation in hours conceded by C.I.G. justly illustrates the repercussions of industrial production on the job market and can, therefore, be substituted by it in this study.

An increase in authorized hours of workers employment

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[1]For a clear and detailed analysis of the mechanism of Cassa Integrazione Guadagni, see P. Munzi Bitetti, La Garanzia del Salario, Ministero del Bilancio report, 1980; Y. Krause, "The Impact of Unemployment Insurance on Unemployment," paper in progress, IUE 1980; M. Ferrera, Suiluppo e crisi del Welfare State in Italia (1981).

[2]In 1979, law no. 624 established the maximum limit at two years.

[3]European Communities (1976), p. 48.

Table Italy 1950-80 n.4 A/B ($_{00}$)

		Costant	T	W_{t-1}	$\dot{P}$	U	O.Ċ.I.	R^2	DW	F
I	GS	608	+193 * (63)	-10 * (3)	+63 ** (34)	+55 (162)	+1.6 ** (0.9)	0.77	1.4	11.3
II	GD	4102	1047** (628)	-57** (31)	+306 (341)	-390 (1597)	-12** (8.8)	0.54	2.3	4.[illegible]
III	MS	+114	125* (39)	-6* (1.9)	+29 (21)	+68 (100)	+1.0 ** (0.5)	0.74	1.4	11.9
IV	MD	-1432	+865 ** (454)	-46* (22)	142 (246)	-4 (1153)	-13* (6)	0.54	2.2	4.8

		Costant	T	W_{t-1}	$\dot{P}$	ψ	O.Ċ.I.	R^2	DW	F
I'	GS	1203	+235* (41)	-22* (7)	+125 * (45)	+1918 ** (1028)	+1.5 ** (0.8)	0.80	1.4	16.9
II	GD	200	1175* (438)	-61 (75)	+286 (483)	-377 (10915)	-12 (8.9)	0.54	2.3	4.9
III	MS	587	134 * (26)	-12* (4)	+63* (29)	+1035 (655)	+1 ** (0.5)	0.76	1.5	13.5
IV	MD	-1442	911 * (316)	-55 (54)	185 (348)	+1359 (7869)	-13 * (6)	0.54	2.2	4.9

compensation[1] will correspond to a phase in which production drops and will, therefore, provoke workers' reaction in defense of their jobs.

The expected sign of the variation [O.C.I. (+)] of consented hours, if substituted in the regression by the variation in industrial production, will be positive. As can be seen in Table 4, for the variables GS and MS the results confirm this hypothesis. The model with simple variables is improved by the substitution of the unemployment rate with the variable ψ.

As far as equations (I) and (III) are concerned, the significance of the variables and the coefficient of determination R^2 increase. The D.W. test remains the same in the area of uncertainty of the test.

All the variables have the expected sign: positive for the variation in consumer prices, negative for lagged real wages which confirms the hypothesis of wage claims from an erosion in purchasing power, and positive for the variable ψ and for the variation in allowed hours of Cassa Integrazione Guadagni in favor of claims made in defense of employment.

A pattern of wage and employment claims regarding the number of strikes would seem to be confirmed in Italy, be they only in the industrial sector or in the entire economy, while in reference to the number of hours lost, the trend component seems to prevail.[2]

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[1]The authorized hours of C.I.G. are the only data given by the Ministero del Lavoro.

[2]It would be interesting to strengthen the ties between Cassa Integrazione and job mobility of which the layoff rate may be considered succedoneous data. Nevertheless, these indications are beyond the scope of this research given the lack of comparable information in the other countries under study. France does not have the statistical classification of layoffs and Great Britain published only the total number of outgoing workers.

3.5 France 1950-1979

3.5.1 Phase I (Simple Variables)[1]

The first test of the model, as in the preceding examinations, will be made with the specification in which the impact of the simple variables is considered: time, real wages lagged one year (RW_{t-1}) which is obtained by the relation between the index of the weekly wage rate in industry--a product of the index of hourly wage times the duration of the paid work week--and the consumer price index, the variation rate of that index ($\dot{RW}$), the change in industrial production ($\dot{IP}$) which includes construction industries, the unemployment rate (U) obtained as a relation between unfilled jobs and the labor force. This last indicator is particularly weak because, it is influenced by the extension of the Agences National pour l'Emploi since 1968 that registers the job market.

The dependent variables will be the number of work days lost per strike (GD) and the number of strikes (GS) in the entire economy and just the number of days lost (MD) in the manufacturing industries. In fact, data on the number of strikes by economic sector has not been available since 1967.

Moreover, data on the variation in jobs offered ($\dot{V}$) has been used instead of the change in industrial production. The inverse of the unemployment rate, $\frac{1}{U}$, has been used instead of the unemployment rate itself.

From Table no. 1/A it can be seen that the component days lost per strike barely lends itself to the explanation of this model. The variable (GD) in reference to the entire economy will no longer be taken into consideration, given the impossibility of overcoming the marked inability of the model to interpret its variation. The results are not satisfactory

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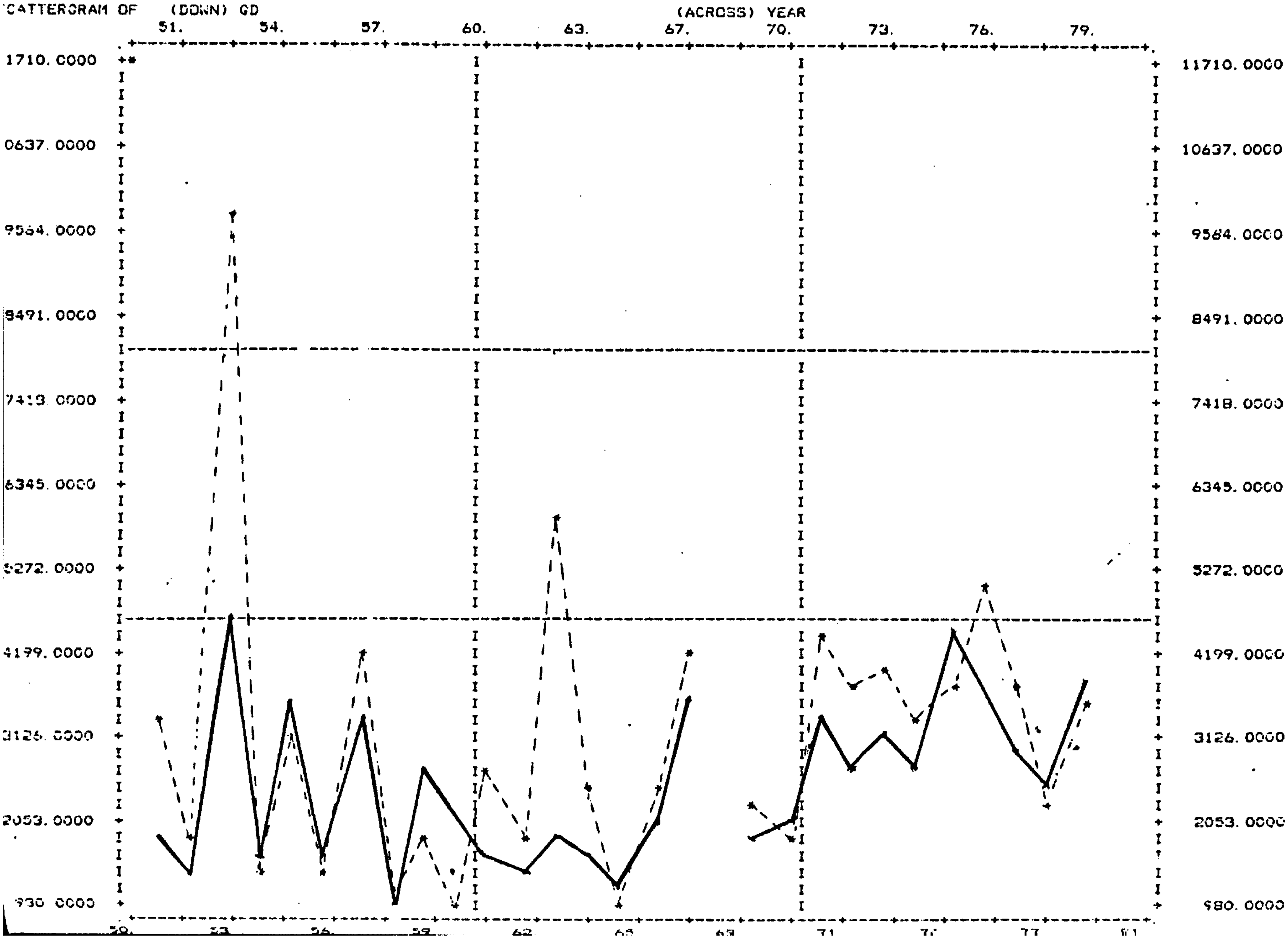
[1]For more detailed information on the data, see Appendix III.

Grapn FRANCE 1950-80

GD= number of man-day-lost in all Economy (--------------)
MD= number of man-day-lost in Manufacturing Sector (————)



GS=number of strikes in all the Economy

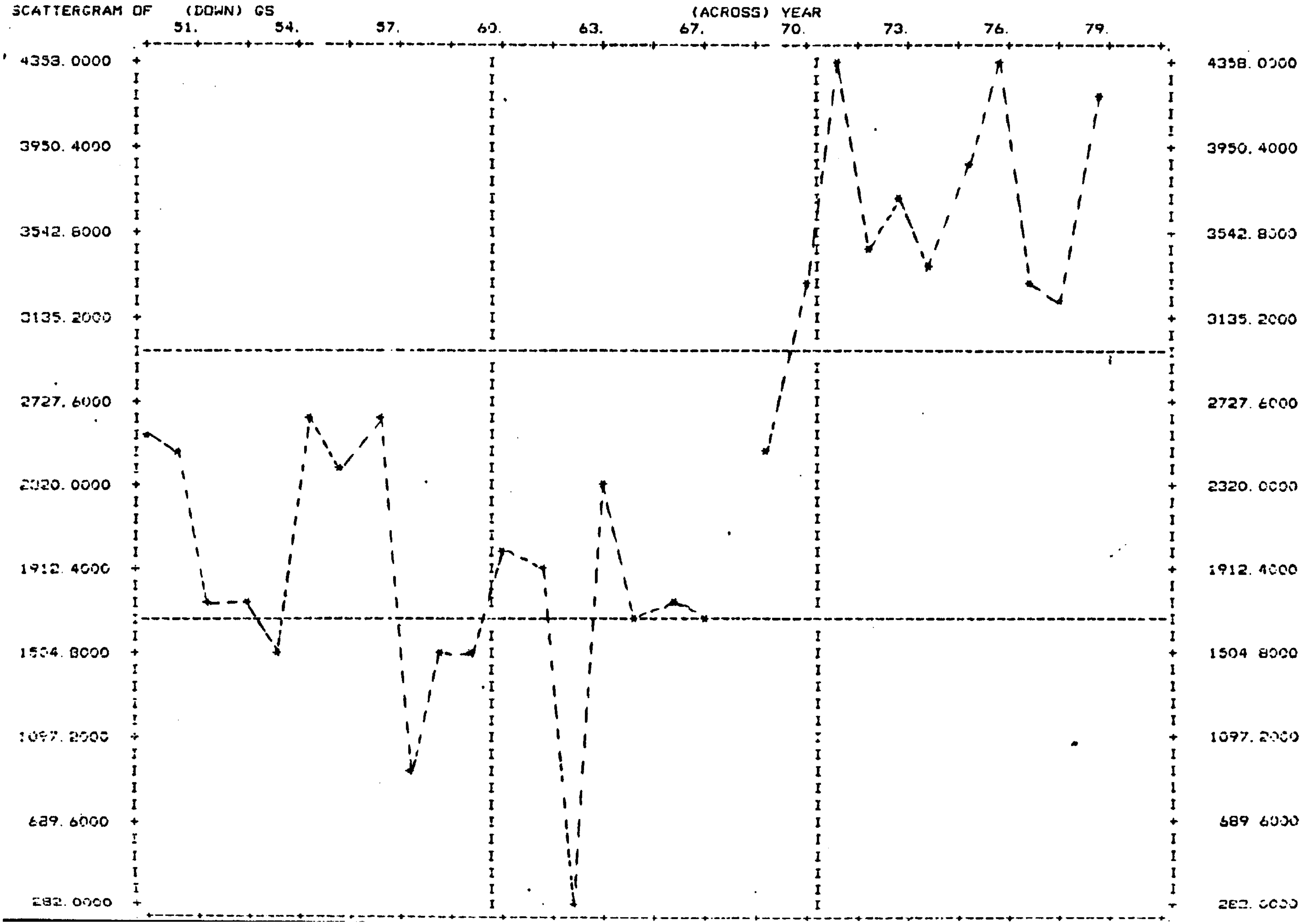


Table France 1950-80 n.1 A (°°)

		Costant	T	$\hat{IND}.P.$	RW_{t-1}	$\hat{RW}$	U	R^2	DW	F
a	GS	-5101	-346* (188)	+40 (40)	+15902* (7451)	0.3 (0.9)	-99 (255)	0.62	1.7	7.4
Ia	GD	1891	-168 (473)	-111 (101)	+5155 (18594)	/	+113 (552)	0.1	2.5	0.5
IIa	MD	-1053	-177 (179)	-51 (38)	+6684 (7095)	0.2 (0.8)	+61 (238)	0.35	2.5	2.4
		Costant	T	$\dot{V}$	RW_{t-1}	$\hat{RW}$	U	R^2	DW	F
b	GS	-4493	-330** (178)	+6* (3)	+14860** (7082)	0.2 (0.8)	-37 (239)	0.66	1.8	8.7
Ib	GD	+1033	-162 (504)	-7 (8)	+5524 (20035)	-0.2 (2.5)	+137 (676)	0.1	2.5	0.3
IIb	MD	-1285	-164 (176)	-1.7 (3)	+6367 (6929)	/	+109 (208)	0.30	2.5	2.4

Table France 1950-80 n.1 B (°°)

		Costant	T	$I\hat{N}D.P.$	RW_{t-1}	$R\hat{W}$	1/U	R^2	DW	F
I	GS	-2316	-266* (129)	+51 (36)	+11507* (4738)	/	-582** (340)	0.65	1.9	11.0
II	GD	+5581	-156 (344)	-96 (97)	+2468 (10611)	/	-1410 (1040)	0.2	2.7	1.0
III	MD	+426	-177 (126)	-46 (35)	+5756 (4672)	0.3 (0.7)	-592 (376)	0.41	2.8	3.1

		Costant	T	$\hat{V}$	RW_{t-1}	$R\hat{W}$	1/U	R^2	DW	F
I	GS	-2365	-282* (128)	+6* (2.9)	+11932* (4719)	0.1 (0.7)	-497** (276)	0.69	2.0	9.7
II	GD	5437	-139 (347)	-7 (8)	+2101 (12677)	/	-1561 (1032)	0.2	2.8	1.0
III	MD	162	-179 (130)	-2 (2.9)	+5981 (4801)	0.2 (0.7)	-662** (382)	0.38	2.8	2.7

The analysis of annual strikes in France from 1959 to 1971 made by Kemeny[1] is in line with this interpretation. The positive effects of the unemployment rate and of the variation in real wages (that of the fluctuation in monetary wages is also positive whereas it is negative for prices) on the likelihood of conflict[2] are interpreted as an antagonistic offensive which is fundamentally permanent, against the political, economic and social system having a class matrix. From this, the author derives a conflicting use of the very improvements in labor conditions and a reaction to increasing unemployment as an index of the insecure situation which is not just economic.

Though remaining consistent with the above, the interpretation presented in this research constructs, along with the positive linear relationship of the unemployment rate, a negative one with the inverse of that rate. A positive relation is hypothesized between increase in unemployment and likelihood of conflict which decreases at unemployment rises.

The results, notwithstanding the high quality of the data used,[3] would lead to the supposition of the presence of claims for levels of unemployment that are not very high which would decrease as unemployment rises.

At first glance, this would seem to refute the classic hypothesis of the restraining effect of the unemployment rate which assumes a negative relationship between the two variables.

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[1] P. Kemeny (1979).

[2] These results were accompanied by a lack of significance of the political-organizational variables.

[3] I would like to emphasize that the results presented here were obtained using data on the unemployment rate that is unreliable. In fact, it is influenced by the opening of the Agence National pour L'Emploi. Nonetheless, the results of the tests are constant even if different statistical sources are used, e.g., Euro. Stat., O.C.D.E., for the unemployment rate, and the Ministere du Travail for the number of unemployed.

Nonetheless, this theory uses the unemployment rate as an indicator of the union's bargaining strength (blackmail power) and assumes that in periods of general unemployment, management can easily decide employment levels or choose non-union labor willing to work for the offered salary since there is an available reserve of labor (the unemployed).

The "classic" theory is then not contradicted by the test results, but the work hypothesis presented there is overturned. The elaborated model generally attributed a propulsive power to unemployment and specifically tried to identify a particular level Umax which alarmed the trade union and caused the workers to protest in defense of jobs. The results of the tests emphasize that at an increase in unemployment, its ability to act as a "fuse," is reduced.

3.5.2 Phase II (ψ)

At first, the construction of the variable ψ = (U-Umax) seems extremely simple. The historical series on unemployment rate, whether data from Eurostat or OCDE is used, and that on the number of unemployed, using national sources, show an increasing course (cf. Table France A). After 1970, the data shows inexorable increases. The Umax chosen, using the historic series on unemployment rate furnished by Eurostat, is fixed at 4%. The number of unemployed, the increase by 3,200,000 in job applications, equal to 1.6% in 1974--therefore, the level of the number index obtained by the series at 200--seemed to be a threshold that was enough to mobilize trade union and labor reaction.

The results of the tests in Table 3A will now be analyzed. In the first equations the variable obtained from the unemployment rate has been used; while in the second equations the independent variable N obtained from the number of unemployed workers (number of job applications) which seemed to better balance the bariation in number of jobs offered (V).

Table A

UA=ANNUAL UNEMPLOYMENT RATE , (EUROSTAT)
NU=ANNUAL NUMBER OF "DEMANDES DE TRAVAIL", (MINISTERE DU TRAVAIL)
U =INDEX OF " " " " " "
UD=ANNUAL UNEMPLOYMENT RATE , (OCDE)

CASE-NO	YEAR	UA	NU	U	UD
1	50.	0.80	1448.	46.27	1.30
2	51.	0.60	1102.	35.23	1.00
3	52.	0.70	1610.	51.47	1.20
4	53.	0.90	1809.	57.83	1.40
5	54.	0.90	1678.	53.64	1.50
6	55.	0.80	1419.	45.36	1.30
7	56.	0.60	918.	29.35	1.00
8	57.	0.40	817.	26.12	0.60
9	58.	0.50	1178.	37.66	0.80
10	59.	0.60	1458.	46.61	1.00
11	60.	0.60	1257.	40.19	1.00
12	61.	0.60	1073.	34.30	1.20
13	62.	0.70	1004.	32.10	1.20
14	63.	0.70	957.	30.59	1.40
15	64.	0.60	1163.	37.18	1.10
16	65.	0.70	1458.	46.61	1.30
17	66.	0.70	1592.	50.90	1.40
18	67.	1.00	2320.	74.17	1.80
19	68.	1.30	2605.	83.28	2.10
20	69.	1.10	2260.	72.25	2.30
21	70.	1.30	3128.	100.00	2.40
22	71.	1.60	3899.	124.65	2.60
23	72.	1.80	4149.	132.64	2.70
24	73.	1.80	4559.	145.75	2.60
25	74.	2.30	6816.	217.90	2.80
26	75.	3.90	10151.	324.52	4.10
27	76.	4.30	10345.	330.72	4.40
28	77.	4.90	11767.	376.18	4.70
29	78.	5.30	13341.	426.50	5.20
30	79.	6.10	14733.	471.16	5.90
31	80.		16100.	514.71	6.30
32	81.				

Table FRANCE 1950-80 n.2 A.(°°)

		Costant	T	$\hat{IP}$	RW_{t-1}	$R\hat{W}$	ψ	R^2	DW	F
a	GS	-6562	-431* (140)	+43 (35)	+19224* (5153)	+2** (1)	-1244* (574)	0.69	1.9	9.8
Ia	MD	-3367	-312* (138)	-53 (34)	+12348* (5075)	+1.8** (1.1)	-956** (565)	0.42	2.4	3.1
		Costant	T	$\hat{V}$	RW_{t-1}	$R\hat{W}$	$N\psi$	R^2	DW	F
b	GS	-6055	-420* (154)	+5** (3)	+18593* (5814)	+0.7 (0.9)	-4** (2)	0.69	1.9	9.6
Ib	MD	-3179	-218** (165)	-2 (3)	+11061** (6226)	+0.3 (0.9)	-2 (3)	0.31	2.5	2.

The results, though satisfactory, were in part unexpected. The coefficient of determination is 0.68 and D.W. 1.98. Four variables are significant: trend is negative, lagged real wages and their variation is positive, in equation (Ib) variations in job offers is also positive--which shows the credit-catch-up effect of wage claims--and the variables ψ and $N\psi$ negative.[1] It should be noted that this negative result of the regression coefficient of the variables ψ and $N\psi$ is obtained in spite of their simple correlation with the conflict indicators being positive, respectively 0.41 and 0.53 with the number of strikes in the entire economy and 0.25 and 0.41 with the number of work days lost in the manufacturing sector.

To better investigate the negative influence of an increase in unemployment rate, the increase of that rate was inserted in the equation, see Table 3/B.

The variance in number of strikes explained by the variable of the model increases, R^2 in the improved model is 0.73. Lagged real wages and their variation are significant and have positive signs. The inverse of the unemployment rate and ψ, both significant, have negative signs.

The relation between the variables seems to be clearer at this point. There is a "credit-catch up" effect of wage claims along with a sensitivity of workers to their jobs which, nonetheless, is not transformed into conflict if an alarming threshold is reached.

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[1]Similar results were obtained if the variable is substituted by the positive residuals (RES ψ) of the interpolation of the unemployment rate with a second degree polynomial. Time and real wages are significant. The variable RES ψ is significant only in equation (Ib). The determination coefficient is less than the corresponding ones in equations (Ia) and (Ib).

Table FRANCE 1950-80 n.2 B (°°)

		Costant	T	$\hat{IP}$	RW_{t-1}	$R\hat{W}$	1/U	ψ	R^2	DW	F
[a	GS	-4582	-399* (137)	+51 (34)	+16983* (5178)	+2* (1)	-585** (367)	-1250* (554)	0.72	2.0	9.1
[Ia	MD	-1397	-294* (139)	-41 (34)	+10583* (5259)	-45 (28)	-540 (364)	-258 (343)	0.48	2.8	3.2
		Costant	T	$\hat{V}$	RW_{t-1}	$R\hat{W}$	1/U	$N\psi$	R^2	DW	F
[b	GS	-4299	-402* (151)	+5** (2)	+16871* (5770)	1 (1)	-556 (370)	-5 (3)	0.72	2.2	8.8
[Ib	MD	-1537	-296* (152)	-3.5 (2.9)	+10776** (5837)	-52* (29)	-634* (368)	-1 (2)	0.46	2.8	3.0

Therefore, there seems to be a French pattern of conflict which presents a generalized tendency to conflict inhibited by the "gravity" of the job market.

Moreover, the classic interpretation of the effect of unemployment would be proposed again, in this case positive, but only if it is above a certain restraining level. That is to say, if the unemployment rate reaches high levels, the blackmail power of trade unions is reduced, and thus, also their use of strikes as a weapon.

3.5.3 Phase III (AIψ)

The preceding results are confirmed by the introduction of the indicator of the gravity of the economic situation AI which is constructed as before from the product of the variation in industrial production $AI = \frac{I.P._{t-1}}{I.P._{t}}$ and the variable ψ, which by now is expected to have a negative sign.

Table FRANCE 1950-80 n.[3] (°°)

		Costant	T	$I\hat{P}$.	RW_{t-1}	$R\hat{W}$	$AI\psi$	R^2	DW	F
Ia	GS	-6601	-433* (140)	+43 (35)	19343* (5150)	+2** (1)	-1282* (584)	0.69	1.9	9.8
IIa	MD	-3379	-330* (141)	-48 (34)	+12998* (5198)	-47** (29)	-237 (364)	0.42	2.5	3.0
		Costant	T	$\hat{V}$	RW_{t-1}	$R\hat{W}$	AV_{ψ}	R^2	DW	F
Ib	GS	-6044	-422* (132)	+5* (2)	+18572* (4823)	+1 (0.9)	-911* (456)	0.71	2.0	11.1
IIb	MD	-4531	-377* (141)	-3 (2.9)	+15211* (5161)	-57* (30)	-480 (362)	0.43	2.5	3.3

CONCLUSION

The prime objective of this research was to analyze the industrial conflict as manifested through strikes in the last thirty years in the three European countries which presented the most similarities according to the fundamental indicators of conflict: France, Italy and Great Britain (cfr. Tables 1, 2, 3, Appendix).

Among the various theoretical paradigms which confront the theme of strikes, considering it from time to time as a protest originating in rapid social changes (Modernization Approach), as a form of collective action (Political-Organizational Approach), or as a phase within a process of institutionalization of conflict, it seemed more interesting and more appropriate to the study at hand, to use the Bargaining Theory. It considers strikes[1] as an instrument of pressure in response to a lock-out in wage negotiations between management and trade union.

If at the dawning of Bargaining Theory, in the formulations of more direct derivations of the game theory, the strike has value only as a potential threat that permits equilibrium of solution satisfactory to the parties (models with perfect and complete information). Subsequently, the occurrence of a strike contributed to reaching an accord and its own level.

After examining the origins of Economic Bargaining

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[1]Unlike other approaches, Bargaining Theory attributes to strikes a limited relevancy to the labor market, though not undervaluating the fact that an increase in power and influence in the economic system has almost direct repercussions on the socio-political one. Choosing Bargaining Theory as an interpretative paradigm of strikes means to favor their economic connotations and neglect the political ones.

Theory[1] within Game Theory and after examining the subsequent developments (models with complete and imperfect, and perfect and incomplete information), an analysis was made of the operational versions of wage negotiations often discussed in the literature on conflict. The empirical test results were presented schematically.

Moreover, an attempt has been made to identify the limitations of the theory in order to overcome them, if possible, and to define its applicability.

Above all, a continuous tendency of the partners to negotiate, as if they were always seated at the bargaining table, has been hypothesized in order to overcome one of the greater limitations of Bargaining Theory--considering a strike as an action that takes place only after an unfruitful attempt to reach an agreement at the expiration of the contract.

Other than that, the hypothesis of a very small bargaining unit has been used. Imagining a perfect interchangeability between base and union leadership, this theory permits one to ignore the relationship between them and to legitimate spontaneous strikes. This hypothesis alleviates the limitation of bargaining with only two partners, management and union, while neglecting government intervention (which now is more frequent).

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[1]In this way the economic character of Bargaining Theory has been emphasized which in the literature on strikes is often inappropriately cited only as an economic approach, whereas it is part of the more general approach of Game Theory.

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The approach and development of this analysis have been applied only to the industrial sector because the formulation of the employer's objective as maximization of future profit value (which pushes him in wage negotiations to try and contain labor costs) excludes, or at least makes dubious, its application to the public and service sectors.

Nevertheless, the main limit of the Economic Bargaining Theory approach is, in my opinion, in considering negotiations that center only on wage themes. If though understandable for the first models developed in the 50's, for a period in America where strikes could be equated with wage claims because those represented almost all union protests, it subsequently became highly inappropriate and erroneous to use in tests of the model global and not only pay strike data.

This lacuna becomes greater and more apparent when, after 1968 and 1973 in a changed economic context, job loss and unemployment press upon everyday working life and job security becomes a basic theme of the European trade union movement.

The objective of this work has been to amplify the negotiating area of the Bargaining Theory model by first introducing modifications in the analytic version and then subjecting it to empirical verification in the three countries under examination--France, Italy and Britain.

To achieve this, an attempt has been made to insert within the bargaining model a labor claims variable. Even though such an insertion certainly does not exhaust the range of claims and motivations at the base of conflict of manifestations, it nonetheless seems to constitute a first step in this direction.

In fact, it is my opinion that limiting negotiations to only wage claims is the principal cause of the shortcomings attributed to the Economic Bargaining Theory in the interpretation of conflict. This fact created a basic ambiguity in the

model, which was implicitly based on a procyclic character of strikes (increase in conflict at increase in prices and decrease in conflict at increase in unemployment) thus assuming through strikes a negative relationship among variations in price and variations in employment of the Phillips curve type.

In a period in which the very theory of the Phillips curve is under discussion because of the contemporary presence of price increases and increases in unemployment, new interpretative theoretical pictures are sought. Also the conflict model shows this inadequacy and the need to explore other ways to resolve the problem arises.

To reach this objective, the model proposed by O. Ashenfelter and J. Johnson was used. This model better combines theoretical formulations and empirical verification.[1]

It hypothesizes wage negotiations in which the employer possesses a monopoly of information: he knows the workers' concession curve for their wage increase claims for the duration of the strike. He decides to concede the increase demanded by the workers or to accept the cost of a strike in order to reduce their demands. The duration of a strike will depend on the maximization of the employer's profit function subject to the limits of the workers' concession curve--in the specific case, a negative exponential.

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[1]A big limitation of this model is given by the lack of distribution of information unilaterally possessed by the manager. It nonetheless remains the best example of combination of theoretical model and subsequent empirical verification. In literature there are more or less two large groups studies: theoretical studies related to game theory and empirical studies in which hypothesis of the model to be subjected to verification are directly constructed (econometric).

The idea of constructing a specific model for only labor claims has been rejected, given the lack of reliable data on the causes of strikes.[1] Instead, an attempt has been made to widen the bargaining area of the Ashenfelter and Johnson model by introducing other than wage claims and their discount rate during the strike, r, labor claims with their own specific rate of resistance, ρ.

This has been done in successive steps.

In the first phase, it was hypothesized that strikes were generated only by labor claims and, considering the fixed wage from a previous contract, I inserted in the Ashenfelter and Johnson model labor demand and the workers' resistance curve on occupational themes.

Moreover, it has been supposed that employment demand could be attributed to two distinct claims: with a defensive one, when production decline, the firm wants to reduce employment. The number of workers the firm wants to employ (LQ) is less than the number previously employed ($\hat{L}$), ($LQ < \hat{L}$). With an autonomous one, unemployment increases and goes from a frictional or cyclic phenomenon to a structural one which damages the internal market of the core groups [$\psi = \psi(U-Umax)$]. These two types of claims have been inserted in the model by hypothesizing in a first approximation that the labor claims would be reduced during a prolonged strike in the form of a negative exponential function of the rate K.

In the second phase, an attempt was made to insert both wage and labor claims in a single measure, the wage bill. In fact, it has been supposed that bargaining occurs on the

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[1]The cause of a strike is a variable that can be revealed only through ad hoc research; and, the published official statistical data divided by cause is not reliable. For further specification, see the Appendix, Limitations of Statistics on Strikes.

entire "workers-wages" and that the union demand wage and employment increases that in the course of a strike are reduced to a single rate Y. Nevertheless, the employment which management wants to hire (LQ) and the previous contract wage ($\hat{W}$) constitute the limit to the possibility of the wage-bill being reduced during strikes. In this case, it has been assumed that the form of the concession curve is a negative exponential one, even if, as pointed out in Chapter 3, the most likely forms can be others. Nonetheless, it seem particularly unsatisfactory to use a single worker discount rate and a single worker concession curve. It is my opinion, that the two claims presents different patterns. The union does not negotiate the entire wage-bill but wage and employment claims separately with two distinct rates of determination.

In the third phase, the trade union demand has been inserted in the model and divided into demands for wage increases (ΔW) with a specific concession rate (ρ) and labor demands (ΔL), exclusively defensive, with its respective resistance rate (ρ).

I have made the simplifying assumption that the workers' concession functions are linear. They are reduced during the strike at two different rates r and ρ. As before, optimal strike duration will be established by the employer with the maximization of his profit function now subject to two limits: wages and employment.

Solving for the maximum employer's profit function, the optimal strike depends, as before, on production value (PQ), on workers' wage claims, on their determination to carry them through (r), on the employer's discount rate (τ), and on workers' employment claims (ΔL) and on their determination to defend them (ρ).

With the lines of workers' resistance and concession forming an angle at points $\frac{1}{r}$ and $\frac{1}{\rho}$, I confronted labor's theoretical optimal solution of S optimal and analyzed the impact of

the variables composing the solution of the conflict which served as a prologue to the operational version.

Without dwelling upon technical details (for which reference may be made to Chapter 2), the proposed goal was reached in this first part by widening the objectives of bargaining and the range of motivation for strikes.

At attempt was made with the operational version to empirically verify the model constructed. In the

In the empirical section, I would emphasize that it is not within the bounds of this work to identify national patterns of conflict indicators. For this purpose, it would have been necessary to use various interpretative models. The scope of that section is only to explore the workings of the developed model in the operational version derived.

The most complex problem proved to be transforming the analytical model into a version that could be empirically tested.

As was pointed out in Chapter 3, as far as the dependent variable is concerned, there is no appropriate indicator to measure the duration of a strike, but there are two indicators used as proxies: the number of strikes begun in the time period considered and the number of work hours lost per strike, which reflects the component participating workers.

Furthermore, there are no direct measures of the independent variables which comprise the model. It has been necessary to make some assumptions on the trade union's and workers' behavior in making claims. Particularly, it has been assumed that when their purchasing power decreases [RW (-)], workers present wage claims that are more tenaciously defended the faster the reduction [$\dot{RW}$ (-)]. On the other hand, a decrease in industrial production would lead to an increase in workers' employment claims [$\dot{\text{I}}$.P. (-)], which would be more tenaciously defended the higher the probability of unemployment in the

economy [U(+)]. The variation in industrial production also is an indicator of the willingness of management to adhere to workers' demands. If industrial production is greater, the more workers will be willing to concede increases and less likely is a prolongation of negotiations and of conflict.

This operational version of the analytical model has been subject to empirical verification in the three countries under consideration, using data both from manufacturing industry (the only sector in which the model can actually be applied) and from the entire economy.

The generally obtained tests confirm the validity of this contribution; however, it is useful to analyze them in more detail.

First, it is important to emphasize that it is not always the same indicator of conflict, that proved itself to be susceptible to his interpretation; in Great Britain the number of days lost was the dominant feature, in Italy, as in France, the dominant feature was the number of strikes.

Moreover, in Great Britain, in interpreting the number of man-days lost in the manufacturing industries (MD), the dominant feature seemed to be a model of "credit-catch up" wage claims (positive regression coefficient for real wages and their variation and a negative one for price fluctuations) united with a defensive one of employment claims for the defense of jobs (positive regression coefficient of unemployment rate).

It is interesting to note how the interpretative model of strikes improves with the insertion of the dependent variable $\psi = (U\text{-}Umax)$ already described and with its substitution by the indicator of the gravity of the economic situation which links the likelihood of unemployment $\psi = (U\text{-}Umax)$ with the drop in industrial production. The coefficient of determination rises from 0.60 to 0.80 and the significance of

the variables of the model increase while maintaining the efficiency of the estimate constant.

The other indicator of conflict, the number of strikes begun in manufacturing industries (MS), shows a positive trend and a strong and constant negative relation to the unemployment rate and to other variables representing the "gravity" of the economic situation (ψ, AIψ).

It seems that in Great Britain there is a procyclic pattern of the number of strikes (reinforced by the positiveness of real salary), but a countercyclic one for their duration represented as number of man-days lost.

In a period of crisis and fall in production, the trade unions would seem to be more reasonable in their claims, in such ways as to make it more difficult to encounter a clear refusal on the part of management, which would provoke a strike in order to make the rank and file accept a reduction in initial claims.

Still, they are very determined in the claims they present and about which they succeed in mobilizing the workers and in protracting manifestations of conflict. These results seem to sustain the interpretation of defensive strikes as having a high rate of participation and of long duration.[1]

The model was inadequate, in the interpretation of strikes referring to the entire economy. These strikes feel the effects of the changing development in the "mining and quarrying sector."

In Italy, as far as the number of strikes in the manufacturing industries (MS) is concerned, income erosion claims (positive fluctuation in prices, negative one in real wage)

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[1] The measure of the number of work hours lost per strike increases both because of the effect of a longer duration of the conflict and the larger number of workers who participate.

prevail, combined with claims in defense of employment (ψ and $AI\psi$ positive).

Moreover, in Italy, the corresponding indicator of conflict, referring to the entire economy (GS), adapts itself to an economic-industrial type of interpretative model. Thus, it sometimes even presents better results as in the case of the last test in which variations in industrial production were substituted by variations in conceded hours of Cassa Integrazionale Guadagni in which all the variables are significant.

As far as the number of hours lost per strike is concerned, a positive trend which absorbs the influx of the other variables strongly dominates.

Italian trade unions and workers seem to have a very rational behavior concerning their claims and their decision to call a strike, which reflects an erosion of income and a defense of employment, whereas regarding the length of a strike, non-economic factors external to model are most important.

Finally, as far as France is concerned, the interpretation of the results of the tests is a bit problematic. In the first place, the indicators of number of hours of work lost, both for just the manufacturing sector and the entire economy, are absolutely not susceptible to the proposal interpretation.

Secondly, since 1967, the other indicator of strike numbers per year, though more receptive to interpretation according to the proposed model is reported only for strikes in the entire economy. A dominating factor seems to be a "credit-catch up" type of interpretation concerning wage claims and a "quasi-classic" type for employment claims. A generic propulsive power of the indicator of unemployment likelihood exists which nevertheless overcomes a threshold that is held to be maximum when it assumes true characteristics of gravity and acts as a brake on claims.

The perplexities of this interpretation are not only tied to the fact of having obtained unforeseen results, but also to having used an exclusively economic-industrial theory to explain the number of strikes in the entire economy. Furthermore, it was accomplished in a country that is not receptive to an economic interpretation of industrial relations and that, without wanting to give in to the temptations of structural explanations, presents a low rate of unionization and a high one of politicalization in the work environment.

I would like to conclude with some comments on the different levels of generality.

A first observation concerns the results of the tests which, even though unpredicted in part, do not negate the validity of the analytic model elaborated here (the three stages in Chapter 2) but urge a reconsideration of the proposed operational version.

On the one hand, the proclaimed economic quality of workers' wage claims is discussed. In Italy, these follow a mechanism of income erosion, but in Great Britain and France, they seem to follow a "credit-catch up" type of model.

On the other hand, there are not enough reasons to negate the existence of claims influenced by the likelihood of unemployment in the economy. The need arises to redefine the process that gives rise to these claims. The motivations for redefining the claim mechanism of employment demands arise from having used the variable (ψ) as a proxy for the determination of the union in defending employment. It hypothesizes that there is a level Umax, a so-called political threshold, that fires the sensitivities of the union and of the workers in relation to their jobs. Several procedures have been used to choose the level that could trigger this claim, while keeping to the principle that a rise in unemployment rate can only lead to an increase in protests.

From the results obtained in the tests, the hypothesis was confirmed in Great Britain and in Italy, but not in France, naturally keeping in consideration the reservations on this last result.

In order to interpret this twofold and contradictory effect, the most fascinating hypothesis is to imagine two thresholds of unemployment rate: a first Umax that awakens worker and trade union interest on the theme of job security, a second $U_{too-much}$, higher than the first, that weakens and blocks their own action because it is interpreted as unfruitful. These being the specific thresholds of every trade union movement, one could coherently imagine in France a general attention and protest for jobs at a low level of unemployment (Umax very low) which becomes impotent when the gravity of the situation increases.

When placed under a more thorough analysis lays itself open to criticism, this hypothesis, as much as it is fascinating because it would confute the "classic" negative relationship between unemployment rate and conflict.

As formulated, it is based on the image of a strong union that is rational and well organized and that, when the internal labor market is threatened, readily intervenes and protests in the defense of jobs. When the unemployment threshold is higher and its own protest action would not be successful but damage the entire economy, it does not intervene.

But this same interpretation of the behavior of the trade union could be reformulated in terms of weakness instead of rationality and strength. In the presence of a weak trade union, one has a generalized action in defense of jobs that nevertheless will weaken as unemployment rises, so much so as to reduce the conflicts themselves. This second interpretation, among other things, better adapts itself to the test results in the countries under consideration,

positive effects of the indicators of economic difficulties on conflict in Great Britain and Italy, a negative one in France, where without a doubt the trade union is weaker (unionization rate in France is about 29% while it is about 40% in the other two countries in the last thirty years).[1] It also adapts itself to the hypotheses implicitly brought forth during the presentation of employment claims and explicitly used in the choice of the alarming unemployment rate (Umax) in Italy. Employment claims are possible with and characteristic of a mature and strong trade union which is faced with a critical phase of production and which wants to defend jobs (of its members and nonmembers).

The second comment deals with the aggregate character of the analysis developed in this paper.

It would probably be fruitful to a better understanding of bargaining mechanisms to integrate the analysis of conflict with an examination of the impact some structural changes have had on the job market, such as variations in the composition of the work force or the transfer of employment from one sector to another.

Above all, it would be necessary to identify other measures of trade union employment demands and of their determination in such a way as to release the unemployment rate from such a strong interpretative power. Moreover, because it refers to the entire economy, it includes components such as workers in search of a first job, unemployment of particular segments of the labor force that cannot be interpreted as a general likelihood of unemployment which affects workers from another

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[1] Cfr. G.P. Cella, 1980; Italy, p. 194; Great Britain, p. 88; France, p. 331.

segment of the labor force, industry.[1]

It would be very useful to keep in mind the effect of employment claims, and of labor hoarding which follow successful strikes, through researching whether or not the claims give way to a perverse causal spiral or if they annul themselves.

A third and final comment which is on more general lines deals with an interest in constructing an interpretative model for strikes in the tertiary sector. Particularly, it would be extremely useful to interpret strikes in such sectors as transportation, public administration, and teaching--sectors that entered the conflict arena only at the end of the 60's. This model would be especially interesting because it would find workers' interests opposing not so much those of management as much as those of the consumers, or generically speaking, of those who use the public and private services. It would be stimulating to analyze how the reaction of consumers influence the willingness of management to negotiate and how it influences the determination of the workers' concession curve.

I have preferred, for now, to avoid this treacherous terrain and to follow the main road of industry while trying to contribute improvements to the interpretative model and widen the range of bargaining.

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[1]The satisfying result for Italy in which youth and workers in search for a first job constitute about 50% of the recent unemployment rate leads to the belief in the validity of using global data (ISTAT, 1980).

APPENDIX

APPENDIX Table n.1 Relative Number of Strikes[x]

Years	IT	FR	UK	IR	FI	BE	AU	DE	GE	SW	NO	NE	SZ	Years
1871-75													0.9	1871-75
1876-80		0.6											0.2	1876-80
1881-85	0.5	1.4								1.2			0.4	1881-85
1886-90	0.7	1.4	6.5°							1.7			1.3	1886-90
1891-95	0.8	2.3	5.2				1.1			1.5			2.0	1891-95
1896-00	1.7	3.0	4.8				2.1			4.3			2.6	1896-00
1901-05	5.9	3.7	2.6			2.9	2.8	6.0	6.6	$\boxed{8.2}$		6.4		1901-05
1906-10	$\boxed{9.6}$	6.1	2.7		$\boxed{8.5}$	4.6	5.8	7.6	$\boxed{9.3}$	$\boxed{10.3}$		7.2		1906-10
1911-15	5.8	4.3	5.2		4.0	5.2°	3.0	4.5	6.7	4.6	4.8	$\boxed{12.1}$	2.9	1911-15
1916-20	5.9	5.0	5.6		$\boxed{11.6}$	$\boxed{13.8°}$	—	$\boxed{12.9}$	6.5	$\boxed{25.0}$		$\boxed{16.5}$	$\boxed{9.3}$	1916-20
1921-25	3.5°	4.0	3.4		3.2	5.4	$\boxed{12.3}$	4.5	$\boxed{10.2}$	$\boxed{10.8}$	5.8	$\boxed{9.9}$	3.3	1921-25
1926-30		4.7	1.7	4.6	2.5	4.3	6.4	1.6	1.8	7.3	7.7	7.0	1.8	1926-30
1931-35		1.6	2.3	6.3	0.8	2.5	0.9	1.3		4.9	7.5	5.6	1.4	1931-35
1936-40		$\boxed{34.1°}$	4.7	$\boxed{8.7}$	1.3	3.5		0.9		2.0	3.5	2.6	1.1	1936-40
1941-45			$\boxed{8.4}$	5.6°		4.5		0.9	—	4.4			1.0	1941-45
1946-50		$\boxed{9.1}$	7.2		4.8	6.5		1.4		2.1	3.2	4.8	1.2	1946-50
1951-55	$\boxed{5.2}$	$\boxed{9.5}$	$\boxed{9.4}$	6.9°	3.2	3.7		0.5		0.9	2.5	1.7	0.3	1951-55
1956-60	$\boxed{9.6}$	$\boxed{9.0}$	$\boxed{11.1}$	4.7	2.8	2.4		2.2	2.1°	0.6	1.3	1.7	0.2	1956-60
1961-65	$\boxed{18.3}$	$\boxed{10.3}$	$\boxed{10.0}$	7.2	2.6	1.2		1.4	0.8	0.3	0.6	1.3	0.1	1961-65
1966-70	$\boxed{16.9}$	$\boxed{11.7}$	$\boxed{11.0}$	$\boxed{10.4}$	6.3	2.5		1.6	1.0	1.3	0.5	0.7	0.1	1966-70
1971-75	$\boxed{23.5}$	$\boxed{17.1}$	$\boxed{10.4}$	$\boxed{15.4}$	$\boxed{17.0}$	4.8		4.5		1.6	0.8	2.6	0.2	1971-75

[x] Number of strikes per 100.000 persons of the economically active population; 5-year averages of annual rates.

$\boxed{}$ 8 strikes and more per 100.000 persons of the economically active population

from :P.FLORA et al. State Economy and Society in Western Europe:1815-1975,
Campus,Francoforte,1982

APPENDIX Table n.2 Relative Number of Strikers[x]

Years	IT	FR	UK	IR	FI	BE	AU	DE	GE	SW	NO	NE	SZ	Years
1871-75		83												1871-75
1876-80		288												1876-80
1881-85	116	278								107				1881-85
1886-90	172	404								107				1886-90
1891-95	211	497	$\boxed{2\ 703^*}$							99				1891-95
1896-00	452	611	1 317							455				1896-00
1901-05	1 559	892	879			1 322		275	760	836	226*	706		1901-05
1906-10	$\boxed{2\ 127}$	1 175	1 647		848	1 317		406	965	$\boxed{3\ 557}$	707	599		1906-10
1911-15	1 942	851	$\boxed{4\ 297}$		537	1 412*		767	930	519	1 734	1 123	218	1911-15
1916-20	$\boxed{4\ 632}$	$\boxed{2\ 743}$	$\boxed{7\ 097}$		$\boxed{4\ 323}$	$\boxed{8\ 104^*}$		1 303	$\boxed{3\ 439}$	$\boxed{2\ 735}$	$\boxed{2\ 629}$	1 687	1 149	1916-20
1921-25	$\boxed{2\ 263^*}$	1 511	$\boxed{3\ 894}$		332	$\boxed{3\ 272}$	$\boxed{6\ 056}$	$\boxed{2\ 974}$	$\boxed{5\ 098}$	$\boxed{2\ 951}$	$\boxed{4\ 737}$	1 471	333	1921-25
1926-30		1 393	$\boxed{2\ 176}$	243	612	1 823	850	147	1 111	1 185	1 609	470	221	1926-30
1931-35		404	1 449	564	106	1 854	144	262		1 054	1 380	575	165	1931-35
1936-40		$\boxed{6\ 609^*}$	1 851	965	203	1 421		1 127		474	1 658	171	113	1936-40
1941-45			$\boxed{2\ 492}$	404*				257	—	1 006			75	1941-45
1946-50		$\boxed{14\ 977}$	$\boxed{2\ 107}$		$\boxed{3\ 290}$	$\boxed{6\ 147}$	419	688		445	465	940	263	1946-50
1951-55	$\boxed{11\ 617}$	$\boxed{6\ 829}$	$\boxed{2\ 855}$	745*	977	$\boxed{3\ 969}$	1 243	208	875	355	408	342	68	1951-55
1956-60	$\boxed{8\ 320}$	$\boxed{7\ 085}$	$\boxed{3\ 263}$	611	$\boxed{5\ 590}$	$\boxed{3\ 591}$	1 006	982	252	37	1 061	612	12	1956-60
1961-65	$\boxed{14\ 848}$	$\boxed{10\ 613}$	$\boxed{6\ 245}$	$\boxed{1\ 996}$	1 855	691	$\boxed{2\ 718}$	1 784	563	53	500	353	11	1961-65
1966-70	$\boxed{20\ 886}$	$\boxed{10\ 753^*}$	$\boxed{5\ 872}$	$\boxed{3\ 609}$	$\boxed{3\ 835}$	1 061	235	1 232	353	388	87	347	3	1966-70
1971-75	$\boxed{29\ 572}$	$\boxed{10\ 559}$	$\boxed{5\ 405}$	$\boxed{3\ 022}$	$\boxed{5\ 422}$	1 996	643	$\boxed{4\ 410}$	766	614	3 368	487	59	1971-75

[x] Number of strikers per 100.000 persons of the economically active population; 5-year averages of annual rates.

$\boxed{}$ 2 000 strikers and more per 100.000 persons of the economically active population

from : P.FLORA et al. State Economy and Society in Western Europe:1815-1975, Campus,Francoforte,1982

APPENDIX Table n.3 Relative Number of Man-Days Lost[x]

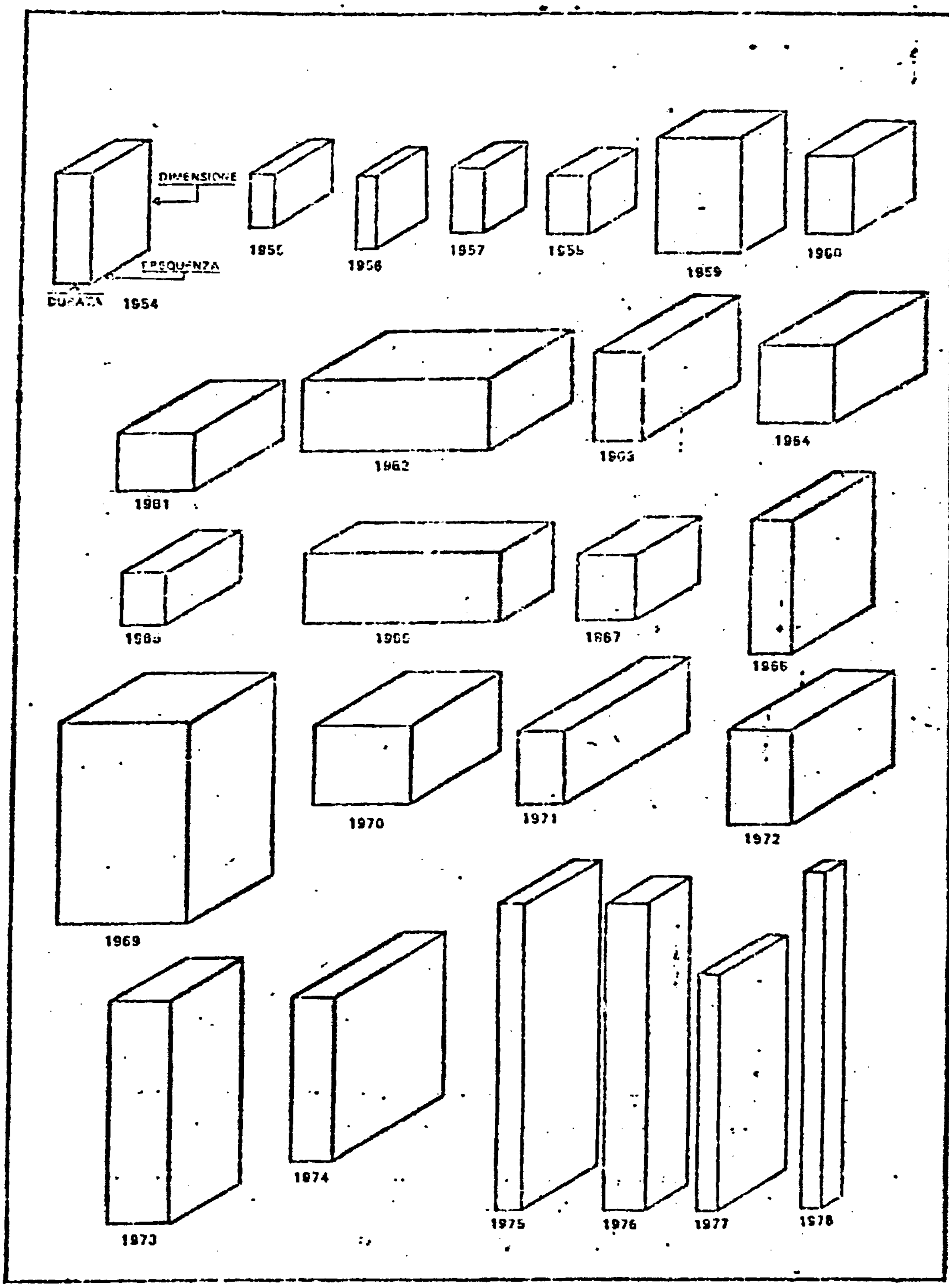
	IT	FR	UK	IR	FI	BE	AU	DE	GE	SW	NO	NE	SZ	
1871-75														1871-75
1876-80														1876-80
1881-85														1881-85
1886-90										20				1886-90
1891-95			942							41				1891-95
1896-00			442							97				1896-00
1901-05	150		165					132	259	375	76°			1901-05
1906-10	147		314		303			88	341	1.349	253	100		1906-10
1911-15	205°		786		360			163	260	162	492	147		1911-15
1916-20			733		451			432	372	1.109	669	344		1916-20
1921-25			1.363		102		579	603	734	1.192	1.074	535		1921-25
1926-30			1.604	58	303	378	139	44	231	571	770	154	65	1926-30
1931-35			179	154	18	255	8	61		732	1.477	217	36	1931-35
1936-40			91	361	60	96°		338		190	558	23	18	1936-40
1941-45			105	64°				19	—	789			8	1941-45
1946-50			69		672	499	55	185		24	52	76	38	1946-50
1951-55	242		104	106°	90	159	23	4	52	88	59	16	9	1951-55
1956-60	276		183	81	770	362	22	111	29	7	157	36	1	1956-60
1961-66	637	141	131	325	148	63	59	244	19	4	105	8	6	1961-65
1966-70	941	131°	227	591	106	88	9	19	7	37	13	13	0	1966-70
1971-75	990	175	518	272	4 196	183	8	345	43	63	69	34	1	1971-75

[x] Number of man-days lost per 1.000 persons of the economically active population; 5-year averages of annual rates.

☐ 500 and more man-days lost per 1,000 persons of the economically active population

from : P.FLORA et al. State Economy and Society in Western Europe:1815-1975, Campus, Francoforte, 1982

Shape of the strike phenomenon in the italian industry



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