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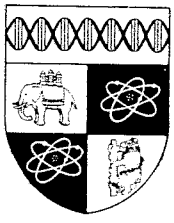
NUMBER 264

WARWICK ECONOMIC RESEARCH PAPERS



DEPARTMENT OF ECONOMICS

UNIVERSITY OF WARWICK
COVENTRY

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July 1985

SUMMARY

In general we expect efficient bargaining between a union and an employer to cover employment as well as wages. But employers may find that they win higher profits if they bargain over wages alone, since the threat of job losses can inhibit workers from pressing wage demands. This is shown to be the case in typical models which use the general (asymmetric) co-operative Nash-bargaining solution. So it is argued that the inclusion of jobs in bargaining is not just a question of efficiency, but also a question of power.

CONTENTS

1. INTRODUCTION

There is some disagreement over the empirical evidence of whether employers and unions bargain over wages alone (e.g. Oswald, 1984) or over employment as well (e.g. MaCurdy and Pencavel, 1983; Clark, 1984; Svejnar, 1984). The question I raise here is whether there may be a conflict of interest between workers and employers over the inclusion of jobs in bargaining. Of course, bargaining over both jobs and wages offers the prospect of an efficient solution. But moving from an inefficient to an efficient deal is not necessarily in both parties' interests if in the course of so doing the distribution of benefits is altered.

Bargaining over the wage alone leads to inefficient outcomes if the union is at all concerned with the level of employment. Nevertheless, employers may prefer not to bargain over jobs if the consequent lessening of the threat of job losses (in response to any bargained wage rise) would enable workers to win a larger share of the economic surplus. In section 2 I show that this is often the case if bargaining is characterised by the (asymmetric) Nash co-operative game where the bargained outcome is affected not just by the exogenous bargaining strengths of the two parties, but also by the marginal rate of transformation of utilities along the bargaining frontier. Changing the shape of that frontier by including or excluding jobs from the bargaining agenda will alter the division of surplus. Thus, the evidence cited by

Oswald (1984) that most US and UK employers do not explicitly bargain over employment levels may be the result of an employers' strategy to pre-set the bargaining agenda in their own favour.

In principle, a move towards an efficient bargaining solution could be facilitated by compensating side-payments. But agreements to make such payments may be unenforceable and unreliable. Workers need only know that they will be able to win job guarantees (implicit or explicit), then they will press wage demands more strongly than if they are faced with a trade-off between wages and jobs.

Oswald (1984) argues an alternative explanation for the prevalence of bargaining over wages alone, namely that unions are indifferent to the threat of job losses since lay-offs are often characterised by seniority rules which give effective job-security to the median union voter. On the other hand we should consider the growing evidence from the last few years of no-redundancy deals, agreements to restrain wage rises or accept wage cuts in the face of threats to jobs, and - most notably - industrial action against the threat of job losses as exemplified by the year-long UK pit strike. These examples imply that workers are concerned not only about risks to their own employment but also about the job chances of family, community and fellow worker. Such concern may be more pronounced in times of high or rising un-employment.[1] I argue here that although workers are concerned about the level of employment it will often be in the employer's

interest to restrict bargaining to cover only the wage.

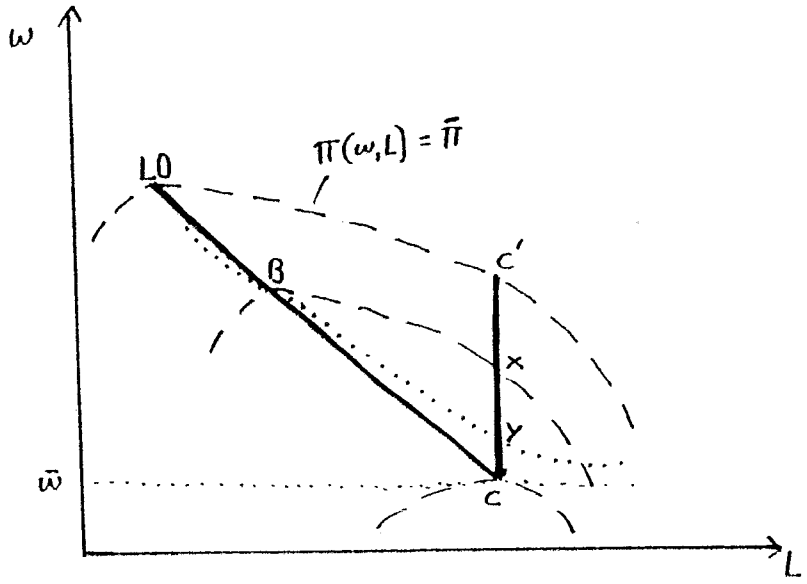
2. NASH-BARGAINING AND THE DIVISION OF SURPLUS

Although there are wage-job deals which are pareto-superior to any non-trivial bargaining solution on the labour demand curve, the actual efficient outcome arrived at through bargaining may be inferior for one of the parties. In particular, bargaining over jobs as well as wages may relieve workers of the threat of job losses and thereby enable them to strike a 'harder' bargain. Diagram 1 illustrates the range of wage-job deals which are feasible outcomes to bargaining between a profit-maximising employer who can earn a minimum profit $\bar{\pi}$ elsewhere and workers who can earn a minimum wage $\bar{w}$ elsewhere. If point B represents the bargaining outcome on the labour demand curve (LDC), it is pareto-dominated by the deals on section XY of the contract curve (C'C). But the introduction of bargaining over jobs may increase the workers' effective bargaining strength to the extent that they are able to win a deal above point X on the contract curve, thereby reducing employer's profits. The power to set employment levels unilaterally may be an important part of an employer's bargaining strategy. We can see that this is so if we examine the Nash-bargaining models which are frequently cited in the bargaining literature.

First, suppose that the workers' collectively expressed preferences over jobs and wages can be represented by the

DIAGRAM 1

COMPARISON OF BARGAINING ON THE LABOUR DEMAND CURVE WITH BARGAINING ON THE CONTRACT CURVE



LDC	=	labour demand curve
C'C	=	contract curve
B	=	a bargain on the ldc
XY	=	the range of pareto-superior efficient bargains
	=	iso-profit lines
	=	the union's indifference curves

commonly used utility function[2]:

$$V(L,w) = L.\ (u(w) - u(\bar{w}))$$

where L is the level of employment, $\bar{w}$ the alternative wage, and the function u(.) captures the relative importance to workers of jobs and wages. This function could be an expression of the ex-ante risk attitude of a typical worker facing the threat of random lay-offs, or the ex-post inequality attitude of the union. For instance, concavity of u(.) implies risk-(inequality-) aversion; the indifference curves illustrated in Diagram 1 become steeper as risk-aversion increases and workers require relatively large wage increases to compensate for job losses. Attitudes to risk or inequality can be conveniently paramaterised (adapting the approach of Svejnar, 1984) by assuming constant relative risk aversion of the incremental utility function:

$$\text{let} \quad -v''(W)\ .\ W\ /\ v'(W) = r \qquad (1)$$

where W is the wage increment, $W = (w-\bar{w})$; and v(W) is the incremental utility function, $v(W) = u(w) - u(\bar{w})$.

$$\text{We can write } v(W) = W^{1-r}/(1-r) \qquad (1A)$$

and see that $1>r>0$ implies risk aversion, $r=0$ implies risk-neutrality, and $r<0$ implies risk-loving.[3]

Second, let the employer's incremental profit function be:

$$\pi(L,w) = R(L) - wL - F \; ; \; R''(L)<0$$

where concavity of the revenue function can result from decreasing returns to the labour input and/or from a down-sloping marginal revenue schedule in the product market.

If the employer aims to maximise profits and the union to maximise their utility function, the asymmetric Nash-bargaining problem is:

$$\max. \text{ w.r.t. } x \quad (\pi(x))^{1-b} . (U(x))^{b}$$

where x is the vector of variables (indexed by i) which are subject to bargaining and the ratio $(1-b)/b$ is the parameter representing the bargaining strength of the employer relative to that of the workers. The solution is characterised by the condition:

$$\frac{\pi(x)}{U(x)} = \frac{(1-b)}{b} \; . \; - \; \pi_i(x) \; / \; U_i(x) \qquad (2)$$

This solution is developed by Svejnar (1984) from an axiomatic framework which incorporates the notion of asymmetric bargaining power and each side's fear of disagreement. He presents a plausible story of the bargaining process to back up the proposed solution. This solution is more general than the symmetric Nash solution used by de Menil (1971), McDonald and Solow (1981) and by Osborne (1984) where the bargaining parameter b is set to $\frac{1}{2}$. The solution is less arbitrary than the assumption that the union can choose its wage subject only to the employer's minimum profit constraint, tantamount

to assuming b=1, as made by Oswald (1982), Sampson (1983) and Gylfason and Lindbeck (1984).

We have now a convenient parameterisation of the bargaining situation : i) each side's threat point or opportunity cost is captured by the incremental utility functions; ii) workers' preferences over jobs and wages are captured by the 'risk-aversion' parameter r; iii) bargaining power is represented by the parameter b[4]; iv) the scope of bargaining is indicated by the vector of bargaining variables x .

My first proposition is that if a) the workers' utility function exhibits constant relative risk aversion and b) the bargaining outcome is characterised by the asymmmetric Nash solution[5], then the employer's share of the surplus (of revenue net of opportunity costs) is higher if they restrict the scope of bargaining to cover wages only than if they bargain over employment as well.

PROOF

Defining the division of surplus as the ratio of employers' incremental profit to workers' incremental wage bill, we can write the division of surplus as:

$$D(w,L) = \pi(w,L) \;/\; L.(w-\bar{w})$$

If bargaining covers both jobs and wages, the incremental

profit and utility functions of employer and union are as follows:

$$\begin{aligned} \pi\ (w,L) &= R(L) - wL - F \quad ; \quad V(w,L) = L.(\ u(w) - u(\bar{w})\ ) \\ \pi_L(w,L) &= R'(L) - w \quad ; \quad V_L(w,L) = u(w) - u(\bar{w}) \\ \pi_w(w,L) &= -L \quad ; \quad V_w(w,L) = L.u'(w) \end{aligned} \tag{3}$$

So the bargaining solution (2) can be written:

$$D(w,L)\ .\ \frac{b}{1-b} = \frac{w - R'(L)}{w - \bar{w}} = \frac{u(w) - u(\bar{w})}{(w-\bar{w}).u'(w)} = \frac{1}{1-r} \tag{4}$$

We see here the established result that if the union is risk-neutral (r=0) the level of employment is independent of bargaining strength (since $R'(L) = \bar{w}$). For our purposes, note that the division of surplus D is greater than (less than) the ratio of bargaining strengths if the union is risk-averse (risk-loving). The greater are workers' fears of job losses, the higher is the share of surplus won by the employer.

Now consider the bargaining result if employers bargain over the wage alone and set employment to maximise profit. We can then write the incremental profit and utility functions as functions of either the bargained wage w or of the level of employment given by the labour demand curve $\ell(w)$.

$$\begin{aligned} &\pi(\ell, \ell(w)) \equiv P(\ell) = R(\ell) - R'(\ell).\ell - F\ ; \\ &P'(\ell) = \ell.R''(\ell) \quad ; \\ &U(\ell) = \ell.(\ u(R'(\ell)) - \bar{u}) \\ &U'(\ell) = \ell.u'.R'' + (u\ ;\ \bar{u}) \end{aligned} \tag{5}$$

Equation (2) allows us to derive the division of surplus which

results from bargaining on the labour demand curve:

$$d(\ell) \equiv \frac{P(\ell)}{\ell.(w-\bar{w})} = \frac{1-b}{b} \cdot \frac{\ell}{\ell.\frac{(w-\bar{w}).u'}{(u-\bar{u})} + (w-\bar{w}).\ell'(w)} \qquad (6A)$$

From (1) we can write the elasticity of the incremental utility function:

$$\varepsilon(w) \equiv v'(W).W/v(W) = (w-\bar{w}).u'(w)/(u-\bar{u}) = (1-r)$$

and we can define the elasticity of the labour demand curve with respect to the wage increment as $e(w) = \ell'(w).(w-\bar{w})/\ell$. So

$$d(\ell) = \frac{1-b}{b} \cdot \frac{1}{\varepsilon(w) + e(W)} \qquad (6B)$$

and we are now in a position to compare the division of surplus on the contract curve (D) with the division on the labour demand curve (d):

$$\frac{D(w,L)}{d(\ell)} = 1 + \frac{e(w)}{\varepsilon(w)} < 1 \qquad (7)$$

This ratio must be less than unity since the labour demand elasticity e is negative and the incremental utility elasticity is positive.[6] So we see that the employer's share of surplus is always greater on the labour demand curve than on the contract curve. QED

We can understand this result through examination of the necessary condition for the bargaining solution (2) which tells us that the division of incremental utility is determined not only by the ratio of bargaining strengths, but also by the marginal rate of transformation of utility along the bargaining frontier. A down-sloping labour demand curve threatens workers with loss of jobs if they win a higher wage, so putting workers at a disadvantage relative to the employer who chooses employment optimally. We can see from (7) that the greater is the threat of job losses along the labour demand curve (the greater the absolute value of the labour demand elasticity e) the more pronounced is the shift in the division of surplus in the employer's favour if bargaining is switched from the contract curve to the labour demand curve. This shift in favour of the employer is also the more pronounced the greater the emphasis that workers put on jobs (i.e. the greater the degree of risk- or inequality-aversion, or the lower the value of ε).

Now, in order to argue that employers earn higher profits by bargaining over the wage alone, it is not enough to demonstrate that the employer can thus win a larger share of surplus; for the size of the surplus varies with the level of output and employment.

Surplus is $S(L) \equiv \pi(w,L) + L.(w-\bar{w}) = R(L) - \bar{w}.L - F$

A convenient benchmark case for analysis is when the workers' are risk- or inequality-neutral. In this case we

can write $u(w) = w$ and the union's maximand is the wage-surplus $L.(w-\bar{w})$. Since both union and employer want to maximise their portion of surplus, it is evident that any efficient bargain must maximise the total surplus. Surplus is divided between employer and workers in direct proportion to their bargaining strengths (see (4), with r=0). In this case we can show the following proposition to be true:

if a) the union is risk-neutral;

b) the bargaining outcome meets the asymmetric Nash condition;

c) the labour demand curve is linear or concave;

then the employer wins a higher level of profit by bargaining over the wage alone rather than over wages and jobs.

PROOF

It is convenient to normalise the level of employment L so that the efficient level of employment $R'(\bar{w}) = 1$. So bargaining over both jobs and wages will yield:

Surplus $\quad S^e = S(1) = R(1) - \bar{w} - F$

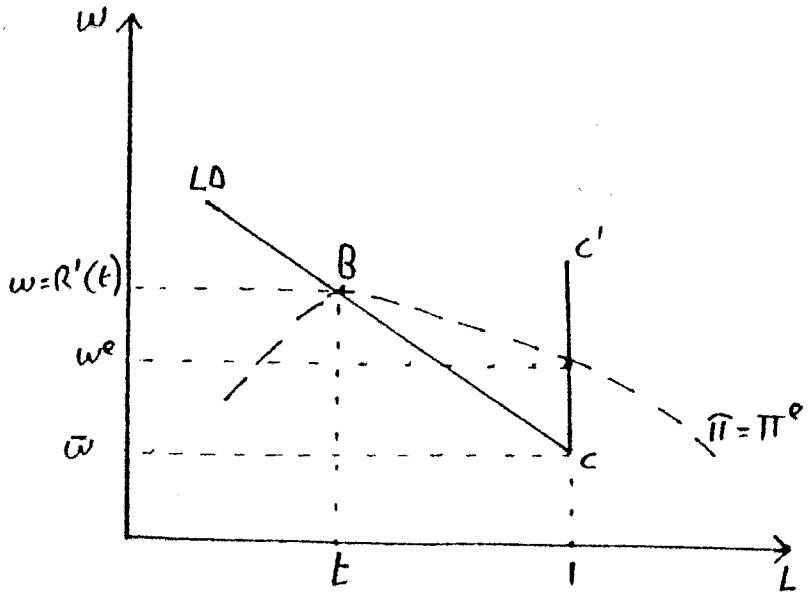
Profit $\quad \pi^e = (1-b).S^e$

Wage $\quad w^e = \bar{w} + b.S^e$

Consider the point B on the labour demand curve where the employer would earn the same profit π^e (see diagram 2). Let employment at this point be t, so the wage is $w = R'(t)$. Using (5) we can compute the marginal rate of transformation

DIAGRAM 2

COMPARISON OF A BARGAIN ON THE (VERTICAL) CONTRACT CURVE WITH THE ISO-PROFIT POINT ON THE LABOUR DEMAND CURVE



LDC = labour demand curve

C'C = contract curve

of utility along the labour demand curve at point B as:

$$M(t) \equiv \frac{-P'(t)}{U'(t)} = \frac{t.R''(t)}{t.R''(t) + (w-\bar{w})}$$

and the division of surplus at this point is:

$$D(t) \equiv \frac{P(t)}{U(t)} = \frac{(1-b).\ S^e}{t.(w-\bar{w})}$$

We can now compute the ratio of the elasticities of wage and profit surplus along the labour demand curve - which ratio would be equal to the ratio of bargaining strengths if this were the solution point to bargaining over the wage.

$$\frac{D(t)}{M(t)} \cdot \frac{b}{1-b} = \frac{b.S^e}{(w-\bar{w})t} \cdot \frac{(t.R''(t) + (w-\bar{w}))}{t.R''(t)}$$

or

$$\frac{D(t)}{M(t)} \cdot \frac{b}{1-b} = \frac{(w^e - \bar{w})}{(w-\bar{w})} \cdot \left[1 - \frac{t(t-1)R''(t) - (R'(t)-R'(1))}{t^2.R''(t)}\right] \qquad (8)$$

We know that $w^e<w$, so the value of the first term in (8) must be less than unity. Note that $R''(t)$ is the slope of the labour demand curve at point B. If the labour demand curve is linear or concave (if $R'''(L)\leq 0$, $Lc(t,1)$) then we know that:

$$R''(t).(t-1) \leq R'(t) - R'(1)$$

and, since $t<1$,

$$t.(t-1).R''(t) < R'(t) - R'(1)$$

So the value of the second term in (8) must also be less than

unity.

$$\therefore \quad \frac{-P(t)}{P'(t)} \cdot \frac{U'(t)}{U(t)} < (1-b)/b \qquad (9)$$

This result tells us that the ratio of the elasticities at point B is less than the ratio of bargaining strengths. In terms of Svejnar's (1984) exposition of the bargaining process, if the deal represented by point B is proposed by the union which is bargaining over the wage only, then the employers would find that their bargaining power relative to their fear of disagreement (measured by the ratio $P(t) / P'(t)$) is greater than the union's bargaining power relative to its fear of disagreement; so the employer would be able to win a better deal further down the labour demand curve, where they would make more profit than they can make through bargaining on the contract curve. QED.[7]

Note that while this result must hold if the labour demand curve is linear or concave and if the union is risk-neutral, it may well hold more generally. For instance, even if $R'''(L)>0$, so that inequality (8A) is reversed, inequality (8B) may still be satisfied. Even if this inequality is reversed, so that the second term in (8) is greater than unity, the first term may be small enough to maintain the result. Given the more general result that, with constant relative risk-aversion, employers' share of surplus is always higher on the labour demand curve, it seems reasonable to conclude that there is a general presumption

that bargaining on the labour demand curve will be more profitable for employers than bargaining on the contract curve.

3. CONCLUSIONS

I have examined situations which are plausible representations of union-employer bargaining in which employers will win a larger share of surplus if they keep employment out of the bargain, and they will often increase the level of profits too. The threat of job losses is a potent bargaining counter against workers who are concerned about the risk of losing their own jobs and/or the threat to the jobs of their actual and potential fellow workers.

The implication of this analysis is that there will usually be conflict between unions and employers over whether or not to include employment in the scope of bargaining. The tradition that employers retain the power to set employment levels unilaterally is one which we may expect employers to guard jealously.[8]

This analysis begs the question of who defines which variables will be the subject of bargaining. The Nash bargaining model simply treats the scope of bargaining as exogenous (as it treats the setting of each side's threat point). The bargaining parameter (b) captures only one dimension of power - the division of surplus within the exogenous constraints. The ability to set the scope of

bargaining should be recognised as another dimension of bargaining power.[9] So we may interpret evidence that employers bargain over wages alone as an indication of employers' power, and evidence of bargaining over jobs as some indication of workers' power.

An obvious implication of this argument is that we should observe a wider prevalence of bargaining over jobs when workers are strong and able to win substantial concessions out of employers - and that employers should return to unilateral employment-setting when workers' bargaining strength is relatively weak. However, to the extent that workers' strength is negatively related to the level of unemployment, a counter-tendency is implied : when unemployment is high we might expect workers to be relatively more concerned about jobs, but they lack the power to win job deals; on the other hand, when unemployment is low and workers are able to win job guarantees, they may be relatively unconcerned about job levels, expecting little trouble in finding employment elsewhere, with the result that the contract curve will be closer to the labour demand curve and it may be difficult to observe significant effects of job bargaining. This is not to argue that the thesis that employers prefer not to bargain over jobs is empirically untestable! Rather, the implication is that cyclical evidence may reflect the two opposing tendencies of incentive and ability to win job deals; so we should perhaps look to other sources of variation in workers' bargaining strength - either in cross-sectional studies or in secular trends - in order to pick up the effect on the prevalence of bargaining over employment.

FOOTNOTES

1. There is a further argument why even non-altruistic workers should be concerned about the threat of job losses to fellow workers - an argument put forward by J. Seade at a Warwick University seminar - namely that the median union voter is short-sighted if she/he presses for pay rises irrespective of the threat to job losses to others; for if jobs are lost in this round of bargaining, she will lose her position as median voter and may be overruled in future bargaining rounds.

2. See, for instance, de Menil (1971), McDonald and Solow (1981), Svejnar (1984). The case where the union is indifferent to the level of overall employment, where $V(L,w) = w$, can be seen as the limiting case as the union's degree of risk-loving approaches infinity.

3. As $r \to -\infty$, indifference curves become horizontal and workers' collective utility is a function of the wage only. (See footnote 2).

4. The bargaining power parameter b is treated as exogenous. One might hypothesise that its proximate determinants include labour relations legislation and history, the level and rate of change of unemployment, and the size, resources and organisational structure of unions and employers.

5. Discounting the trivial case where workers have no bargaining power at all, $b = 0$.

6. We can see that in the limiting-case of risk-loving, as $\varepsilon \to \infty$, the division of surplus is the same on the labour demand curve as on the contract curve. This indeed is the case analysed by Oswald (1984) where workers are indifferent to the level of employment and the contract curve is the labour demand curve. Note that in this case it is easy to show that the division of surplus equals the ratio of bargaining strengths.

7. This last argument can be shown more formally. We can ignore the trivial case where the iso-profit point B is on a section of the labour demand curve where union utility is an increasing function of employment, in which case a move down the labour demand curve is an improvement for both parties. So we are concerned only with cases where $U'(t)$ is negative. Of course, $P'(t)$ is positive, so we know that the ratio $P(t) / U(t)$ is an increasing function of t .

We can also show that the ratio $-U'(t)/P'(t)$ is an increasing function. Given the assumption that $u''(w) = 0$, we can write (5) :

$$P'(t) = -t.R''(t) > 0 \quad ; \quad \text{and} \quad -U'(t) = -t.R''(t) - (R'(t) - \bar{w}) > 0$$

$$\frac{d}{dt}(-U'(t)/P'(t)) = \frac{d}{dt}\left(1 + \frac{R'(t) - \bar{w}^*}{t.R''}\right) = \frac{t.R''.R'' - (R' - \bar{w}).(t.R''' + R'')}{(t.R'')^2} >$$

which ratio must be positive given the assumptions that R"( ) and R"'( ) are negative. So, since the term on the left of inequality (9) is the product of two functions of t which are both positive and increasing, this term must itself be an increasing function at point B and along all relevant sections of the labour demand curve. So the necessary bargaining condition can be satisfied only when employment is greater than t , i.e. lower down the labour demand curve where profits are higher.

8. The power to determine employment levels is of course a quite separate issue from employers' power to discipline and hire and fire individual workers.

9. Likewise, the ability to influence the bargaining threat points is another dimension of power. For instance, Osborne (1984) models a symmetric Nash bargain over the wage where employers can alter their own minimum profit constraint by influencing the size of the pool of unemployed workers. (An alternative approach would have been to allow the number of unemployed to affect the explicit bargaining power parameter in the asymmetric model.) We could also consider employers' ability to alter their threat point by adjusting the capital structure of the firm - e.g. by borrowing against expected surplus profits - in which case the threat of bankruptcy would raise the minimum profit constraint.

Alternatively, owners of a firm might lease/franchise/sell their assets at a price which capitalises expected surplus. Either strategy might be used to adjust the minimum profit constraint and effectively remove surplus from the bargaining arena - an argument put forward by Cowling (1982, p.114) in relation to worker-controlled firms.

10. Svejnar (1984, p.17) finds in his empirical study of bargaining in a sample of unionised US corporations that "union bargaining power is affected ... postively by unemployment". He points out that this result is a corollary of the observation that the union-nonunion wage differential varies positively with unemployment. But there is no explanation why unemployment should increase workers' bargaining power when there is an obvious expectation that unemployment should have the reverse effect by offering employers a pool of potential strike-breakers. It is possible that his finding is the result of inter-temporal wage contracts (implicit or explicit) which provide some cushioning against cyclical fluctuations in the wages of unionised workers.

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