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The Impact of Unanticipated Output and Consumer Prices on Wilcat Strikes
L'effet des changements dans le rendement et l'indice des prix sur les grèves sauvages

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Article abstract

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The Impact of Unanticipated Output and Consumer Prices on Wildcat Strikes

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Wildcat strikes — which we take to be strikes during the term of collective agreements, regardless of whether or not they were authorized by the union executive — have been dealt with in several ways in the literature[1]. There are several case studies of individual wildcat strikes like the one by Flood (1971). Clack (1975) examined the incidence of wildcat strikes in Canada and the United States, as well as the reasons for such "protest", "midcontract" or "unlawful" strikes. Several research teams have conducted sociological investigations of wildcat strikes. Brett and Goldberg (1979), as well as Turner, Roberts and Roberts (1977), for instance, examined organizational factors influencing wildcat strikes, while Kerr and Siegel (1954) focused on the influence of rural versus urban plant location on such strikes. Some researchers have studies the influence of economic factors, such as the level of unemployment and changes in the consumer price index on wildcat strike activity. Fisher (1981), for instance, conducted a time series regression analysis of wildcat strikes across British Columbia during

1   Other studies have defined wildcat strikes as not only strikes during the term but also strikes not authorized by the union executive. (See, e.g., BRETT and GOLDBERG, 1979, 165, n. 1.) Union officials, often due to their limited political bases, limit themselves to attempting to persuade employees to return to work during an unauthorized strike during the term (see BRETT and GOLDBERG, 1979, 478-79).

1950-75 along these lines. However, there does not appear to have been an empirical study of the influences of unanticipated output and consumer price movements on wildcat strikes within a particular industry either in B.C. or elsewhere[2].

This paper investigates the role that industry-specific as well as other economic determinants, play in triggering wildcat strikes and in prolonging them in the copper industry of British Columbia during 1967-79. It emphasizes the importance of *unanticipated* movements in industry and consumer prices in leading to strikes during the term. Here "unanticipated movements" mean the difference between realized and predicted values of economic variables under consideration.

The B.C. copper industry was chosen for five reasons. First, copper is a homogeneous product. Second, copper is sold on a world market and the prices of copper, both spot and future prices, fluctuate over time. Moreover, the existence of a futures market provides a proxy for anticipated copper prices upon which economic agents might base predictions. Third, the copper industry is situated primarily in a rural setting, which means that we need not take into account rural-urban differences. Fourth, the B.C. copper industry has a fragmented bargaining structure in which, on average, ten firms negotiated contracts separately with the unions representing their members. (The existence of many collective agreements in this industry is of paramount importance for our empirical analysis.) Fifth, both small Canadian and large international unions represent copper miners in B.C. Thus, standardizing for location, we can focus on product prices, the nature of the union (i.e., size) and other economic variables (e.g., the unemployment rate and consumer price index) in empirically investigating their influence on wildcat strike activity in this industry.

The theoretical underpinnings and methodological approach adopted in this paper may be generalized to other industries. Our theory attempts to link the occurrence (and to a lesser extent, duration) of wildcat strikes to the kinds of implicit forecasts organized labour and management made during contract negotiations of the change in certain key economic variables during the term of the collective agreement to be negotiated. The key economic variables include the output price, the consumer price index and the firm's profit rate (except that data concerning the latter generally were not available). Our theory modifies and combines two previous theories of

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2 It seems the closest study we have found to this one in the sense of investigating price movements on the predictability of strikes was NEUMANN'S (1980) study. Neumann investigated the ability of New York Stock Exchange prices for stocks to predict the occurrence of impending strikes, most of which apparently arose out of contract (re)negotiations. See also ANDERSON and GUNDERSON, 1982, 231.

strikes during the term: a spontaneous theory and a calculated theory. The spontaneous theory is Rees' (1952, 382) pressure-value theory in which workers strike once their frustrations surpass a given tolerance limit. The calculated theory is implicit in Slichter, Healy and Livernash (1960, 663-691). In it workers determine the expected benefit and costs from wildcatting as opposed to "working now and grieving later". Inter-industry differences are attributed in our theory to such things as differences in the volatility of product price movements and differences in the nature of work. Both factors, in turn, affect worker frustration levels.

The probit model is used to study empirically the occurrence/non-occurrence of strikes during the term. The tobit model is applied to the duration of wildcat strikes. This two-step approach has its roots in the literature on the demand for consumer durables (i.e., investment goods)[3]. (See, for instance, Cragg (1971).) Dussault and Lacroix (1980, 637-640) and Cousineau (1981, 88-95) have used the probit model in their analyses of strike activity.

A PRESSURE-VALUE, STRIKE-AS-AN-INVESTMENT THEORY OF WILDCAT STRIKES

Unions and firms face uncertainty during contract negotiations, as acknowledged by some bargaining theories[4]. This uncertainty arises from the fact that bargainers possess imperfect knowledge (1) about their counterparts at the bargaining table and (2) about the future. The former gives rise to second-guessing and bluffing, among other things. Significantly, the latter means that bargainers are uncertain as to the future real income stream to be divided. The firm's output price is a key economic indicator of its future real income stream, since profit data often are unavailable at the time of contract negotiations. It is assumed in this analysis that the individual firm, since it sells its output in a world market, is a price-taker. This means that prices and profits levels will be positively correlated.

Incorrect forecasts of the firm's future real income stream and of future consumer price movements along with other factors (spelled out below) affect worker frustration levels. It is assumed that there is a

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3   REES implicitly treated wildcat strikes as consumer durables (1952, 382).

4   See, for example, JOHNSTON (1972), RABINOVITCH and SWARY (1976) and FISHER (1979b). By contrast, one of the paradoxes of the ASHENFELTER and JOHNSTON (1969) theory is that the employer has perfect knowledge but the union does not. (See SHALEV, 1980, 141 and FISHER, 1979a, 190-1.)

threshold level for worker frustrations which is taken as being given but may be lowered by union officials' threatening members with internal union discipline for refusing to engage in midcontract strikes. For the sake of simplicity, the threshold level is the same for all workers. When it is exceeded, workers will be *prepared* to wildcat strike. Admittedly, an obvious deficiency of this theory is that there is no independent measure of frustration thresholds (or of frustration levels). Nonetheless, we find this concept intuitively appealing. For the sake of realism, we also assume that frustrations decay over time (i.e., that "time heals all wounds")[5].

Once workers are emotionally prepared to strike, they or the union's leaders must (1) find an issue, either real or ostensible, for rationalizing the protest strike action they contemplate and (2) determine that the strike during the term, with its attendant risks, is expected to confer greater benefits on them than "working now and grieving later". Strikes during the term are statutorily deemed to be illegal strikes in British Columbia and in all but one of Canada's remaining juridictions[6]. By striking during the term in these jurisdictions, workers become vulnerable to future discipline or dismissal for cause, and trade unions can become subject to litigation (primarily through the grievance machinery but possibly also through the judicial system) and, may be compelled to pay for damages. (In our opinion, such legal ramifications are an important reason that strikes during the term are of much shorter duration than first agreement strikes and contract renewal strikes[7].) Expected strike costs presumably mount in the face of these attendant risks.

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[5] REES' pressure-value theory (1952, 382) tends to focus primarily on the releasing of pent-up frustrations and economic circumstances which are conducive to their release. By contrast, our theory emphasizes the intertemporal emotional capability (or incapability) of workers to strike during the term.

[6] The United States model of not statutorily deeming strikes during the term to be illegal is followed in Saskatchewan.

The Canadian system of prohibiting strikes during the term and providing compulsory grievance handling procedures and generally compulsory grievance arbitration is unique among labour relations systems. Grievance handling and arbitration became mandatory in exchange for the prohibition on legal work stoppages during the term in the early 1940's. This labour policy was adopted in order to maintain the war effort. (See, for instance, WILLIAMS (1977).)

[7] For example, during 1945-75 in British Columbia, the average duration of first agreement, contract renewal and wildcat strikes was 67.7, 38,4 and 6.8 working days. (See FISHER (1980, 4).)

The relatively shorter duration of wildcat strikes may be due to relatively fewer issues, as well as to the illegality of such strikes as opposed to strikes issuing from contract negotiations.

Work place issues which are potential strike isues are assumed to arise uniformly over time (e.g., once per week)[8]. They may arise due to management's role as the initiator in implementing new policies (e.g., closer supervision), increased defiance of managerial policies on the part of union members or from the union's storing for opportune moments alleged contract violations or complaints outside the scope of the collective agreement. They probably will include issues falling into the following categories of issues *stated* (but not necessarily the real reasons) for the occurrence of wildcat strikes: wages (including pay, fringes and workload), comfort, occupational health or safety, job security, deployment, discipline, scheduling, union movement, jurisdiction, contractual matters, and general issues[9]. Significantly, wildcat strikes over issues could pre-date or supplant the filing of grievances in order, for example, to achieve a settlement that is more favourable to the union, or they could post-date the filing of grievances in order, for example, to expedite the handling of those grievances or to achieve pro-union settlements[10].

Once a possible strike issue has arisen and workers have become frustrated enough to wildcat strike, the workers and the union's leaders must compare the expected costs and benefits (both real and psychic) of striking during the term as opposed to following the "work now grieve later" maxim. to reiterate, an important possible benefit to the union of pressure tactics like wildcat strikes is the possibility of achieving a more favorable settlement than was attained during prior rounds of contract negotiations or than could be attained through standard contract administration procedures. They include the following kinds of settlements (Slichter, Healy and Livernash, 1960, 676):

8   It may be that such issues are not uniformly distributed over the term of the collective agreement. FISHER (1982) found, for instance, that midcontract strikes seldom are clustered near the expiry date of a collective agreement (presumably in order to "speed negotiations along"), that they tend to be spread over the terms of collective agreements, but that somewhat more than one-half tend to take place during the last half of labour contracts.

It may also be that such issues can be "manufactured" in order to rationalize engaging in such behaviour.

9   See FISHER (1979 a, 275-277) and CLACK (1975, 7-8).

10   SLICHTER, HEALY and LIVERNASH (1960, 663) describe the timing of the wildcat strike as follows (emphasis is added): "...Day to day union-management relations have involved more than the peaceful adjustment of grievances because the existence of a grievance procedure with arbitration as its final step has not guaranteed that this procedure would be used. In some cases, the grievance procedure has been ignored and direct action action taken its place. In others, grievances have been filed, but the processing of grievances has been supplemented effectively and frequently through pressure on management. The objective may have been *to obtain concessions beyond the scope of the contract, or simply to obtain favourable grievance of the contract, or simply to obtain favourable grievance decisions under existing principles of contract interpretation.*»

"...in favourable initial grievance decisions, in modifications, and reversals of decisions and in concessions beyond the scope of the contract."

Expected benefits probably will vary in accordance with the *real* issue dispute, and they should increase if management tended to make concessions in response to pressure tactics in the past[11]. Wildcat strikes also should have the informational benefits of providing workers and union officials with feedback as to the extent to which management might grant concessions in future to such pressure tactics[12]. Unfortunately, data concerning managerial concessions and the functioning of grievance machineries were not available.

Juxtaposed against such potential benefits are the expected costs of the foregone earnings for workers (which they invest in strike action) as well as possible future costs in the form of disciplinary action against wildcat strikers and of litigation and, perhaps, damage payments against the union[13]. Such costs should rise, *cet. par.,* the more vigorously management has pursued disciplinary and legal action vis-a-vis wildcat strikers and the union in the past. (See, e.g., Slichter, Healy and Livernash, (1960), 682-685).) Unfortunately, we were not privy to such information for B.C.'s copper industry.

Three types of employees normally are involved in wildcat strikes (Slichter, Healy and Livernash, 1960, 684): leaders, followers and sympathizers. Of course, we see the above theory as applying primarily to leaders, be they union officials or not. But we obviously cannot predict a priori who the leaders will be. Our theory requires that we assume that the leaders possesses some knowledge (or that they have heard rumors) about spot product prices and the current consumer price index (CPI) as well as

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11   See, for instance, SLICHTER, HEALY and LIVERNASH (1969), 683-687) and BRETT and GOLDBERT (1979, 478-479).

12   Clearly, management will resist making concessions to pressure tactics if it preceives that it has more to lose either currently or in future by making them. To the extent that the union's gain represents management's loss, grievance handling involves distributive bargaining, as defined by WALTON and MCKERSIE (1965, 4-5).

13   Not only do wildcat strikers invest their own foregone earnings in anticipation of achieving future benefits, but also they often are investing union funds for the legal expenses that may follow. Such legal expenses would stem from (1) pursuing a grievance on the issue, either ostensibly or actually in dispute, and (2) in legal action concerning disciplinary actions taken against them and possible damage payments. The problem with those wildcat strikes that are purely spontaneous or unauthorized strikes during the term is that the strikers may be committing union funds for such purposes without prior authorization. (See, for example, BRETT and GOLDBERG (1979, 478) and SLICHTER, HEALY and LIVERNASH (1960, 687-691).)

See, for instance TACON (1980, 107-130) and J. WEILER (1979) concerning arbitral jurisprudence with respect to unlawful strikes in B.C. and elsewhere in Canada and P. WEILER (1977) for one administrative view of unlawful strike action in B.C.

about the product price levels and CPI movements forecasted during the last round of contract negotiations.

OUTPUT AND CONSUMER PRICES AND WILDCAT STRIKES

As it relates to output and consumer theories our theory is an equity theory. The wage outcome to contract negotiating is indeterminate within the bilateral monopoly context[14]. The settlement that is achieved reflects, among other things, the relative bargaining power and bargaining skills of the union and management negotiating committees and their forecasts as to the future movements of output and consumer prices. Unanticipated deviations in output and consumer prices generally will influence worker frustrations, in the sense that the terms and conditions of the collective agreement appear to be less equitable, as equitable or more than equitable in view of economic developments subsequent to those which prevailed during contract negotiations (and before) and which influenced the parties forecasts at that time. The collective agreement clearly will appear to be equitable if the parties' forecasts subsequently manifested themselves. Our concern, then, is with deviations from those forecasts and their effect on worker frustration levels[15]. Incidentally, the problem of equitable labour contracts in resource-based industries lead Jamieson (1962) to propose a profit-sharing scheme for wages above a floor wage in the forest products industry of British Columbia[16].

We make a simplifying assumption that the future real income stream to the firm as predicted by both organized labour and management is the same at the effective date of the contract and that their predictions concerning future movements of the CPI are same, too. This means that we can focus exclusively on the deviation between realized and anticipated price movements.

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[14]   See, for instance, MARSHALL, KING and BRIGGS (1980, 346-348), JOHNSTON (1972), and FISHER (1979b).

[15]   We anticipate that a resource based-industry, like copper, which sells in an international market and faces volatile price movements, should be more susceptible to wildcat strikes than, say, a manufacturing industry which sells at relatively stable prices, everything else the same.

During the late 1940s, for instance, gold miners in B.C. negotiated a cost-of-living adjustment (COLA) clause which was tied to the price of gold in the world market. (This is personal knowledge of one of the authors of this paper, who saw such contracts in Labour Canada's Collective Bargaining Division.)

[16]   Such an arrangement could also permit sharing of work during a downswing in the forest products industry.

Disparities between observed and forecasted real income stream to the firm, affect both the union and the firm and can lead to wildcat strikes, whether they are positive or negative. If observed product prices exceed forecasted ones, the rank-and-file are receiving a smaller proportion of firm profits than they anticipated receiving during negotiations[17]. They also are confronted with *real future* opportunity costs which will accrue until the contract expires[18]. These costs are the future costs of not striking now in an attempt at extracting more from the firm's current real income stream. As noted above, some wildcat strikes are conducted in order to gain "concessions beyond the scope of the contract" (Slichter, Healy and Livernash, 1960, 676). These concessions may include improvements in the quality of food or living conditions in company towns or increased time for safety inspections in mines. The final result, if acceded to by management, would be an increased flow of firm benefits to employees, holding worker inputs constant, or a reduction in worker inputs, holding wages constant. Conversely, if the firm's current real income stream is less than what is anticipated, the wildcat strike may occur in response to attempts by management to enhance productivity by implementing, for example, a "speed-up" or increased supervision.

Although deviations in predicted and observed output price movements affect both labour and management, unanticipated deviations in the consumer price index are seen as affecting primarily the union. The trade-union presumably will become wildcat strike prone if observed increases in the CPI exceed the ones it anticipated. This erosion of workers' standard of living gives rise to cost-of-living adjustment (or COLA) strikes in particular. (See Meadows (1974) and Meadows (1975.) If the observed CPI greatly exceeds the predicted CPI and if, the firm consequently is encountering greater problems in recruiting and retaining employees, it has an

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17 Government taxes on resource output (royalties, etc.) may not capture the increase in economic rent which results from the higher copper prices. In this case these resource rents accrue to the firm as increased profits. Thus, workers by incorrectly anticipating future copper prices not only receive less in wages than they should but also due to contractual arrangements, forego the opportunity of perhaps capturing some of the resource rents through wage increases. COPITHORNE (1979) argues that rents in the B.C. forest industry not captured by the government are distributed between the International Woodworkers of America and the forest firms.

18 Economic theory teaches that foregone earnings associated with incorrect implied forecasts are "bygones" by the end of the existing contract and, therefore, should not influence future behaviour. Of course, bargaining relationships are long-standing relationships and the rank-and-file and, consequently, union negotiators may not follow this dictate of economic theory. Perhaps, the more important factor in wildcat strikes is future-oriented rather than past-oriented. It is the fact that greater foregone earnings are associated with a longer time period between the commencement date for the wildcat strike and the expiry date.

incentive to accede to organized labour's demands during a COLA strike (or other such pressure tactics)[19]. Offsetting this is the disincentive of possibly setting a bad precedent concerning future contract negotiations or future union pressure tactics. Nonetheless, it is noteworthy that Fisher found a statistically significant, positive relationship between percentage increases in the consumer price index and the number of wildcat strikes across all industries in B.C. during 1950-75 (1980, 24-25).

The unanticipated output and consumer price variables are included as variables in our theory, in order to reflect the fact that strikes during the term may involve, in varying degrees, the repudiation of the forecast implicit in existing labour agreements. A COLA strike is, perhaps, the most dramatic example of such a repudiation.

OTHER DETERMINANTS

Other possible key determinants of strikes during the term include (1) the unemployment rate, (2) the type of union organization (i.e., whether a large international union or a small Canadian union), (3) the absence or presence of a COLA clause in the collective agreement, (4) the length of the contract (in years), (5) changes in government taxation of copper production, (6) previous strikes during the term and (7) the number of months until the contract expires.

As suggested by Rees (1952, 380-1), the unemployment rate should be negatively related to wildcat-proneness. Employees, since they presumably are concerned with job security, should be less inclined to strike when the unemployment rate is high, due to the presumed scarcity of alternative employment opportunities (*cet. par.*). Moreover, employers probably will find it easier to substitute other employees (e.g., supervisory personnel or possibly strike-breakers) for them. Our analysis is concerned, however, with (1) differences between the economic circumstances under which the collective agreement was negotiated and those existing when the protest strike took place and (2) the impact of these differences on strikes during the term. This means that our unemployment variable will be a relative one which takes into account the percentage change in unemployment between these

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19   Unanticipated increases in the CPI may be accompanied by unanticipated increases in input prices and thereby induce the firm to implement cost-minimizing measures, such as speed-ups, which, in turn, may lead to an upsurge in strikes during the term. This may be a weak linkage, since there is not necessarily a one-to-one mapping between the CPI and prices of intermediary products such as oil. In any case, the effect of such cost-minimizing measures would simply reinforce the effect on workers' proclivity to wildcat strike of their perceiving that their standard of living has been eroded.

two points in time[20]. An increase (decrease) in the unemployment rate should be associated with a higher probability for the non-occurrence (occurrence) of wildcat strikes and with shorter (longer) strikes.

There is one major union in B.C.'s copper industry: the United Steelworkers of America (USWA); and two competing unions: Canadian Association of Industrial, Mechanical and Allied Workers (CAIMAW) and the International Union of Operating Engineers (IUOE). The IUOE is a fairly large international union. CAIMAW is a small Canadian union which possesses several certificates in B.C.'s copper industry; whereas, "Steel" is an international union holding a small share of those certificates. During the 1970's, CAIMAW successfully wrested away some of Steel's (and the IUOE's) certificates in copper mining, other mining and other industries, partly due to workers' complaints of poor servicing. By contrast, some observers interpret a Steel-led strike at Trail, B.C., in 1974 against a zinc and lead mining operation as a showcase for the kind of resources that the USWA can muster, including grocery hampers by the box-carload and man-power planners who assisted strikers in finding alternative employment. To put it mildly, there is quite a rivalry between USWA and CAIMAW[21].

It is difficult to predict whether or not union size increases or decreases the probability of wildcat strike, but union size presumably increases the duration of a strike, owing to greater financial resources, once the strike takes place (cet. par.). On the one hand, the kinds of issues that render workers capable of engaging in midcontract strikes presumably do not depend on the size of the union. On the other hand, a large union may be able to exert greater discipline over workers and also have greater success in negotiating with firms because of its ability to carry through on any threat. Smaller unions, by contrast, might treat wildcat strikes as a relatively low costs of a protracted strike at contract renewal time. It must also be born in costs of a protracted strike at contract renewal time. It must albo be born in mind that some wildcat strikes are, indeed, unauthorized strikes, as they sometimes are called. For those wildcat strikes over which the union exerts some control, the key factor determining the union's willingness to support a wildcat strike probably is the legal costs of such action, which is prohibited by law in British Columbia. To the extent that larger unions have larger "bankrolls", they would be more inclined to initiate such action.

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20 Strictly speaking, this unemployment variable will apply to the duration of strikes during the term. For the occurrence of strikes, the unemployment variable will be constructed for the following two points in time: the effective date and the expiry date for the collective agreement, due to our use of the probit model, as explained below.

21 See, for instance, Canex Placer Ltd. (Endako Mines Division) (1976), 2 *Canadian LRBR,* 264.

Once initiated, larger unions should be better able to organize and finance strikes of longer duration, especially if legal costs are likely to be significant[22]

The existence of a COLA clause in a contract should reduce the probability of a strike (other than a COLA strike) because the probability and costs of unanticipated real wage declines is reduced over the remainder of the contract. But, because the COLA clause will automatically be triggered by a certain increase in the CPI, workers will receive greater income over the term of the agreement. Therefore, the existence of a COLA clause should increase the duration of such strikes, everything else the same.

Revisions to provincial mineral tax policy can cause unanticipated changes in firm profitability, thereby altering the economic environment governing labour relationships with affected firms. The *Mineral Royalties Act* (or Bill 31), which the Government of British Columbia enacted in 1974, reduced copper firms' profitability, in that it imposed a minimum annual royalty as well as a super royalty tax designed to capture a significant share of any increase in mineral prices above a given base (see Brown (1974, 322).) Brown estimates that this Act in conjunction with federal taxes imposed an effective tax rate from 70% to over 90% of any copper price increase. It was in force from January 1, 1974 through January 1, 1977. To the extent that its impact altered copper firms' profit streams, we feel that it should increase significantly the probability of a wildcat strike.

We hypothesize that the occurrence of one strike during the term of labour contract will increase the probability of another such strike occurring. Hostility and frustration arising from the first wildcat probably means that workers become more receptive than otherwise to initiating another wildcat strike should conditions seem to favour such action.

The duration of the contract should be positively related to the probability of a wildcat strikes, since the longer is the contract, the greater are the probability and costs of unanticipated price movements. This variable will only be applied to our empirical analysis of the occurrence or non-occurrence of a wildcat strike, since our analysis (i.e., probit analysis) focuses on the probability that a wildcat strike will occur *sometime during the term of the agreement*. This precludes our including the variable for the amount of time left in the collective agreement (or the unemployment rate) *at the time of the wildcat strike* in the probit model. However, the amount of time left in the collective agreement should influence the duration of a wildcat strike. A positive relationship is expected here, since a longer time

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22   The union size variable is the kind of variable that STERN suggested for use in explaining the duration of strikes, in particular (1878, 39).

until expiry means a longer time to attain the expected benefits from a strike during the term (*cet. par.*).

EMPIRICAL SPECIFICATION

The decision to invest in "hitting the bricks" (as opposed to relying on the grievance machinery) involves at least two sub-decisions. One is to decide whether or not to engage in a strike during the term, and the other is to determine how long the strike is expected to last. The latter decision impinges upon the former decision in the sense that the expected length of the strike determines the amount of earnings a wildcat strike is expected to cost workers who strike. The ideal empirical analysis of these decisions would involve, first, estimating the expected duration (and therefore some of the costs) of a wildcat strike and then "plugging" that result into the (probit) equation used to estimate the probability of a wildcat strike.

Unfortunately, this procedure involves sample selectivity and perfect identifiers. The basic problem is that no observations exist for the expected durations of strikes where strike action was contemplated but not carried out. Observed strike durations only exist for strikes which took place. These observations would have to be used to estimate the expected duration for those strikes that actually took place. Such an estimated expected strike duration would then be applied against (and perfectly identified with) those observations which yielded strike activity in the subsequent (probit) analysis of the probability of strike during the term. In the final analysis, such an estimation procedure does not necessarily measure what it was intended to measure: the probability of a strike, given the expected duration of a strike, *regardless of whether or not strike action ensued.* (See, e.g., Neumann (1980, 531) concerning selectivity bias.)

Another reason for empirically analysing the decision to strike separately from the decision of how long to strike is that the union is solely responsible for the former decision but not for the latter one. In particular, the duration of a work stoppage is determined through management and union interactions and sometimes by the courts, labour relations boards or the government as well.

For these reasons, the occurrence/non-occurrence of a strike and the duration of the strike will be investigated individually below. We shall analyze the occurrence of strikes during the term using the probit model and their duration through the tobit model. Tobit is used in the latter analysis rather than ordinary least squares (OLS) because the predicted duration of some strikes in our sample using OLS is negative. The tobit model allows us

to specify a lower bound of 1.0 day for the minimum predicted value of strikes occurring in our sample. This lower bound coincides with the shortest duration of wildcats in our sample.

THE DATA BASE

The probit model requires that collective agreements be linked with the occurrence/non-occurrence of strikes during the term. Contract and wildcat strike data were obtained from the Mining Council of British Columbia. They covered ten copper firms from 1967 through 1979 and included forty-seven collective agreements, nine of which were excluded since they did not include wage rates at either effective dates or expiry dates. The absence of such data meant that it was not possible to calculate predicted wage rates over the term of these collective agreements. The strike data consisted of eleven strikes. The following reasons were given for them: discipline (including demotion)—6, safety—2, union movement (sympathy strike)—1, deployment (supervisory personnel jurisdiction)—1 and job security (lay off)—1. Two firms experienced three wildcat strikes during the term of one of their agreements. Significantly, eight strikes took place during 1973-1975 when double-digit inflation first was experienced in British Columbia and when several COLA strikes took place in B.C. (See, for instance, Meadows (1975.) All eleven strikes took place during the term of collective agreements which were in force while the *Mineral Royalties Act* of British Columbia was in effect. Thus, there was considerable economic change with respect to real wages and the expected real profit position of B.C.'s copper firms when the bulk of these strikes occurred. The sources and construction of other variables is explained below in the text[22a].

THE EMPIRICAL SPECIFICATIONS

The importance of the various factors we have discussed in determining strikes during term is assessed by applying the probit model to the following equation:

(1) $W = a_0 + a_1(COPD) + a_2 (RWD) + a_3 (CAIMAW)$
         $+ a_4 (UG) + a_5 (COLA) + a_6 (YEAR)$
         $+ a_7 (TAX) + a_8 (MULT) + U$

The dependent variable W assumes a value of 1.0 if a wildcat took place and is 0.0 otherwise. The variable COPD is the *absolute value* of the

[22a]   A data appendix is available upon request from the authors.

annual relative difference between realized and predicted copper prices over the term of the contract and is taken to represent unanticipated copper price movements. Our measure of realized prices is the spot price prevailing at the end of the labour contract. The predicted copper price is the forward (or futures) price of copper in the metals market at the date closest to the expiry date of the contract when the contract was negotiated[23]. The increase in both prices is calculated relative to the spot price of copper at the effective date of the contract.

The variable RWD measures unanticipated movements in the growth of real wages. It is defined as the difference between realized and predicted annual real wages over the term of the contract. The negotiated wage settlement is used to calculate the money wage component of both the observed and predicted real wage variables. Realized real wages are calculated using observed values of the CPI during the term of the contract. Predicted real wages are calculated using as the deflator predictions of the level of the CPI at the expiry date of the contract made at the effective date of the contract. It is assumed that the value of the expected CPI can be generated by a distributed lag of its previous values and that workers (and employers) use knowledge of this relationship to predict future consumer price movements. The data appendix explains in greater detail the derivation of these expected price series.

The variable UG is the annual relative change in British Columbia's unemployment rate during the term of the contract. As a relative measure it reflects changes in the labour market from the effective date of the contract to its expiry date. The variable CAIMAW is a dummy variable whose value is 1.0 when the small Canadian union holds the certificate and is 0.0 elsewhere. COLA is a dummy variable which takes a value of 1.0 if the collective agreement contains a cost-of-living adjustment and is 0.0 otherwise. The variable YEAR measures the length of the contract in years. TAX is a dummy variable with a value of 1.0 if the contract was either negotiated or in force during the period when the *Mineral Royalties Act* (Bill 31) was in force. The final variable is MULT. It, too, is a dummy variable which assumes a value of 1.0 if there was more than one wildcat during the term of the existing contract.

The signs of coefficients are determined by examining the impact of the corresponding variables on worker frustration levels, including their tolerance levels. The coefficient of COPD should be positive. That is any deviation between realized and predicted copper prices should increase the

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23   We have ignored the fact that the futures price also includes a premium for the opportunity cost of the capital tied up in the futures contract.

probability of a strike and the probability should increase with the absolute value of the deviation. The value of RWD, on the other hand, should be negative. Unanticipated declines in real wages (realized real wages < predicted real wages) should increase worker frustrations thereby increasing the probability of a wildcat strike and vice versa. The coefficient of UG should be negative as an increase in unemployment in the provincial economy during the term of the contract should make workers less inclined to engage in wildcat strikes as alternate job opportunities are fewer. The existence of a COLA clause in a contract should also reduce the probability of a strike as the cost of unanticipated consumer price movements to the worker is reduced. The duration of the contract YEAR should be positively related to the probability of a wildcat strike since the longer the contract runs, the greater is the cost and more likely the occurrence of an unanticipated price movement and the greater the cumulative work place frustrations.

The period in which Bill 31 was in operation (TAX) should clearly be associated with a greater incidence of wildcat strike activity as the Act had the effect of drastically reducing firm after-tax profits for both increased production and production at previous levels. Finally the occurrence of one wildcat strike during the term of a contract (MULT) should increase the probability of subsequent wildcat strikes simply because of the resulting strains on union-management relations. The union size variable (CAIMAW) has an ambiguously signed coefficient for the reasons discussed earlier.

PROBIT RESULTS

The results of estimating equation (1) and some variants are presented in TABLE 1. There were 38 observations. Row 1 provides the estimates of the entire equation. The Psuedo R^2 of the model is .81[24]. The likelihood ratio text allows us to reject at a 0.5% significance level the joint hypothesis that all coefficients are equal to zero. Unfortunately, there appears to be considerable multi-collinearity among the independent variables. In row (2) equation (1) is estimated omitting the union variable CAIMAW. The likelihood ratio test does not allow us to reject the hypothesis that the coef-

[24]   UHLER and CRAGG, (1971), 344). The Pseudo R^2 is defined as:

$\{1 - \exp\{2(Lw - Lr)/T\}\} / [1 - \exp\{Lw\text{-Lmax}\}/T\{]$

Here Lw is the maximum of the logarithm of the likelihood function using only a constant, Lr is the maximum using all of the variables, and Lmax is the minimum possible. T stands for the number of observations.

ficient of CAIMAW is zero[25]. In row 3 the variable MULT is omitted. The hypothesis that the coefficient of MULT is zero can be rejected at a 0.5% significant level using the likelihood ratio test. Row 4 provides the results of estimating equation 1 omitting TAX. Similarly we can reject the hypothesis that the coefficient of the TAX variable is zero at a 0.5% significance level. Thus although the 't' statistics of both coefficients are low the likelihood ratio test suggests both are significant determinants of the probability of wildcat strikes. Similar results hold for COPD and RWD.

The coefficients of most variables have their predicted signs. A wildcat strike is more probable the greater the deviation between realized and predicted copper prices, (COPD). Conversely the greater the growth of realized real wages relative to predicted real wages the less probable is a wildcat strike. The coefficient of the TAX dummy suggests that Bill 31 had a perceptibly disruptive impact on labour relations in the copper industry. Moreover, the significant difference in terms of a likelihood ratio test between rows 2 and 4 indicates that any analysis of labour relations in the copper industry must take into account the impact of Bill 31. Our results suggest that a history of recent wildcat strikes as measured by MULT increased the probability of subsequent wildcat strikes during term. The results also indicate that the probability of a wildcat strike increases with the length of the contract. Finally a rising unemployment rate during the term of the contract reduces the probability of a wildcat strike.

The dummy variable denoting the existence of a cost-of-living allowance clause (COLA) in the contract does not have the appropriate sign. Our results indicate that a wildcat strike is *more* probable during the term of contracts with such provisions. Perhaps only militant locals during the period of our study were successful in obtaining COLA clauses and hence the variable might be a proxy for the militancy of union locals.

THE DURATION OF WILDCATS

The second stage of the analysis involves examining the factors influencing the length of time that workers are willing to invest in a wildcat strike,

25 The likelihood ratio test is $-2 \ln \lambda$ which has a X^2 distribution with r degrees of freedom, where λ is the ratio of the restricted to the unrestricted likelihood functions of the model, and r is equal to the number of restrictions imposed.

For example when MULT is deleted from the model the likelihood ratio test statistic between rows (2) and (3) is 5.76 with 1 degree of freedom equal to the restriction that the coefficient of MULT is zero. We can reject this hypothesis at the 2.50% confidence level.

The likelyhood ratio test statistic between rows (1) and (2) is 0.24 and we are unable to reject the hypothesis that the coefficient CAIMAW is zero at any reasonable significance level.

TABLE 1

Occurrence of Wildcat Strikes Using Probit Analysis

(T Statistics in Parentheses)

Constant	COPD	RWD	CAIMAW	UG	COLA	YEAR	TAX	MULT	Psuedo R^2	Likelihood Ratio TEST	Log of Likelihood FUNCTION
1) -89.62	.14	-.47	-.63	-.12	1.52	28.27	35.32	7.08	.81	31.11*	-6.96
(-.02)	(1.28)	(-1.33)	(-.48)	(-1.04)	(.93)	(.02)	(.02)	(.002(			
2) -92.58	.13	-.53		-.13	1.66	29.24	36.43	7.15	.80	30.87*	-7.08
(-.02)	(1.18)	(-1.56)		(-1.17)	(1.06)	(.01)	(.01)	(.001)			
3) -88.47	.09	-.52		-.14	1.19	27.94	35.76		.70	25.12*	-9.96
(-.01)	(.83)	(-1.46)		(-1.16)	(.77)	(.01)	(.01)				
4) -2.34	-.05	-.02		.06	-.44	.90		6.26	.66	22.90*	-11.07
(-1.23)	(-1.12)	(-.02)		(1.87)	(-.53)	(1.01)		(.03)			

*Likelihood ratio test significant at 0.5% level.

once they have decided to initiate a strike during term. This analysis is performed by estimating equation (2) below using Tobit. The sample size consists of the eleven contracts during whose term wildcat strikes occurred.

(2)   NDL = b_0 + b_1 (COPWD) + b_2 (RWWD) + b_3 (CAIMAW)
              + b_4 (UGW) + b_5 (COLA) + b_6 (TOGO) + b_7 (MULT) + U

The dependent variable NDL is the duration of the strike in days. The variables COPWD, RWWD and UGW are defined as before except that the magnitude of the variables is calculated from the effective date of the contract to the date on which the wildcat strike occurred rather than to the expiry date. The variables CAIMAW, COLA, and MULT are defined the same as in the first stage of the analysis. The variable TOGO is the time in years between the occurrence of the wildcat and the expiry date of the contract.

The results of estimating equation (2) are provided in Table 2. Because of the small sample size (n + 11) there are only three degrees of freedom. Only the variables COPWD, MULT and TOGO are significant (one tail t) but this is at the relatively low significance level of 10%. The signs of these coefficients are as predicted. Wildcats strikes are of longer duration the greater has been the deviation of realized from predicted copper prices. The longer the contract has to run the greater is the amount (duration of strike) which workers and management (in terms of foregone profits) appear willing to invest in a wildcat. Finally, the existence of previous wildcat strikes in the contract makes subsequent wildcat strikes even longer. The coefficients of the other variables are not statistically significant even at the 10% level and in the cases of RWWG and UGW have incorrect signs.

TABLE 2

Duration of Wildcat Strikes Using Tobit Analysis

CONSTANT	COPWD	RWWD	CAIMAW	UGW	COLA	TOGO	MULT	SEE
1. -7.95	.44	.60	-27.64	.08	-9.93	5.54	6.48	2.56
(-1.28)	(2.10)*	(1.34)	(-1.83)	(2.19)*	(-1.54)	(1.55)	(1.95)*	

(Significant at 10% level, "One Tail T" df + 3)

CONCLUSIONS

The essential premise of this paper is that economic as well as sociological factors are important determinants of the occurrence and duration of wildcat strikes in the copper industry of British Columbia. A theory was developed which linked the decision either to engage in a wildcat strike

now and work later or to "work now and grieve later" to factors such as unanticipated movements in output and consumer prices, government resource tax policies, union size, specific provisions of contract, as well as indicators of the state of labour relations during the contract. Our statistical results lend some credence to this view at least with regard to the occurrence/non-occurrence of a strike. The fact that all eleven midcontract strikes took place while the *Mineral Royalties Act* was in force is consistent with our view that decreases in firm profit levels may induce firms to engage in "speed-ups" and other measures to increase production. The incidence of greater firm efforts to boost production may be reflected in the strike data, in that the stated reason for seven of the eleven strikes was "discipline" (in 6) or "deployment" (in 1). We are much less successful in explaining the duration of wildcat strikes. In particular, the existence of unanticipated movements in output prices was an important determinant of the occurrence and to a lesser extent the duration of wildcat strikes. Unanticipated movements in real wages were significant determinants only in the case of the occurrence of wildcat strikes. The introduction of Bill 31 appeared to have a significant positive impact on the incidence of wildcat strikes in the B.C. copper industry. Finally and not surprisingly, a history of strikes during the term of a contract increased both the probability of subsequent wildcats and also their duration.

The results of this study should be seen only as provisional, given the small sample size for strike duration in particular, but the general theory and methodology probably can be applied to other industries. An ideal counterpart to this study would be along the lines of Brett and Goldberg (1979). It would consist of a case study approach focusing on the personnel practices and organizational behaviour of the firms involved in the strikes.

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L'effet des changements dans le rendement et l'indice des prix sur les grèves sauvages

Le présent article traite des conséquences des changements imprévus du rendement et de l'indice des prix à la consommation, de même que d'autres variables sociologiques et économiques, sur les grèves sauvages ou en cours de convention qui ont eu lieu dans l'industrie du cuivre en Colombie Britannique pendant la période 1967 à 1979. On y expose une théorie des grèves sauvages qui soutient que les travailleurs s'engagent dans de telles grèves avec l'idée de fonder leur décision ou celle de leurs dirigeants, de les déclencher spontanément ou non selon ce qu'elles peuvent rapporter ou coûter. Il s'agit au fond de courir un risque calculé. L'étude a porté sur un échantillon de 38 conventions collectives pendant la durée desquelles il y eut onze grèves. On y analyse la décision de recourir ou non à la grève dans chacune d'entre elles ainsi que la durée de la grève là où elles se sont produites.

La théorie mise de l'avant estime que les travailleurs doivent être suffisamment frustrés ou sous la menace du syndicat pour prendre l'initiative d'un débrayage pendant la durée d'une convention collective. Elle considère aussi que les frustrations s'accumulent d'une façon concomitante et se résorbent avec le temps parce que «le temps cicatrise toutes les blessures». Les grèves se produisent par réaction à ce qui peut se produire dans la nature même du travail ou encore dans les différences entre ce qu'on obtient et les avantages qu'on escomptait au moment de la négociation de la convention. Les deux éléments principaux qui pèsent sur l'intensité de la frustration sont le prix auquel est vendu le cuivre et l'indice des prix à la consommation. Le prix du cuivre, pour sa part, a une influence sur le taux de rendement de l'entreprise.

Comme elle se rattache au rendement et à l'indice des prix à la consommation, la théorie en est une d'équité. Les conséquences salariales de la négociation de la convention sont indéterminées dans le contexte d'un monopole bilatéral. Le règlement auquel on en arrive reflète, entre autres choses, la force relative et l'habileté de négociation du syndicat et de l'employeur ainsi que leurs propres prévisions par rapport aux changements futurs du taux de profit et de l'indice des prix. Les déviations imprévues dans le taux de rendement et l'indice des prix ont généralement une influence sur le degré de frustration des salariés dans le sens que les conditions établies dans la convention collective semblent moins équitables, aussi équitables ou plus équitables face aux changements économiques subséquents à la négociation collective et qui avaient influencés les parties à ce moment. La convention collective sera équitable si les prévisions des parties au moment des négociations se réalisent. Si tel n'est pas le cas, il peut y avoir grève sauvage. Ainsi, si les prix dépassent ce qu'on avait prévu, les salariés touchent une plus faible partie des profits de l'entreprise que celle qu'ils escomptaient obtenir lors des négociations. Par contre, si les revenus de l'entreprise sont moins élevés que ce qu'elle anticipait, la grève sauvage peut se produire par réaction aux efforts de la direction pour accroître la productivité.

En ce qui a trait à l'indice des prix à la consommation, il en est de même. Si l'indice des prix dépasse ce à quoi on s'attendait, il y aurait davantage danger de grève

sauvage, surtout si la firme a quelque peine à recruter de nouveaux employés et à garder son personnel. Enfin, d'autres facteurs qui influent sur la décision de s'engager ou non dans une grève en cours de convention ainsi que sur sa durée comprennent le taux de chômage, la puissance du syndicat, l'existence d'une clause d'indexation dans la convention collective, le nombre des grèves antérieures pendant la durée de la convention et les politiques gouvernementales de taxation des ressources naturelles.

Lorsque les frustrations des travailleurs dépassent un certain seuil, il peut y avoir grève pendant la durée de la convention et les dirigeants syndicaux peuvent activer ces frustrations. On peut présumer que leurs causes surgissent en tout temps. Il faut choisir l'occasion de frapper et de soupeser les coûts et les avantages de la décision de passer à l'action. Les avantages importants que le syndicat peut en retirer consistent dans certaines concessions de la part des employeurs, plus précisément celles qui constituent des précédents et qui consistent dans des gains pour le syndicat en matière de pratiques antérieures et de changements au texte de la convention.

Les données recueillies tendent à confirmer que le genre de facteurs ci-dessus identifiés influencent la décision de déclencher ou non une grève en cours de convention. C'est principalement le cas en ce qui concerne les politiques gouvernementales de taxation des ressources naturelles, puisque toutes les grèves sauvages ont eu lieu au moment où les entreprises engagées dans la production du cuivre en Colombie Britannique ont été plus lourdement taxées pendant les années 1974-1975. Les changements imprévus dans les salaires réels et les prix du cuivre furent des motifs déterminants de la décision de déclarer ou non la grève, mais ils n'ont pas eu beaucoup d'effet sur sa durée. Naturellement, l'existence de grèves antérieures en cours de convention collective accroît la probabilité de récidiver et influe sur la longueur des grèves subséquentes.

Finalement, on peut conclure que les constatations de la présente étude doivent être tenues pour provisoires, principalement en ce qui a trait à la durée de ces grèves. Cependant, la théorie générale énoncée ainsi que la méthodologie mise au point devraient pouvoir s'appliquer dans d'autres industries, surtout dans celles qui exploitent les ressources naturelles. La contrepartie normale de ce travail consisterait dans une étude de cas portant sur les attitudes et les comportements personnels des dirigeants d'entreprises touchés par de semblables grèves.